

# HAM

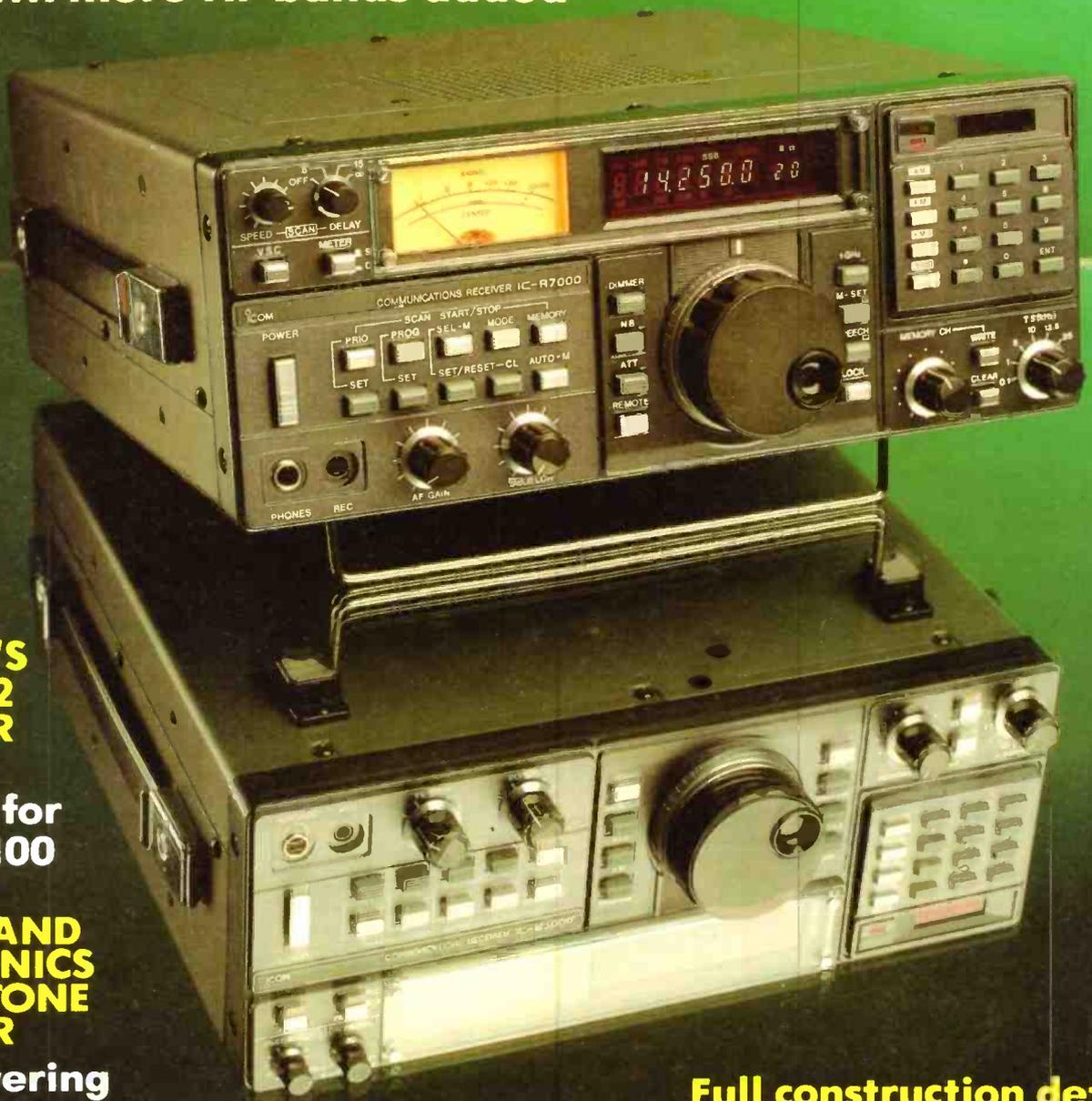
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FEBRUARY 1989 £1.40

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# TODAY

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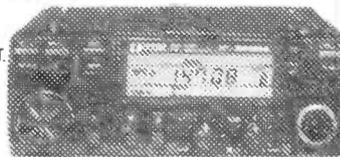
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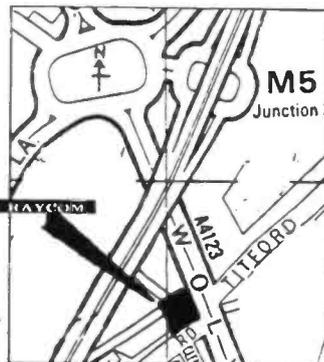
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VOLUME 7 NO 2 FEBRUARY 1989

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*Part 2 of Tuning back the Clock will appear in the March issue.*

## TX-3 RTTY/CW/ASCII TRANSCEIVE

The high performance, low cost system

Split-screen, type-ahead operation, receive screen unwrap, 24 large memories, clock, review store, callsign capture, RTTY auto CR/LF, CW software filtering and much more. Needs interface or T.U. **BBC-B/Master** and **CBM64** tape £20, disc £22. **Spectrum** tape £35, +3 disc £37 inc. adaptor board (needs interface/TU also).

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

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

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

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From, Upper Llandwrog, Caernarfon LL54 7RF.  
Tel: 0286 881886



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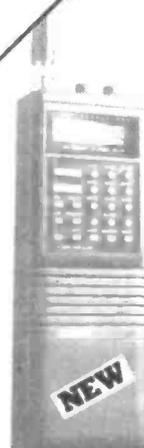
Probably our most popular handheld scanner with 16 memory channels and selectable AM/FM reception. Very sensitive receiver covering:-  
26-30MHz, 50-88MHz,  
115-178MHz, 200-280MHz,  
360-520MHz (approx)

£235

## 200 XLT Bearcat

Handheld scanner with 200 channels of memory scan covering:- 29-54 Mhz,  
118-174 Mhz, 405-512 Mhz,  
806-956 Mhz

£249



## Bearcat 210 XW

NEW Base station scanning Rx with 20 channel memory scan covering: 30-50MHz,  
136-174MHz, 406-512 MHz,  
12 Volt or mains

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## 55 XLT Bearcat

A super NEW low cost handheld scanner with 10 memories and covers:-  
29-54 MHz, 136-174 MHz,  
406-512MHz

£99<sup>99</sup>



## Bearcat 800 XLT

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

£229

## NEW 580 XLT Bearcat

100 Memory channels covers:  
29-54 MHz, 118-174, 410-512 MHz

£199 Requires 12V DC supply

## JUST ARRIVED Bearcat 950 XLT

Mobile scanner with 100 memory channels and 900 MHz band.

Covers: 29-54 MHz, 118-174 MHz,  
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Features Fast Scan 15 channels/second and folding stand for table top use. For home use requires 12V DC supply.

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# RADIO TODAY

## Riding Over the Waves

An updated list of Radio Clubs meeting in South Yorkshire has been issued by the RSGB Regional Liaison Officer for South Yorkshire, Ian Abel G3ZHI, who can be contacted at 52 Hollytree Avenue, Maltby, Rotherham, Yorks, Tel. (0709) 814911. These are as follows (meeting start around 7.30pm unless otherwise stated):

**Maltby A.R.S.** K Johnson G1PQW, 20 Rolling Dales Close, Maltby, Rotherham (Rotherham 814135). Meets Fridays Hellaby Community Hall, Hellaby, Nr Maltby.

**Mexborough A.R.S.** D. Thomas G6FUM 48 Earlsmere Ave, Balby, Doncaster (Doncaster 859654). Meets Fridays Harrop Hall, Mexborough.

**Sheffield A.R.C.** Alan Pemberton G0ILG PO BOX 73, Sheffield (Sheffield 670866). Meets Mondays Firth Park Pavillion, Firth Park, Sheffield.

**Barnsley A.R.C.** Ernie Bailey G4LUE 8 Hild Ave, Cudworth, Barnsley. Meets alternative Mondays Monk Bretton Training Centre, Burton Rd, Monk Bretton).

**Hoyland A.R.C.** M Wardle G0GDC 11 Sokell Ave, Wombwell Ave, Barnsley. Meets Wednesdays West Bank House, West St, Hoyland.

**Rotherham A.R.C.** F. Moody G0FNR 87 Whitegatewalk, Rockingham. Est, Rotherham (Rotherham 552925). Meets alternative Wednesdays Church Hall opp 'Pike and Heron' Bawtry Rd, Tinsley, Sheffield.

**Doncaster Radio A.R.C.** K. McMahon G8JJR 5 Cross Gates, Wadworth, Doncaster (Doncaster 852938). Meets Mondays Corporation Brewery Taps, Cleveland St, Doncaster.

**Sheffield Packet Group P.** Green G4PHL 6 Yews Close, Worrel, Sheffield. Meets Tuesdays Rugby Club Stocksbridge (Start 8.30pm).

**U.K. FM Group Northern L.** Laughton, G4UNA, Claremont, Mail St, East Ardsley, Wakefield, W. Yorks. Meets first Sunday in the month Dove Inn, Doncaster Rd, Barnsley.

## SSTV Software

*ICS Electronics have introduced an Amiga-SSTV software package for the Commodore Amiga, produced by Volker Wertich Hard and Software Co of West Germany, for whom ICS are the sole UK importers. Amiga-SSTV is the follow-up to the Amiga-Fax software and interface. By the same writer as the earlier program, and using the same interface card, Amiga-SSTV implements all the common amateur SSTV protocols in colour and black and white, and can send and receive images. Images can be generated from paint files, or from a TV camera via a digitiser.*

*Amiga-SSTV costs £99.95 inc VAT plus £2.50 p&p. To upgrade from Amiga-Fax, the cost is £59.95.*

*ICS remind us that the Amiga costs only £399.95 now and is very good value as an SSTV station.*

*Details from ICS Electronics, PO Box 2, Arundel, W. Sussex BN18 0NX.*

## Kenwood add-on

American company International Radio Inc. have recently released two further devices to their line of accessories for the Kenwood TS-940 and its relations.

The first is a tuning upgrader which allows the TS-940, TS-440 or TS-930 to have three automatically selected tuning rates, adding a 2.6kHz/5kHz (operator selectable) scan per rotation of the tuning pot to the radio's stock 10kHz-per-rotation and high-speed functions. The slow speed acts as a fine-tuner, say ICI.

The upgraders include a speed LED which lights up when the unit leaves slow speed. The same indicator function can be done via the meter light, which would unlight in medium- and high-speed modes.

Installation of the upgrader for the TS-440 requires a track cut and two or more solder connections with a low-wattage pencil iron. Full instructions are included. Installation in the TS-440 requires some soldering. Installation in the TS-940 unit needs no cuts or soldering and mounts in an easily accessible area of the radio. ICI say that you may wish to restore radios which already have the 5kHz/rotation mod to take full advantage of the add-on, but do not need to do so in order to use it.

All these units use low-power Cmos circuitry, come with a six-month warranty, cost \$34.00 each plus carriage, and should be available by the time you read this. ICI will install the units for \$22.00 plus carriage. Prices given here are USA prices; you should write to ICI for information about currency payments and carriage costs overseas.

Order the units as Model number TU-440-541 (TS-440), TU-940-539 (TS-940) or TU-930-540 (TS-930). Upgraders are in the pipeline for the TS-430, Yaesu FT-757 and FT-980, "and others".

ICI have also released a memory bank controller for the Kenwood TS-940 which is designed to be used with a voice synthesiser. "The Bank Controller II is not made to replace the Bank Controller I", say ICI (I can see the nomenclature causing misunderstandings, even so...). "it is made for owners who desire the convenience or a front panel memory bank control without having to access the memory bank slide switch under the top panel sliding hatch, and who have, or plan to have, a voice synthesiser."

The Bank Controller II is operated by pushing the Voice Button control to have it step the radio to the next memory bank, and (via the voice synthesiser) to announce which memory bank is selected (user-defeatable). If the button is tapped twice sharply, the radio will stay in the same memory, and the voice synthesiser will announce the frequency and memory bank.

The Bank Controller II connects to the voice synthesiser without soldering or modification. It has its own lithium back-up battery and uses low-power Cmos circuitry. It operates quite happily without a voice synthesiser (no sound, of course), and comes wired and tested with a six-month guarantee and instructions. US prices are \$49.95 plus carriage.

For more information contact International Radio Inc., 751 South Macedo Blvd., Port St. Lucie, FL 34983, USA. Tel. (US overseas code) +407 879 6868.

## 2m and On The Air

The photograph (above) shows the new Azden PCS-6000 2m mobile from Waters and Stanton. The PCS-6000 has extended coverage in the VHF FM band up to 174MHz, and can also receive the aircraft AM band from 118 to 136MHz. highly unusual. AM reception is undertaken by a different module within the transceiver, so there is no compromise between the two bands.

The transceiver gives 25W of FM output between 144-146MHz, and received between 118 and 174MHz. Features include the usual scanning modes, 20 memories, priority channel, temporary memo channel, reverse repeater, etc. Each memory channel can take a range of data such as auto toneburst, repeater shift and so on. For monitoring outside the amateur band, each memory channel can have a separate repeater shift programmed into it. For example, one memory could have a 600kHz shift for 2m, the next 4.6MHz for marine, and so on.

More information from Waters and Stanton, 18-20 Main Road, Hockley, Essex SS5 4QS. Tel: 0202 206835.



## Merry Men Offer Awards

The Mansfield Amateur Radio Society has recently released details of its Sherwood Forest Award for operation around Nottingham.

The Award is available to all licenced radio Amateurs and short wave listeners (on a 'heard' basis) from 1st January 1982.

A total of 30 points are required to claim the basic Award. These can be gained as follows:

One point per station worked or heard in Nottinghamshire.

Two points per Mansfield ARS member station worked or heard.

Five points for working or hearing the Mansfield ARS stations G3GQC and G1GQC.

All permitted bands and modes may be used. Working or hearing a station logged in one band or mode on a different band or mode is not counted.

Proof of contact or hearing may be requested. A full list of current licenced members of the Mansfield ARS is available from the awards manager on receipt of an SAE.

To claim the Award, send your log details together with the fee of £1.50 inclusive of postage to the Mansfield Amateur Radio Society Awards Manager, A. Gibbins G4GNC, 52 Wheatfield Crescent, Mansfield Woodhouse, Mansfield Notts. NG19 9HQ.

Mansfield ARS meets on the second and fourth Friday of the month at the Westfield Folk House, Westfield Lane, Mansfield, at 7.30pm. The annual subscription is £5, the club has a full program of lectures, demonstrations and activities, and welcomes anyone interested in Amateur radio and short wave listening.

For information about the Society, call the Secretary, Keith Lawson on Mansfield 642719.

## New QTHs

We have two change of address announcements for radio societies this month, and can only regret that the postal strike prevented us from publishing them sooner.

Firstly, the QTI Talking Newspaper Association for blind radio Amateurs worldwide has moved its offices from Sheffield to those of its new chairman, Mr. Longley, 7 Anderson Close, Lancaster LA1 3JE.

Secondly, Bob Andrews G1JZJ, who runs the British Amateur Radio Teleprinter Group (GB2ATG) has moved to 52 Linridge Road, Erdington, Birmingham B23 7HX. GB2ATG is one of the few Amateur radio news broadcast services in the UK.

Please send items of Amateur radio news for possible transmission to Bob. Items about data activity (RITTY, Amtor, Packet, Fax) are particularly welcomed.

GB2ATG is transmitted during the first and third Sunday of each month on 3.590MHz, 14.09MHz and 144.600MHz. It is operated by a group of volunteers, and changes in schedule are published by the Group's quarterly journal *Datacom*.

Bob is also looking for more volunteers to transmit the station.

Membership for the calendar year 1988 is £8 (UK). Please contact Pat Beedie GW6MOJ, Ffynnonlas, Salem, Llandeilo, Dyfed SA19 7NP. Tel. 0558 822286.

## CQ, CQ, Raise Your Glasses

The Scottish Tourist Board (Radio Amateur) Expedition Group has now been formed and will be active in 1989. The group's purpose will be to activate amateur radio stations from locations that are unusual, historic or 'pertaining to any aspect of Scotland'; and to make the public more aware of amateur radio by opening all its stations to the public. So far, the group hopes to set up stations in

a world heritage site, an island, a Robert Burns site, an unusual castle, an aircraft museum, and two malt whisky distilleries. Start queuing . . .

A full list of events will be issued by the group in February. Please send return postage to the group, presently c/o John McGill, GM3MTH, 9 Ramsay Road, Coatbridge, Strathclyde ML5 5RE. The group hopes to be able to issue colour certificates for working a minimum of three stations, eventually. Watch this page for more information.

GB2



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TNA PSE QSL DIRECT VIA RSGB

## Rapid Reload Battery Clip

Components supplier Bulgin have added a panel mounting battery holder taking four AA (R6) size cells to its range.

The holder, serial number BX0027 has a removable, latching, loading magazine and

2.8mm series tabs/solder tags. Four tab/tags can be wired in series or in two parallel pairs. One-PP3 (BX0023) and two-PP3 (BX0026) size holders are also available with removable magazines.

Bulgin & Co. are at Bypass Road, Barking, Essex IG11 0AZ. Tel. 01-594-6913.

### Raycom in DTI Quandry

Raycom Communications Systems have been caught in the crossfire in a dispute with the DTI about the importing of the Uniden 2830 (amateur band 28-30MHz) transceiver.

Ray Withers, Managing Director of Raycom, contends that the DTI is, by its actions, implying that Raycom has been dealing in illegal equipment. "In view of the fact that this company has at all times sold the 2830 as an amateur radio, and the fact that we have never sold or marketed CB radios, I take exception to the fact that we are accused of dealing in illegal CB radio," Withers says.

The Uniden 2830, which is factory preset to 28-30MHz, has been imported by Uniden as an amateur radio and "should never have been classified as a CB radio" following recent changes in the legislation covering sets on those frequencies. The changes, ironically, were supposed to protect the interests of amateurs rather than undermine them.

The Wireless Telegraphy (Control of Manufacture and Importation) Order 1982 (SI 1982 No. 636) prohibited manufacture and importation of all apparatus capable of transmitting in the frequency band 26.1MHz to 29.7MHz unless it complied with performance specification MPT 1320. Behind this lay the desire to prevent CB users from adapting more powerful and versatile amateur equipment in adjacent bands for illegal CB use.

The new order, the Wireless Telegraphy (Citizens Band and Amateur Apparatus) (Various Provisions) order 1988 (SI 1988 No. 1215) revoked the previous Order and, while it made it illegal to manufacture, import, advertise, sell, possess or use CB radio apparatus designed to transmit in the frequency band 26.1MHz to 28MHz unless it complied with Specification MPT 1320 (UK) or MPT 1333 (CEPT), it actually relaxes controls on the importation and manufacture of amateur equipment

operating in the frequency band 28-29.7MHz, provided the apparatus is designed or adapted to operate on one or more other amateur bands.

Says the DTI: "This is to allow more effective control of illegal CB apparatus and is not intended to restrict the activities of responsible licensed amateurs. However, so as not to allow a loophole whereby amateur apparatus could be cheaply adapted for illegal CB activity, a restriction on the manufacture and importation of 28-29.7MHz single band amateur apparatus remains."

During recent visits by representatives of local branches of the DTI Radio Investigation Service to various radio suppliers, equipment has been removed as not complying with current regulations. Raycom was not one of the firms affected, but are now in a position where stocks their own custom transverters, worth £10,000, are lying dormant. Further legislation clarifying amateur use is projected, but not yet resolved.

The DTI's attention has been drawn to the Uniden 2830 by the fact that the 2030 is also marketed, with the same specification, as the President Lincoln Professional Citizen Band and Amateur Radio, and is easily convertible to 26-28MHz. This version was apparently intended for the European market and only appeared in the UK due to shortages of the 2830.

The DTI is at the time of writing putting urgent and serious consideration into clarifying the situation and freeing radio amateurs as far as possible from inconvenience caused by anti-illegal CB legislation.

It remains to be seen where the Uniden 2830 and suppliers committed to it, like Raycom, will stand. Says Ray Withers: "The local areas were responding to a directive sent out from Wellington Road (the DTI Radio Investigation Service head offices) saying these radio are illegal. The trouble is that

### Dominating The Landscape

Willows may weep, but the mighty Diamond X500 "Dominador" dual band vertical could be laughing. Standing a minimum of 5.2m high, it provides 8.3dB of gain on 2m and 11.7dB on 70cm compared with a quarter-wave. Fully encapsulated in white fibre glass, it gives 200W of power handling, and with C-loading it is the equivalent of three 5/8th antennas on 2m and eight 5/8th antennas on 70cm. The VSWR is given as better than 1.5:1 across both bands (144-146MHz and 430-440MHz), and as a typical 1.1:1 at the centre frequency.

The ERP compared with a quarter-wave, running 25W, is approximately 200W on 2m and 400W on 70 cm. A groundplane of 3 radials is incorporated, and the base socket is an N-type for low losses. The complete antenna comes with all necessary hardware for masts up to 2.25in in diameter, including spanners, and breaks down into three sections for transport. Limited numbers available from stock, price £129, inc VAT.

More information from Waters and Stanton, 18-20 Main Road, Hockley, Essex SS5 4QS Tel: 0202 206835.

### Erratum

CAT Interface, November 1988.

A statement was omitted from the program line on page 25: the complete line should read:

```
10 REPEAT;PRINT TAB(5,5) ADVAL(1) DIV 16:REPEAT:  
AS=GETS:UNTIL AS<>"":UNTIL FALSE
```



different areas interpreted it in different ways. Our local DTI are very happy about what we are doing. However, Southampton DTI have taken it on themselves to confiscate radios from some dealers. We haven't been busted, but they've knocked down doors elsewhere. They took 400 radios from Uniden, and we've had to withdraw ours from sale. We have £10,000-worth of transverters, which we have been advertising since March, and we can't sell them. We were at the Leicester Show and we couldn't sell the 2830, although there were people there doing so.

"The DTI have decided that these are CB rigs, and this is out of order. They were totally legal when Uniden imported them, and we had no warning about the new legislation, and no chance to put them on ice. It is important that we get the 2830 recognised as a true amateur radio. We've never marketed or sold CB radios. We can account for every unit sold, on a serialised basis."

Withers has supplied various suggestions to the DTI as to how the units can be adapted so that conversion for CB use is impossible. The DTI are looking at these suggestions seriously but, says a representative, "Even if this is effective, it doesn't address the basic problem, which is that at present it is not legal to import these sets. Importing and manufacturing this apparatus without authority has been illegal for the past twenty years. Uniden were obviously not aware of this, because they are a reputable company and if they had been aware, they would have done something about it. The sets do not now conform to the current regulations. We are working on a general authority to allow amateurs to convert legal CB gear without coming to us. A draft is with our lawyers and could be ready in a week or two."

The DTI has consistently made it clear that its intention is not to restrict licensed amateurs. Any individual amateur who wishes to convert a legal CB rig to 28-29.7MHz for his

or her own use can contact the DTI and will, we are told, willingly be given an authority to do so.

The crux of the matter is that, although licensed amateurs can seek and receive permission to convert both legal and illegal CB rigs for amateur use only — and HRT has heard informally that this includes single-band rigs which it is still an offence to import or sell ("I can own it, fit it in my car, use it for amateur operation without breaking any regulations, but nobody can legally import it or legally sell it to me" grumbles one well-informed amateur who has taken it upon himself to look into the matter.) — any rig which remains capable of operating on CB frequencies requires an authority to convert or possess, because it continues to be defined as CB equipment. The Uniden 2830 is set up for single-band amateur operation on 10 metres — itself an offence to import or sell — and is in its present form easily convertible for CB use, while being outside legitimate CB specifications in the UK.

It would seem that the Uniden rig will remain a bone of contention, whatever blanket permission the DTI awards to amateurs to convert CB rigs for their own use, while regulations remain on the import and sale of single-band 10 metre equipment. There are signs that permission to handle the rigs would be given if some way could be found to make conversion to CB use impossible, and the method currently being tried out involves a drill and epoxy resin. We await with interest to see if this is acceptable.

The fight against illegal operation is a serious one, but surely a reputable and established dealer like Raycon, who make an effort to stay on the right side of the law, should not be put suddenly in a position where they cannot sell their stock, so that a substantial quantity of business lies mouldering in the warehouses. It must be hoped that a solution which treats operators and dealers fairly can be worked out in the shortest possible time.

## Paper Round

The 10 Metre FM Group Newsletter opens "... we seem to have slipped a month, but who cares ... when the bend is wide open in JA in the morning and W in the evening." Such dedication to the real thing. The newsletter is dedicated mainly to a DTI letter stating the law as currently applying to 10m conversion. Contact Jim G4XRU, 33 Hayling Rise, Worthing, W. Sussex BN13 3AL.

The Irish Radio Transmitters' Society Amateur Radio Yearbook 1988-1989 is

now out. Its primary functions is to bring the list of Irish call signs, clubs and SWLs up to date as of September. There is also an introduction to amateur radio and a membership form for the IRTS, which can be contacted at PO Box 462, Dublin 9. A5, 44 pages plus cover, glossy, £2.

The Hastings Electronics & Radio Club Newsletter, October 1988, contains articles on RF Feedback, talking to people you have never met before, some history, local reports, and My Shack by G0GTF. Also the best logo in

the business, although we would not encourage reader to follow suite. 14pp, A4, information from Stan Simpson G4ITM, 49 Vicarage Road, Hastings. I notice they've conned an XYL into doing the editing, as well. Many happy hours over a hot typewriter, Sylvia. At least you don't have to deal with (*ffttt — struck by lightning, and it's not even raining . . .*).

## SWL Specialists

Sony UK has nominated 100 dealers around the country as shortwave specialists. The company are

starting a drive to make the public more aware of the opportunities in SWL, and capture that market, which they see as underdeveloped, with their range of SW radios.

## Hunt Slip

Prices quoted for Steve Hunt's UC1332 upconverter board in last month's Radio Today were incorrect: the kit conversion costs £39.50, and the made up board costs £49.50. Contact Steve at 21 Green St., Milton Malsor, Northants NN7 3AT.

## Teledataname

The British Amateur Radio Teleprinter Group have changed their name to the British Amateur Radio Teledata Group, by vote at the Group's AGM.

"We've had 'Teleprinter' in our name since the Group was founded in 1959, and this change was not an action which we took lightly. The change does not mean that BARTG is dropping its interest in the

mechanical teleprinter, but rather that we want to make it clear that BARTG does also cater for AMTOR, packet (ie AX25) and FAX," say the Group.

Will this mean a flood of

new members? UK subs at £10 p/a, Europe, Eire and overseas surface £13, and overseas air mail £18. Membership details from Pat Beedie GW6MOJ, "Ffynnonias", Salem, Llandeilo, Dyfed SA19 7NP.

# VHF/UHF FM Handhelds

If you want a handheld with exceptional features, quality built to last, and a wide variety of interchangeable accessories, take a look at the ICOM range of FM transceivers.

All ICOM Amateur handhelds are supplied with a flexible antenna, rechargeable nicad battery pack and an AC wall charger.



## IC-2E 2 Metre Thumbwheel Handheld

This popular transceiver from ICOM is still available after eight years of production. If you're looking for a straightforward but effective handheld the IC-2E takes some beating. Frequency selection is by means of thumbwheel switches (with 5KHz up switch), with simplex and repeater operation possible. Power output is 1.5 watts or LOW 150 milliwatts (2.5 watts possible with BP5A battery pack).

## MICRO 2E/4E

These micro sized 2 metre and 70 centimetre handhelds give the performance and reliability you expect from ICOM. Measuring only 148 x 50 x 30 the micro fits in your pocket as easily as a cassette tape. The micro features up/down tuning switches for quick frequency changing, 10 programmable memories, LCD readout and 1.5 watts output (2.5 watts possible with BP24 battery pack).

## IC-02E/04E Keypad Handheld

These direct frequency entry handhelds utilise a 16 button keypad allowing easy access to frequencies, memories and scan functions. Ten memories store frequency and offset, a front panel LCD readout indicates frequency, signal strength and transmitter output. Power output is 2.5 watts or LOW 0.5 watt. (5 watt is possible with the BP7 battery pack or external 13.8v D.C.)

## IC-2GE/4GE

The 'G' series of handhelds fulfills the most important criteria for a handheld transceiver, it is small, rugged and easy to operate. The 20 memory channels can store simplex and repeater frequencies and with the several scan functions there is no need to manually search for activity. The 3 watt output and power saver circuit ensures low battery drain. (7 watts is possible with the BP7 battery pack or external 13.8v D.C.)

## IC-12E 23 Centimetres

Similar in style to the 02E/04E this 1296MHz handheld utilizes ICOM's experience in GHz technology, gained by the excellent IC-1271E base station. With the growing number of repeaters on 23cm the IC-12E makes it an ideal band for rag chew contacts. Power output is 1 watt from the standard BP3 battery.

## IC-32E Dual Bander

This exciting new handheld offers 2 metres and 70 centimetres in one compact unit. Tough and splash resistant it offers many features including crossband duplex operation, 20 dual band memories and power saver circuit. The IC-32E utilises most existing ICOM accessories, ideal if you are upgrading from an existing ICOM handheld.

Also available for ICOM handhelds are a large range of optional extras including rechargeable nicad battery packs, dry cell battery cases, desk chargers, headset and boom microphones, leatherette cases and mobile mounting brackets. New products just released: - HM46 miniature speaker/microphone and HS51 lightweight headset/microphone complete with PTT and Vox unit.

**Icom (UK) Ltd.**

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

# Into '89 with Icom

## IC-751A HF All-Band Transceiver



- **Amateur Bands 160m - 10m.**
- **General Coverage Receiver.**
- **105db Dynamic Range.**
- **100W Output (40w A.M.)**
- **32 Memories.**
- **Electronic Keyer.**
- **CW Semi/Full Break-in.**
- **HM36 Microphone.**

The ICOM IC-751A was created for the ham operator who demands high performance whether entering contests, chasing DX or just simply enjoying the shortwave bands. It is an all mode solid state transceiver with a host of features designed for the crowded HF bands of today.

Additional features include passband tuning, 9MHz notch filter, adjustable AGC, noise blanker, RIT and XIT. A receiver pre-amp and attenuator provides additional control when required. The FL32 9MHz/500Hz CW filter is fitted as standard with CW sidetone on Rx and TX modes. On SSB the new FL80 2.4Khz high shape factor filter is fitted.

The transmitter is rated for full 100% duty cycle with a high performance compressor for better audio clarity. With 32 memory channels and twin VFO's, scanning of frequency and memories is possible from the transceiver or the HM36 microphone supplied.

The IC-751A is supplied for 12v operation but can be used with either internal or external A.C. power supply. It is fully compatible with ICOM auto units such as the IC-2KL linear amplifier and the AT500/100 antenna tuners.

Options available:- PS35 internal AC power supply, PS15 external AC power supply, EX310 voice synthesizer, SM8 and SM10 desk microphones and SP3 external loudspeaker.

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

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



# LETTERS

## Letter of the month

We amateurs seem to revel in the use of the 'Q' code — scan the amateur bands and you'll surely a 'Q' something in every other sentence.

The code was devised for International use for Radio Telegraphy and condensed two or three words into one 'Q' symbol.

We seemed to have turned the original concept upside down: using it on the phone bands where it was never thought to be applied, and in so doing, often turning one word into three. A couple of examples: QRX, three words — CUE ARR EX — for one word WAIT. QRN, three words for one word STATIC. Incidentally — to the best of my recollection QRX was one symbol never used in the Pro' world. AS was

the symbol for wait, as of course was 'R' for received or understood.

Somebody who reads this letter is indignantly going to think or say 'but I'm a DXer and for me the Q code is a must'. I agree, well needed on CW but near useless on 'phone especially the Qs ad nauseum on the VHF and even CB.

Maybe we ought to have an Amateur Op' code. If anyone is thinking of it — why not a two letter code? It's served the Royal Navy well for many years.

— **Sam Brown G4ISB, Whitefield, Manchester**

*Good point. What do other people think? — G3YZW*

Every hour two people are killed on our roads and fifty people are seriously injured. The number of collisions is unbelievable.

By all means talk on the radio in a moving vehicle if it gives you some strange pleasure, but please do it from a passenger seat. Driving a potentially lethal car safely requires skill and concentration and the driver's eyes should *never* leave the road while the vehicle is moving. Rule 54 in the Highway Code says do not use a hand-held microphone while your vehicle is moving except in an emergency. Insurance companies take full notice of Code violations.

The most interesting and enjoyable feature of having mobile gear is the ability to drive to various high, clear locations and there enjoy unrestricted radiation.

— **Jack Pemberton G3DOZ, Seaford, E. Sussex**

*I would not wish to advocate anything that might cause an accident, but on the other hand I don't think that operating amateur radio equipment is shown to have caused an accident to date. Has anyone information to the contrary? Use of such things as hand mics is governed by the laws which concern driving with due care and attention, so that if an amateur does have an accident while using a hand mic, he or she will have the book thrown at them and perhaps lose their insurance as well. Proper use of a mobile rig should be no more distracting than the act of driving the car itself, where the driver's eyes have to leave the road, and hands the wheel, just to monitor the car's instruments and mirror, operate the gears, and check the road before manoeuvring. If anyone finds rig operation more demanding and distracting than this,*

## Foul and Grouse

I would like you to print this letter in your next edition of *Ham Radio Today*. I address it to the yobbo and his mate, lost in Oldham between 4 and 4.10 Friday 28th October.

Said yobbo being GO(callsign withheld in case a fake callsign was used. Sadly, we think this was unlikely in the circumstances), who seems to believe that it is acceptable to swear on S20 when his plaintive pleas for direction go unanswered, due, no doubt, to the fact that there was probably nobody on S20 in Oldham at the time who could give him directions.

When at about 4.06 a G4 YL answered him, this foul mouthed yobbo berated her for not answering sooner, as if it was her bounden duty to do so. He did state, forcefully, again swearing heavily, that it would not happen in or around his QTH.

As we can see from the call-book, his callsign has the "particulars withheld", so we can't judge if his "sworn statement" is true . . .

I also make it clear, that I've reported him and his foul language to the authorities, and he should no doubt have had a slapped wrist by now.

— **J D Bolton G4XPP, Timperley, Cheshire.**

*Never mind a slapped wrist. Amateurs who are heard behaving like this on more than the odd isolated occasion should have their licences revoked.*

*Radio amateurs work hard to get their licences, and they should be able to use the bands without fear of abuse.*

*I was lost in Oldham once, come to think of it. I pulled up and asked an Oldhamite the way, which he pleasantly told me. Perhaps the good people of Oldham were hoping that the caller you heard would just go away, and I can't say I blame them. — HPA.*

## Driven to Danger

I am appalled at the tacit encouragement in the Amateur Radio press to operate a radio and drive a car at the same time.

"... Fumbling around the dashboard looking for a tone button when accessing a repeater . . ."

"Using the set while driving is simplicity itself. I rarely needed to take my eyes off the road."

## £10 FOR THE LETTER OF THE MONTH

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

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

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



they should certainly stop it.

For many years, before black box operation became commonplace, it was accepted practice for amateurs to use home constructed hands free microphones. A move back to this method of mobile operation, because of the highway code, is a good thing.  
— G3YZW

### Not-So-Easy Listening

I am writing with reference to the article in the September issue of Ham Radio Today by Chris Lorek, in which he reviewed the AR800E Handy Scanner. My reason for writing is that Mr. Lorek made no mention of the legal position of those who receive transmissions they are not authorised to receive. By the way he mentions a recent court case, he might be considered to be encouraging people to break the law. I say this, because what Judge David Rodwell said at Luton Crown Court was misreported in the press. The interception of calls on mobile telephone systems which have been designated as public telecommunications systems (Cellnet and Vodaphone) under the Telecommunications Act 1984 is an offence under the Interception of Communications Act 1985.

In addition, the unauthorised reception of radio transmissions is an offence under section 5 of the Wireless Telegraphy Act 1949. Section 5(b) makes it an offence for any person who:

"Otherwise than under the authority of the Secretary of State or in the course of his duty as a servant of the Crown, either:

(i) uses any wireless telegraphy apparatus with intent to obtain information as to the contents, sender or addressee of any message (whether sent by means of wireless telegraphy or not) which neither the person using the apparatus nor any person on

whose behalf he is acting is authorised by the Secretary of State to receive; or

(ii) except in the course of legal proceedings or for the purpose of any report thereof, discloses any information as to the contents, sender, addressee of any such message, being information which should not have come to his knowledge but for the use of wireless telegraphy apparatus by him or by another person."

The maximum penalty on conviction for an offence under section 5 of the Act is a fine of £2,000. Furthermore, while we intend to remove, in the near future, the need for a licence for reception of transmissions (except for broadcast television) only under section 1 of the Act, unlicensed reception remains at present an offence which on conviction attracts a penalty of up to £400 fine. The removal of the requirement for a licence will in no way mitigate any offence under section 5 of the Act.  
— J C F Ketchell, Radio Investigation Service.

*This isn't so much a reply as a gloss on J C F Ketchell's letter. A call to the DTI revealed what is on their mind. The problem of SWLs who make a hobby of tracking down restricted service bands — police, military, fire brigade, and other bands which are generally well known to be illegal to monitor and report — and circulating the frequencies "well, almost like train spotters," says J C F wearily, meaning no offence to train spotters, is leading to official anxiety and an increasing number of convictions.*

*Further, the availability of good, cheap receivers and the general lack of any official licence for general short wave listening has led perfectly well-intentioned SWLs to believe that anyone can listen to anything without let or hindrance. One wonders, with a shudder, how many listeners failed to get the point of the cartoon which*

appeared on page 38 of the December's HRT. Um . . .

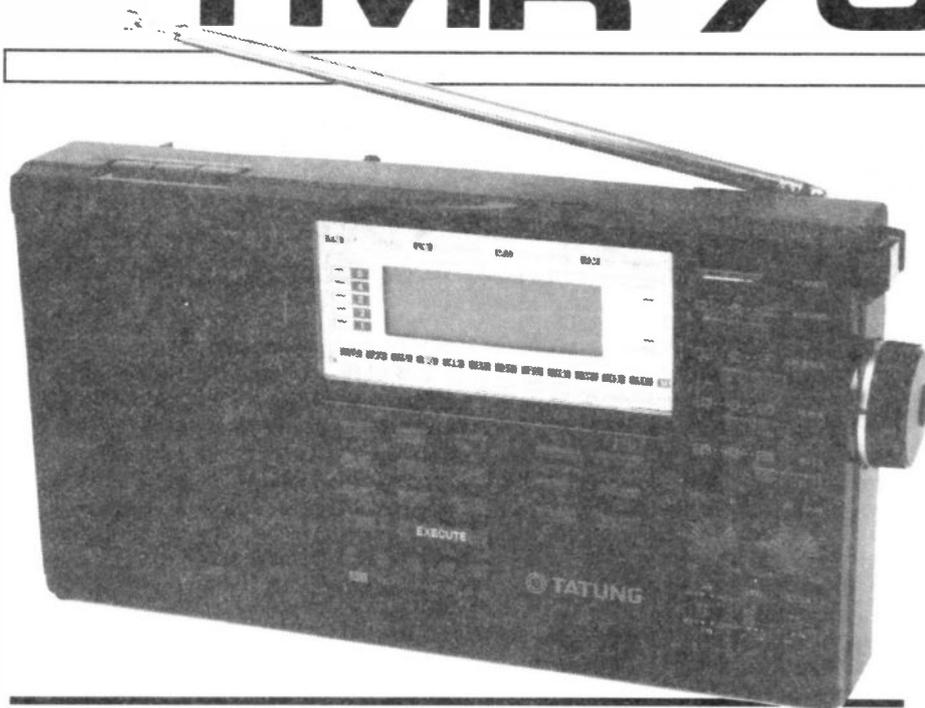
Strictly speaking, reception of any airband, marine band, fire and ambulance services, or other service band by persons not authorised to receive them professionally (or by possession of an amateur licence, where this applies), is against the law. In practice, airband listening, for instance, has been a hobby for decades and does nobody any harm.

The DTI acknowledges this, and is framing legislation to cover the necessary requirements. "The chap who listens to planes taking off is no big problem. We will abolish the notional licence requirements, so that, roughly, it will be OK to buy a receiver and listen to it as long as information is not passed on," says J F C. "Secure things such as the police and MOD, will remain covered by the law governing unauthorised messages. There have been cases recently which are being viewed seriously. There have been fines and one person is being considered for custodial sentence."

Chris Lorek, by the way, was very careful to say that the judge's remarks were reported — he smelt a rat, but wasn't able to follow it up at the time. It is as illegal as ever to listen in to portable 'phone conversations, and will remain so. From the ones I've heard toted by the executives who clutter up the cafes around here in the lunch hour, most poserphone conversations are excruciatingly boring, and we ought to be allowed to pay to stay away from them. — HPA.

We regret that Ham Radio Today cannot reply to queries individually. Every month we publish a section of the most interesting. We will endeavour to answer straightforward queries about the back issues index if readers enclose an SAE and much patience. It helps if letters and back issue enquiries arrive on separate sheets of paper, although the same envelope can be used.

# TATUNG TMR 7602



## *Chris Lorek G4HCL finds an all-band receiver for under £100*

Many SWL newcomers to the HF bands, either prospective amateur or broadcast listeners, simply can't justify the cost of the many hundreds of pounds currently required for one of the latest all-singing all-dancing 'black box' receivers, but likewise don't wish to go along the route of obtaining old or surplus equipment for renovation such as the many pieces of ex-wartime equipment currently in use.

When I first started out I was exactly in this position. After building one or two very simple receivers using 'white spot' (!) transistors I saved hard and eventually sent off for one of the 'World Band' receivers advertised in the newsprint pages. This of course had limitations in tuning, frequency stability, the lack of a BFO for reception of SSB/CW (this I added internally later), and no such luxuries like an RF gain control or facilities for external aerials (out came the screwdrivers again). How I

would have marvelled at owning the Tatum receiver featured here, selling for just under the £100 mark. In view of this, a phone call quickly brought a review sample to test for any like-minded readers of HRT!

### **Listen to the World**

The set is capable of a variety of uses, ranging from broadcast reception of medium and long wave, the many HF broadcast bands, amateur SSB/CW, and even VHF FM Band 2, indeed stereo reception of the latter is possible if you plug a pair of headphones in, the separate bass and treble slider controls letting you tailor the tonal response to your exact liking. The actual frequency coverage is 150kHz to 29.999MHz in 1kHz minimum tuning steps, together with 87.5MHz to 108MHz in 50kHz steps. Push-buttons allow instant selection of the long wave, medium wave and FM broadcast bands, and repeated

depressions of the SW button cycles the set through the individual HF broadcast band ranges.

Direct frequency entry is possible using the numeric keypad, and a rotary tuning knob mounted on the side of the set complements the panel mounted up/down buttons for further tuning operations once a given frequency has been entered. For reception of SSB/CW, a switchable BFO is fitted, this being used in conjunction with the AM mode of reception. A front panel mounted rotary knob varies the BFO injection frequency to enable LSB and USB reception, an adjacent rotary RF gain control providing a degree of protection from strong signals overcoming the BFO signal, or for general use on other bands when operating in the presence of strong signals. A further degree of interference protection is given by a two-position selectivity for AM use, 6kHz (wide) for general reception of 2.7kHz (narrow) for SSB/CW or AM in crowded band conditions. An adjacent lock switch may be used to guard against accidental frequency shifts caused by inadvertent operation of the tuning knob.

Nine memory channels are provided to allow you to store your favourite stations for quick access. Following any frequency or memory channel entry, the tuned frequency in kHz together with any recalled memory channel number is displayed on a large LCD panel, this always reverting to the current time after a minute or so. Adjacent to this display is a LED bargraph giving an indication of the relative strength of received signals. When switched off, the set's LCD always indicates the current time, and the set may be used as a clock radio to wake you up to the resounding melodies of Radio Tirana or whatever. A snooze timer may also be used to automatically switch the set off after a variable preset interval of between 10 and 90 minutes, a set-



top push button giving an LCD back-light facility for night-time use.

An internal ferrite rod aerial is fitted for MW/LW use, a set-top telescopic aerial being used for the higher frequencies. A side-mounted 3.5mm jack socket is provided for an external aerial connection, a short interface lead terminating in a connection block being provided with the set to enable a quick coax connection to be made without requiring a soldering iron to be wielded. Further sockets are supplied for connection of an ear-phone and tape recorder, and a DC input socket allows an optional AC adaptor to be used when at home to save discharging the set's main batteries, these being six C size cells. A further two AA size cells are also required, to power the control and timer functions of the set, these must always be fitted irrespective of AC adaptor usage.

The set measures approx. 290mm (W) x 160mm (H) x 60mm (D), and comes supplied with a shoulder carrying strap for portable use. A user instruction booklet is provided, together with a very useful Wave Handbook giving a comprehensive country-by-country frequency listing of HF broadcast stations together with a short guide to HF reception techniques. A complete service manual is available as an

optional extra; this was supplied with the review set.

### In Use

When first switching on, after pulling up the telescopic aerial and tapping in a few frequencies of HF broadcast stations it struck me the set was marvellously sensitive and certainly capable of pulling in a great many signals used simply as a portable receiver. In fact coupling an external long wire aerial necessitated the RF gain to be reduced considerably, due to overloading problems which is not surprising given the intended use of the set. Tuning around by using the rotary knob or up/down buttons was not particularly easy, due to the fact that the synthesiser blanked the received signals for a fraction of a second at each step. I must confess I became rather annoyed at this, but when considering the cost of the receiver I felt I shouldn't really complain too much.

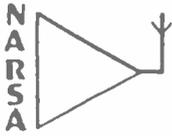
Due to the 1kHz steps, tuning of amateur signals was a delicate process, with the variable BFO being used to interpolate between frequencies. The recovered SSB/CW audio had a noticeable warble superimposed, again due to synthesiser limitations, however this was no worse than some budget radios I have

listened to. A useful facility of the set for broadcast reception was a start/stop mode, where a depression of the relevant button set the receiver scanning upwards in frequency, stopping when it found a signal. The steps used in the receiver were 1kHz when placed in AM mode, and 9kHz when MW had been selected, the latter being switchable to 10kHz steps if required for use with some countries.

### Conclusions

Overall I feel the set exhibits very good value indeed for its current price of just under £100. As I said previously I wish something like this had been around when I was first starting out as an SWL! Its performance is certainly *not* up to that found on the other (far more expensive) receivers, but as a beginner's set or as a general-coverage receiver for broadcast listening on a budget it is certainly worthwhile of very serious consideration. It is interesting to note that an apparently identical set both inside and out but retailing under a different name, is available on the high street at around £30 more than the Tatung set, you pay your money and takes your choice!

*My thanks go to Johnsons Short-wave for the loan of the review set.*



# NORBRECK RADIO AND ELECTRONICS EXHIBITION

by the Northern Amateur Radio Societies Association

at the

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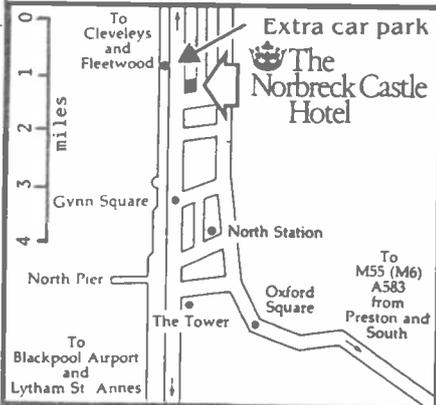
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# Icom IC-R7000

## Review

Many a keen VHF/UHF listener must have gazed longingly at the Icom IC-R7000 receiver, currently being the 'top of the range' of amateur scanner receivers with a price tag to suit. I

fitted 100MHz upconverter in circuit, the set's display at the same time having its leading '1' blanked giving a correct frequency display as the result. A spare phono coaxial socket

FM (narrow) filter width to either  $\pm 3\text{kHz}$  or  $\pm 7.5\text{kHz}$ . The receiver itself tunes 25MHz-1000MHz range, here Icom only guarantee performance over the confines of the amateur 1296MHz band though. The ARE modification adds the 500kHz-25MHz range, although in practice the set is quite usable right down to 60kHz for reception of stations such as MSE Rugby.

*Chris Lorek tests the top-of-the-range receiver which now goes DC to light!*

know of one or two that have certainly found professional uses, as well as several being used by amateurs seriously interested in studying the various VHF/UHF propagation modes, these amateurs of course always being the first to know of a sporadic-E or Tropospheric 'opening' and working the 'choice' DX!

ARE Communications in Ealing have now taken the set one stage further, not only does it still receive from 25MHz to 2000MHz but also covers the entire HF range from 500kHz upwards. With a tuning range in fact down to 60kHz it certainly offers DC to light coverage!

### Modifications

The set's normal coverage is left unchanged, however a press of the previously-used 'Remote' button on the modified set places an internally-

on the rear of the set is used for the HF aerial input, allowing a separate aerial such as a wire dipole or active whip to be used for HF together with the ubiquitous discone for the higher frequencies. One of the first prototypes of the modified receiver was exhibited at the Leicester exhibition this year, HRT came away with the same exhibition model to test for our readers . . .

### Offerings

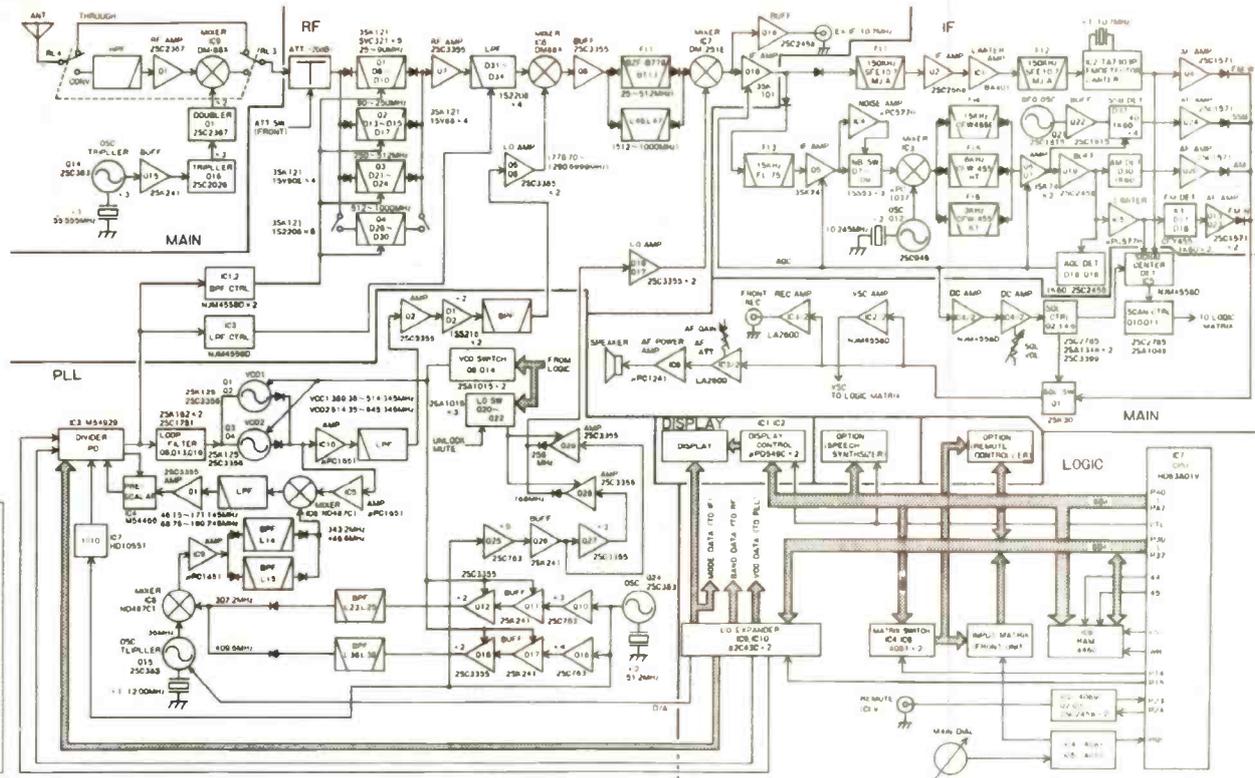
The standard set, having been around for a while will no doubt be familiar to many amateurs, but for others here is a brief overview of its many features. The set is capable of reception on SSB/CW, AM, FM (Narrow band) and FM (Wide band). A rear panel mounted latching pushbutton switches between LSB and USB, an adjacent switch changing the AM/

Tuning is achieved either by direct frequency entry, or by using the main rotary tuning dial, a further control selecting a tuning step rate of 0.1, 1, 5, 10, 12.5 or 25kHz. A small adjacent click-step rotary knob allows selection of the 99 switched memory channels, these may also be accessed by direct channel number entry via the keypad.

### Searching For Someone

Six different types of scan modes are available. Firstly, a priority dual watch scan may be used to alternately keep track of activity on two pre-set frequencies. A programmed scan may be used to search between any two pre-set frequencies, in the user-programmed step sizes, likewise an auto-write memory scan does the same but when finding activity it automatically programs these fre-





The Icom block diagram of the IC-R7000

quencies into memory channels 80-99.

All programmed memories may be scanned for activity, alternatively a selected memory scan may be initiated where only specified channels are sampled. As well as this, a selected mode memory search may also be initiated, where only memory channels stored with the mode in use are sampled. In all cases the scan speed may be continuously varied by the use of a small rotary knob, the hold delay may be switched to zero, 5 seconds, 15 seconds, or infinity by an adjacent rotary switch.

The search in all cases halts when the receiver squelch raises, this being an all-mode function set by the variable squelch control on the front panel. At its threshold position, it acts as a noise squelch for AM and narrow-bandwidth FM. When rotated further, it acts as a carrier strength squelch, the S-Meter needle varying to indicate the signal level required to raise the receiver squelch.

Connection facilities are provided for a remotely-switched tape recorder to record activity, also a wideband ID output is available allowing a panoramic adaptor or RF analyser to give a graphical display of activity and

relative signal levels. For the enthusiast who would like the ultimate in versatility, an optional Icom CT-17 interface may be used to allow your computer's RS-232 line to control the receiver, given suitable software.

The set operates from an AC mains supply, and measures 286mm (W) x 110mm (H) x 276mm (D), weighing 8kg. It comes supplied with an AC power cable, spare fuses, two phono plugs for the ancillary connectors (one of which is used for the HF aerial connection with the ARE HF addition), four jack plugs, and a user instruction manual giving operating instructions and a circuit diagram but no internal servicing information.

### In Use

When I installed the set, it was fascinating to think the receiver sat in front of me was capable of receiving virtually anything floating around on the airwaves. MSF Rugby, TV sound, 23cm SSB, 80m CW, HF broadcasts, 10m FM, 70cm repeaters, the local FM radio stations, the works! My wife Sheila had to drag me away for my Sunday lunch during the first day I had it on test, I found the number of reception capabilities so extensive

that I could quite happily have sat with it tuning around the bands all day.

After an initial period of do-everything listening, I went onto trying to test its capabilities a little in comparison with other receivers. On FM, using both wide and narrow bandwidths it performed quite well, and I noticed little difference in sensitivity from my usual transceivers for each band. 23cm FM was noticeably deaf though, I could only just detect my semi-local 23cm repeater/beacon GB3PS which gives a noisy but perfectly readable signal on my IC120 transceiver.

When using the set on SSB and CW, both HF and VHF, the first thing I certainly found was an apparent roughness on received signals, this being due to superimposed noise on the VCO (Voltage Controlled Oscillator) adding a slight FM noise component to received signals. Following switch-on, the set also took around 15-20 minutes to finally stabilise sufficiently for data reception use on HF, although this fact is pointed out in the instructions accompanying the HF converter. However I believe that the SSB receive facility of the set is not one of its strong points, possibly

being added as an afterthought in the design stages by Icom especially in view of the LSB/USB switch being placed at the rear of the set.

On VHF and UHF this performance could be accepted by many, but because the HF modification up-converts received signals to VHF with similar results I feel the ardent HF listener could be a little disappointed. On bands such as 40m, the limitations in dynamic range were starting to become evident, with the band sounding rather more noisy than usual.

### Insides

The accompanying block diagram shows the general internal circuit arrangement for the benefit of the technical boffins amongst us, a full description being beyond the scope of this brief review. The ARE HF converter addition takes the form of a 100MHz overtone crystal oscillator feeding a standard block diode ring mixer, with on-board filtering and a pair of relays being used for signal and voltage switching. The set supplied used a prototype HF board, but I am told by ARE that professionally made roller tinned PCBs will normally be used.

### Technicalities

When measured in the laboratory, the set showed a reasonable sensitivity across 25MHz-1GHz, but as found on-air was rather down at 23cm. The HF sensitivity was reasonable although tests performed at 28MHz showed the converter had an overall conversion loss rather than a gain. This of course is not a disadvantage as the majority of problems that would generally be encountered on the HF bands are those of strong-signal rejection performance rather than absolute sensitivity limitations.

A further measurement of the 3rd order intermodulation rejection, to test the dynamic range of the HF up-converter, was performed at both 28MHz and 128MHz, with no difference in results, indicating the dynamic range was limited only by the IC-R7000 rather than by the converter. The VHF signal rejection in the HF range was measured as less than 30dB, so beware if you live close to a VHF broadcast station transmitting in the 100MHz-plus region, a

low-pass filter placed in the HF aerial connection lead may be required in such cases.

As a final point, I understand that due to an inadvertent connection fault on the Leicester Exhibition stand, a full 100W of RF power from another transceiver was accidentally fed to the aerial input of the set, yet it survived perfectly, this certainly testing its strong-signal handling capabilities to the limit!

### Conclusions

The ARE HF modification certainly adds to the high degree of versatility that the IC-R7000 already offers, the set becoming a very wide range receiver as a result. The modification does not give the receiver the same performance as would be achieved from a high cost, purpose designed HF receiver such as the

### Laboratory Results

#### Sensitivity

Input level, SSB/CW, required to give 12dB SINAD.

#### HF Coverage

Freq MHz	Signal Level
1.8	0.71 $\mu$ V pd
3.5	0.68 $\mu$ V pd
7.0	0.65 $\mu$ V pd
10.1	0.63 $\mu$ V pd
14.0	0.57 $\mu$ V pd
18.0	0.54 $\mu$ V pd
21.0	0.59 $\mu$ V pd
24.5	0.61 $\mu$ V pd
29.0	0.60 $\mu$ V pd

**Blocking:** Measured as increase over 12dB SINAD level of interfering signal, unmodulated carrier (SSB/CW), causing 6dB degradation in 12dB SINAD on-channel signal, measured at 21.4MHz

+/- 50kHz; 90.5dB  
 +/- 100kHz; 95.0dB  
 +/- 200kHz; 99.5dB

**3rd Order Intermodulation Rejection:** Increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product, measured at 21.4MHz

50/100kHz spacing: 71.5dB  
 100/200kHz: 72.0dB

#### Converter VHF Isolation

Ratio of signal leakage of 114.25MHz when tuned to 14.25MHz:  
 -27.0dB

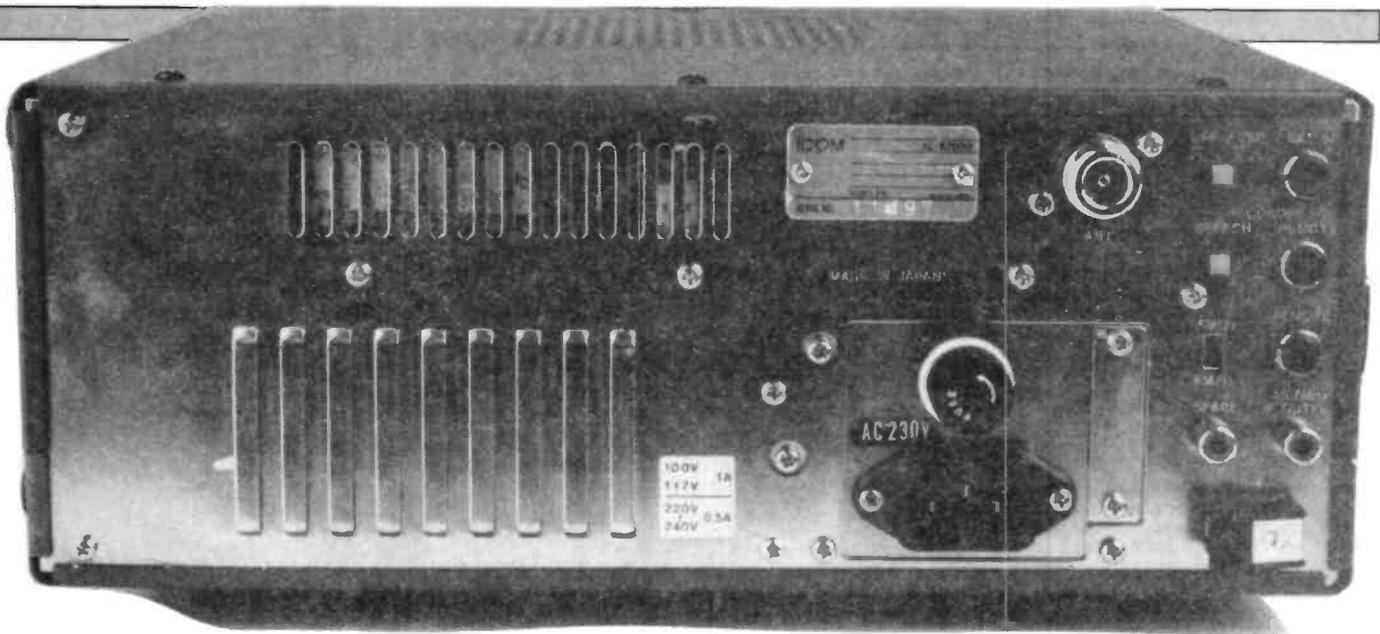
#### S-Meter Sensitivity

Signal input level required to give S9 reading on 14.25MHz:  
 101.2 $\mu$ V pd

#### VHF/UHF Coverage

Freq. MHz	Signal Level
29.0	0.22 $\mu$ V pd
51.0	0.23 $\mu$ V pd
70.0	0.24 $\mu$ V pd
145.0	0.11 $\mu$ V pd (0.32 $\mu$ V pd FMn)
435.0	0.12 $\mu$ V pd (0.34 $\mu$ V pd FMn)
1297.0	1.10 $\mu$ V pd (2.87 $\mu$ V pd FMn)

Selectivity	-3dB	-6dB	+40dB	-60dB
SSB/CW	1.4kHz	2.1kHz	4.6kHz	8.0kHz
AM/FM(N) - 1	6.2kHz	7.6kHz	12.5kHz	47.3kHz
AM/FM(N) - 2	7.8kHz	11.8kHz	21.7kHz	52.3kHz
FM(W)	140.8kHz	168.7kHz	364.0kHz	448.1kHz



Icom IC-R71. But as a relatively low-cost internal addition I feel it could be what many present IC-R7000 owners could find very useful as a retrospective fitment, as well as providing an extremely versatile set for the amateur or listener looking for a new receiver.

The performance on HF is limited

by the VHF performance of the set itself, hence this modification would basically offer similar signal-handling performance as an outboard up-converter such as possibly the Datong unit would provide. Note however the level of VHF signal leakage which may be a problem in some areas, I feel a low pass filter in line with the HF

aerial input would not go amiss with the internal modification.

*ARE have since been in touch to say that all future sets will have a low pass filter on the HF input as standard. My thanks go to ARE Communications in Ealing for the loan of the review equipment.*

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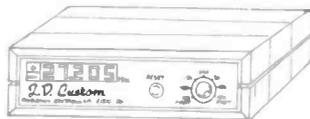
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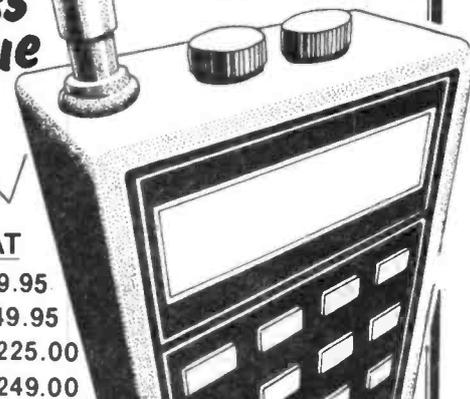


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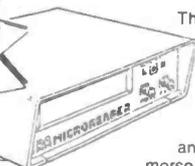
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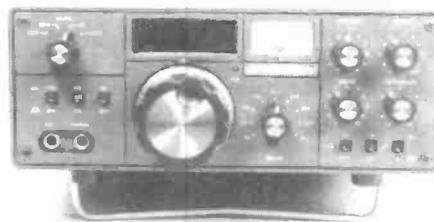
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# Listening On...

*This month, our peripatatic Listener supplies the winter frequencies for the world's stations.*

As most listeners to the broadcast bands will be aware, most short wave radio stations change their frequencies several times a year. At one time, these frequency changes were made roughly every three months, on specific Sundays of the year. These days, however, a number of stations choose instead to change their schedules when they change from local summer time to winter time — and unfortunately there is very little agreement as to when the clocks should be changed! Other stations have decided to simplify things somewhat, and have a schedule which changes very little throughout the year, only changing frequencies

when reception reports indicate that it is really necessary.

However, the result of all this is that generally speaking most short wave stations tend to have a fairly major re-shuffle of frequencies around the end of October or beginning of November, as winter propagation conditions in the Northern Hemisphere mean that higher frequencies do not work as well as they have been doing in the summer and autumn.

In this "Listening On . . ." we give you the winter frequencies schedules of as many stations as possible. All the programmes listed are in English and are either specifi-

cally beamed to Europe, or are well-received, generally speaking, in Europe, even if they are intended primarily for listeners in other continents. Details of the timing of these broadcasts and the frequencies come either from the stations themselves (in the form of printed schedules which they will send out upon request) or from listening checks made in early November. Several stations are obviously missing — eg Radio Prague, Radio Polonia, Warsaw — and this is because as of writing date I have received no details from these stations.

## Winter Frequencies

**Afghanistan.** Radio Afghanistan, Kabul, 1900-1930 on 4760 and 6020 kHz.

**Australia.** Radio Australia, Melbourne, does not broadcast specifically to Europe, but their transmission at 0700-1030 on 9655 kHz is well received most of the year round. (This is one frequency which tends *not* to change with the seasons). Also sometimes audible between 1500-2030 on 6035, 7205 or 7215 kHz.

**Austria.** Radio Austria International, Vienna, has several broadcasts every day in English: 0830-0900, 1230-1300, 1730-1800 and 2230-2300, all on 6155kHz. The broadcasts at 1730, 1830 and 2230 GMT are also on 5945kHz.

**Bangladesh.** Radio Bangladesh, Dhaka, 1230-1300 on 15195 and 17710 kHz. Also 1815-1900 on 7505 and 11510 kHz.

**Belgium.** The BRT (Belgian Radio and TV of the Flemish Community), Brussels, is a popular and friendly small station which can be heard at 1830-1900 with a repeat at 2200-2230 GMT, both on 1512 kHz medium wave and 5915 kHz short wave.

**Brazil.** Radio Nacional do Brasil, in Brasilia. No recent details from this station, but when last heard it was on 15265 kHz with an English programme at 1800-1850 GMT.

# SUPERPOWER KUSW RADIO WORLDWIDE



## FROM THE WEST TO THE WORLD!

Salt Lake City, Utah - United States of America

**Canada.** Radio Canada International, Montreal, has a relay agreement with the BBC and thus some frequencies are actually broadcast from Daventry rather than Canada. News broadcasts in English are at 1545-1600 on 9555, 11915, 11935, 15315 and 15325 kHz, and at 1715-1730 on 5995, 7235, 15325 and 17820 kHz. On Mondays to Fridays there is a general magazine-style programme at 1930-2000 on 5995, 7235, 15325 and 17875 kHz, and finally there is a daily relay of the CBC domestic services new programme at 2200-2300 on 9760 and 11945 kHz.

**China.** Radio Beijing, Peking, at 2000-2100 and 2100-2200, both on 6860 and 11500 kHz. There is also a programme at 2200-2230 relayed from Switzerland on 3985 kHz.

**Ecuador.** Radio Station HCJB, Quito, is a religious broadcaster with some general-interest and news programmes as well. Their morning programme at 0645-0800 has been clashing with Radio Australia on 9655 kHz, but their new schedule shows them on 9610 kHz instead. Let's hope they move soon so that both stations can be heard clearly again. In the evenings, HCJB can be heard at 1900-2000 and 2130-2200 on 15270 and 17790 kHz.

**Egypt.** Radio Cairo, 2115-2245 GMT on 9900 kHz.

**Ethiopia.** The Voice of Ethiopia has recently introduced broadcasts in English to Europe. They can be heard with surprisingly good strength at 1800-1830, with an immediate repeat at 1830-1900 on 9662 kHz (announcing 9660).

**Finland.** Radio Finland, Helsinki's new transmitters often put in block-busting signals, although their schedule is confusing. Look for them at 0515-0530 on 963, 6120, 9635 and 11715 kHz; at 0730-0800 on 963, 6120, 9560 and 11755 kHz; at 1505-1530 on 9640, 11850 and 15185 kHz; at 1930-1945 on 963, 6120, 9530 and 1755 kHz and finally at 2200-2230 on 963, 6120, 9760 and 11755 kHz.

**France.** Radio France International, Paris, has a one-hour programme intended for Africa, but well-received in the U.K. on 6175 kHz at 1600-1700 GMT.

**East Germany.** Radio Berlin International, "The Voice of the German Democratic Republic" recently expanded their broadcasts in English to Europe and can now be heard at 1045 and 1400 on 6115 kHz; at 1200 on

9665 kHz; at 1445 on 9730 kHz; at 1645 on 7295 and 9730 kHz; at 1815 on 7260, 7295 and 9730; and at 2045 on 1329 and 6115 kHz. All these broadcasts are, unusually, 45 minutes long.

**West Germany.** West Germany has two external broadcasting stations, both in Cologne. **Deutsche Welle** broadcasts on continents outside Europe only, but their Asian and Australasian service programme at 0900-0950 is often heard well on 11945, 17715, 17780, 17875, 21650 or 212680 kHz. The other station, **Deutschlandfunk**, broadcasts on medium wave only for Europe and can be heard in English at 1915-2000 on 1269 kHz.

### Bazouki Music

**Greece.** The Voice of Greece, Athens, has short English news bulletins within their normally Greek-language transmissions. The start time of the news bulletin varies, depending on the length of the preceding piece of Bazouki music but almost all transmissions are equally well-received, no matter whether the frequency is beamed to Europe, North America or Africa! The Voice of Greece changes frequencies quite often, but tends to stick to the same favourite spots on the dial; so perm any two or three frequencies from the following: 7430, 9395, 9420, 9425, 9905, 11645, 15625, 15630, 17565 kHz. Listen for English news about 0135, 0840, 1040, 1235, 1520, 1840, 1920, 2335 GMT.



Frequency
890KC
7130KC
9655KC
9685KC
9765KC
11725KC
11825KC
11860KC
15125KC ✓
15345KC
17720KC
17780KC
17890KC

## QSL

教指請敬聽收謝謝  
Thanks for Listening  
Comments are welcome



**VOICE OF FREE CHINA**  
Coverage Chart of Overseas Transmission  
and Exchange Programs

**Hungary.** Radio Budapest, 1930-2000 and 2100-2130 on 6110, 7220, 9585 and 9835 kHz.

**India.** All India Radio, Delhi, broadcasts its so-called "General Overseas Service" (a throw-back to colonial broadcasting?) at 1845-2000 on 7412 and 11620 kHz and 2000-2230 on 7412, 9910 and 11620 kHz.

**Iran.** The Voice of the Islamic Republic of Iran, Tehran, at 1930-2030 on the rather odd out-of-band frequency of 9022 kHz. This frequency has been used since before the beginning of the Pahlavi dynasty, so is unlikely to change.

**Iraq.** Radio Baghdad, the broadcasting Service of the Iraqi Republic, at 2000-2145 GMT on 9770 kHz.

**Israel.** Kol-Israel, the Voice of Israel in Jerusalem has programmes specifically intended for abroad as well as ones broadcast within Israel and relayed on short wave. Both are equally well-received. They can be heard at 1100-1130 on 11588, 15650, 17575, 17685, 21660 and 21760 kHz; at 1800-1815 on 7404, 9455, 9930 and 11585 kHz; at 2000-2030 on 7355, 7460, 9010, 9435, 9800, 9815 and 9855 kHz; at 2230-2300 on 7355, 9010, 9435, 9800, 9815, 9855 and 11605 kHz and at 0000-0025, 0100-0125 and 0200-0225 on 7460, 9385 and 9435 kHz.

**Italy.** RAI, the Italian Radio and Television, Rome, has a very old-fashioned style of broadcasting which apparently hasn't changed since the 1940s. They can be heard at 1935-1955 GMT on 7275, 7290 and 9575 kHz.

**Japan.** Radio Japan, Tokyo, is notoriously difficult to hear in Britain, but thanks to their relay in Gabon, West Africa, there are three daily transmissions which are well-heard: at 0700-0800 on 21695, 1500-1600 on 21700 and 2300-2400 on 11800 kHz.

**North Korea.** Radio Pyongyang has recently expanded their services to Europe with three new transmissions at 1300-1350 on 9325 and 9345 kHz; 1500-1550 on 9325 and 9977 kHz and at 1700-1750 also on 9325 and 9977 kHz. However, the best-heard broadcast is their long-standing one at 2000-2050 on 6576 kHz.

**Malta.** The Voice of the Mediterranean, Velletra, is a new station with Libyan backing. Programmes are at 0600-0700 on 9765 and 1400-1500 on 11925 kHz.



**Netherlands.** Radio Netherlands, Hilversum, is one of the most popular short wave broadcasters. Listen to them at 1130-1225 and 1430-1525 on 5955 kHz and at 1830-1925 on 6020, 15175, 17605 and 21685 kHz.

**Nigeria.** The Voice of Nigeria, Lagos, used to have a service for Europe on 15120 kHz, but this seems to be now defunct. However, the programme for West Africa can sometimes be heard by those up early enough — it is at 0500-0600 on 7255 kHz.

**Norway.** Radio Norway International, Oslo, has English-language feature programmes on Sundays only (the rest of the week the programmes are in Norwegian). Listen at 1300-1330

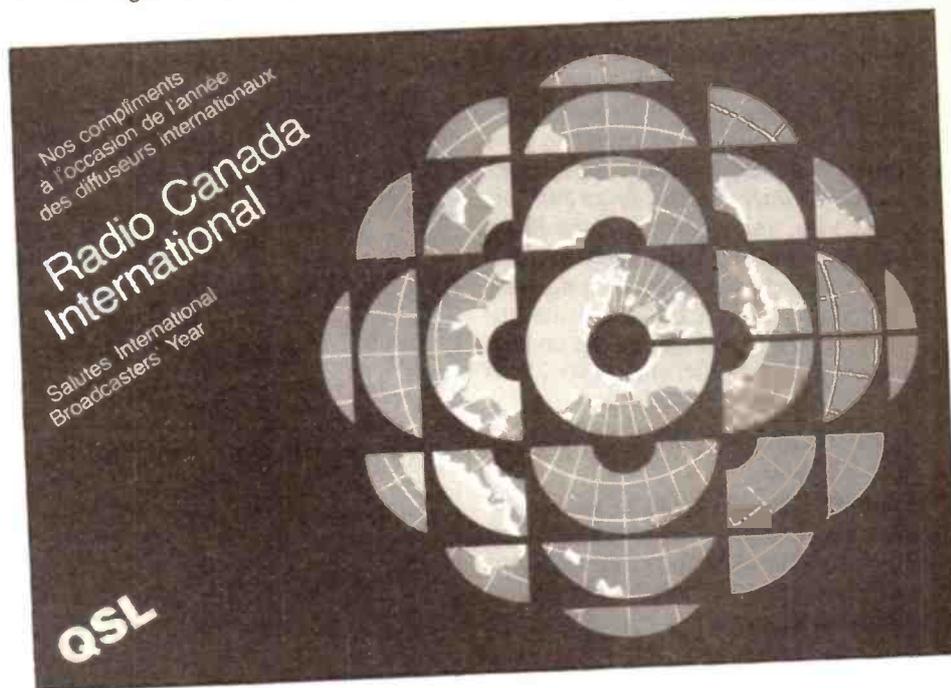
on 6035 and 9590 kHz; at 1700-1730 on 9655 kHz and at 1900-1930 on 6015 and 9590 kHz.

**Pakistan.** Radio Pakistan, 1005-1010 and 1100-1120 on 15606 and 17660 kHz. Also at 1715-1800 on 11570 kHz.

**Portugal.** Radio Portugal, Lisbon, now only broadcast in English Mondays to Fridays; at 2030-2100 on 11740 kHz.

**South Africa.** Radio RSA, Johannesburg, at 1100-1200 and 1400-1600 on 21590 kHz and at 1800-1900 and 1900-2100 on 15365 and 17795 kHz.

**Spain.** Spanish Foreign Radio, Madrid, broadcasts on 9765 and 11790 kHz at 1900-2000 with a



repeat at 2100-2200.

**Surinam.** Radio Surinam International broadcasts in Dutch and English at 1700-1745 via the transmitter of Radio Nacional do Brasil on 17835 kHz.

**Sweden.** Radio Sweden, Stockholm, at 1800-1830 and 2100-2130 on 1179 and 6065 kHz, with a further repeat at 2230-2300 on the medium wave frequency only.

**Switzerland.** Swiss Radio International, Berne, at 0730-0800 and 1830-1900 on 3985, 6165 and 9535 kHz. Also at 1300-1330 on 6165, 9535 and 12030 kHz.

**Syria.** Radio Damascus can be heard on 12085 kHz at 2005-2100 and 2105-2200.

**Taiwan.** The Voice of Free China, Taipei, has not sent any recent information, but they were last known to be on 9955, 15370, 15440 and 17845 kHz and again at 2200-2300 GMT.

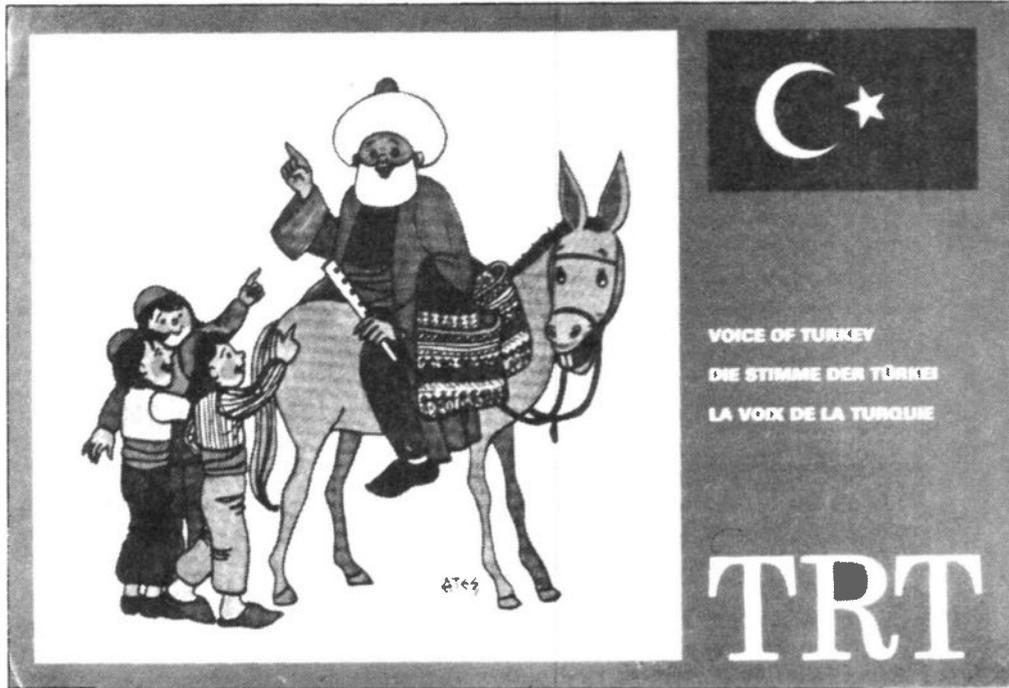
**Turkey.** The Voice of Turkey, Ankara, at 2100-2150 on 9825 kHz and again at 2300-2350 on 7250 and 9445 kHz. Although the latter frequency is beamed to North America, it generally gives better reception than the one intended for Europe.

**United Arab Emirates.** United Arab Emirates Radio and TV, Dubai, at 1030-1055 on 21605 kHz and at 1615-1640 on 11955, 15435 and 17865 kHz.

## World Service

**United Kingdom.** The BBC World Service is well known, and broadcasts 24 hours a day in English on many frequencies. In Britain check 648, 3955, 5975, 6195, 9410, 12095 and 15070 kHz, with 198 kHz used overnight after Radio 4 closes down. Most people don't realise that there are separate English-language programmes on 648 kHz, called simply "BBC 648" at 0430-0445 and 0545-0630 GMT.

**U.S.A.** There are several short wave stations broadcasting from the USA, the largest being the US Information Agency-controlled Voice of America. Transmitters are located in Britain and West Germany as well as the USA itself. VOA programmes can be heard at 0400-0600 on 6040 and 7325 kHz, at 0630-0700 on 1197, 3980, 6040 and 7325 kHz, at 1700-1730 on 1197, 3980, 6040 and 11760 kHz and at 1730-2200 on 6040 and



11760 kHz. There are also separate **VOA-Europe** programmes, mainly of American pop and rock music plus news bulletins, at 0630-1300 daily and 1300-1700 Mondays to Saturdays on 1197 kHz. Also from the USA are Radio Station **WRNO** in New Orleans at 1500-2100 on 15420 and 2100-2300 on 13760 kHz and **WCSN** (the World Service of the Christian Science Monitor) also on 13760 kHz at 1400-1600 and on 9495 kHz at 2000-2200 GMT. "Superpower" **KUSW** broadcasts mainly "adult-orientated rock" music from Salt Lake City, Utah, but is not so well heard in Europe. Try at 1900-2200 on 15690, 2200-0100 on 15580, 0100-0300 on 11695 or 0300-0500 on 9815 kHz, when conditions are good. KUSW does not broadcast on Sundays.

**USSR.** There are several English-language broadcasts from the USSR too. Biggest of all is **Radio Moscow World Service**, which broadcasts 24 hours a day on many frequencies. Look for them at the high-frequency ends of the 25 and 19 metre-bands during the day and at the top of the 41 and 31 metre-bands during the evening. At night they use 1143, 1215, 1325, 1386 and 1494 kHz. In

addition, **Radio Moscow** has an hour programme specifically for Britain and Ireland, at 2000-2100 on 1143, 5905, 6030, 7115, 7150 and 7170 kHz. Their broadcast for North America is also well-heard here at 2300-0300 on 4895, 7115, 7215, 7310 and 9765 kHz. Also in Moscow is "Radio Station Peace and Progress", which has a slightly different political slant from Radio Moscow. They have recently started an English broadcast for listeners in Europe for the first time. It is at 2200-2230 on 1323, 4060, 6145, 7250 and 7360 kHz. **Radio Keiv**, from the Ukraine, can be heard at 1900-1930 on 6010, 6090, 6165 and 7115 kHz. Finally, **Radio Vilnius**, in Lithuania, can be heard at 2230-2300 on 6100 kHz and continuing at 2300-2330 on 6100, 7165 and 7400 kHz.

**Vatican.** The Vatican Radio broadcasts in English at 1445-1500 on 6248, 7250, 9645 and 11740 kHz and at 2050-2110 on 1530, 7250 and 9645 kHz. They also broadcast news and light music programmes presented in Italian, French, English and Spanish called "Four Voices" on these frequencies at various times during the day.

# Aerial Display

One of the least expensive yet most fascinating and rewarding branches of amateur radio is experimentation with different types of aerials.

Every time, however, a new aerial is contemplated, the first task is to

wave matching sections.

In each case standard formulae have been used as the basis of the calculation. However, it should be emphasised that this would be the length in free space, and local

aerial is initially dimensioned for the middle of the required band, no further adjustment is necessary.

## Matching Section

Many types of aerials, particularly loops, present an impedance which would result in a relatively high VSWR on the feeder. One of the most effective, yet simple and convenient, methods of overcoming this is to use a quarter wave matching section. The fifth option on the menu calculates the impedance and dimensions necessary to achieve a match.

In using this option, it may be assumed that the impedance presented by either delta or quad loops is about 100 ohms.

One of the disadvantages of simple programs is that, unless instructed otherwise, the dimensions will be calculated to a far higher degree of accuracy than is necessary. Accordingly, to obviate this annoyance, this program only provides

## *Brian Kendal G3GDU provides an adaptable program for calculating aerial dimensions.*

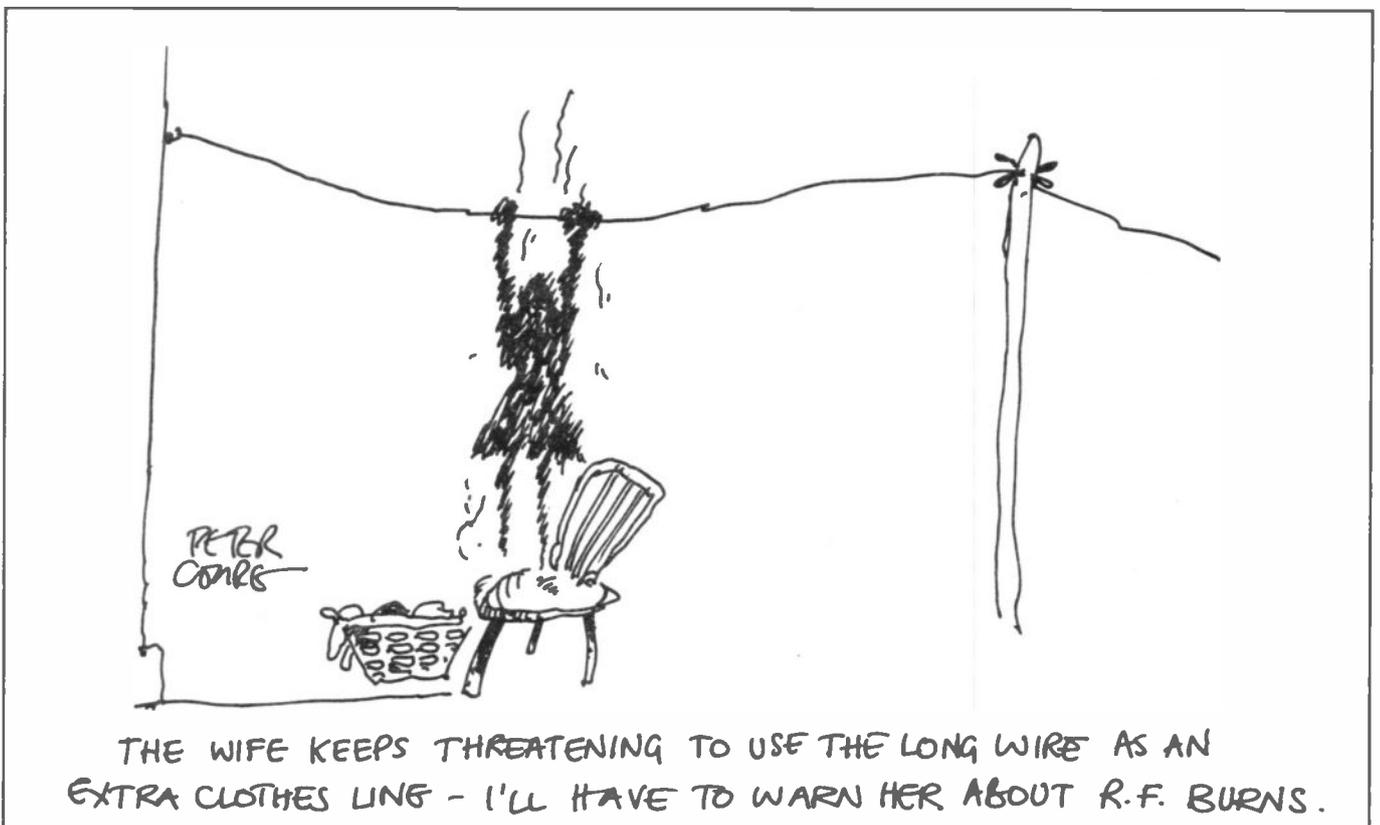
consult the reference books in order to calculate dimensions, etc. This program is intended to eliminate this task.

In my article on *Delta Loops*, which appeared in HRT, January 1988, I included a short computer program for calculating the dimensions of this type of aerial. Since then, that program has been extended to include most of the more common types of wire aerials, ie dipoles, long wires, delta and quad loops, and length and impedance of quarter

conditions, such as proximity to trees, houses, etc., may have an effect.

Most affected by this are dipoles and long wires and, to assist the reader in this respect, the program also calculates the variation in length per hundred kilohertz in order to minimise trimming problems and enable resonance at the desired frequency to be readily achieved.

Quad and Delta loops are far less affected by nearby objects and it is my experience that, provided the



```

L. 10 REM:AERIAL LENGTH CALCULATIONS
20 CLS
30 PRINT
40 PRINT"LENGTH OF H.F. WIRE AERIALS"
50 PRINT
60 PRINT"PROGRAM VALID TO 60 MHZ"
70 PRINT
80 PRINT"1. HALF WAVE AERIALS"
90 PRINT
100 PRINT"2. LONG WIRE AERIALS"
110 PRINT
120 PRINT"3. DELTALOOPS"
130 PRINT
140 PRINT"4. QUAD LOOPS"
150 PRINT
160 PRINT"5. QUARTER WAVE MATCHING SECTIONS"
170 PRINT
180 INPUT"SELECT 1, 2, 3, 4 or 5."A
190 IF A>5 GOTO 20
200 ON A GOSUB 210,420,680,990,1160
210 CLS
220 PRINT
230 PRINT"HALFWAVE AERIALS"
240 PRINT
250 INPUT"FREQUENCY OF OPERATION (MHZ) ".F
260 IF F=0 GOTO 210
270 IF F>60 GOTO210
280 L=(INT(10*(468/F)))/10
290 PRINT
300 PRINT"AERIAL LENGTH AT ":F:" MHZ IS ":L:" FEET"
310 F=F*.1
320 M=(INT(10*(468/F)))/10
330 L=(INT(10*(L-M)))/10
340 PRINT
350 PRINT"LENGTH/FREQUENCY VARIATION = "
360 PRINT I: " FEET PER 100 KHZ"
370 PRINT
380 INPUT"ANOTHER CALCULATION (Y/N)".B$
390 IF B$="Y" OR B$="y" GOTO210
400 IF B$="N" OR B$="n" GOTO20
410 GOTO380
420 CLS
430 PRINT
440 PRINT"LONG WIRE AERIALS"
450 PRINT
460 INPUT"LENGTH OF AERIAL IN HALFWAVELENGTHS ".N
470 PRINT
480 INPUT"FREQUENCY OF OPERATION (MHZ) ".P
490 IF N=0 OR P=0 THEN GOTO 420
500 CLS
510 Q=(INT(10*(492*(N-.05)/P)))/10
520 PRINT
530 PRINT"LONG WIRE AERIALS"
540 PRINT
550 PRINT "THE LENGTH OF A ":N:" HALFWAVELENGTH LONG WIRE AT ":P:" MHZ IS "
:Q:" FEET"
560 PRINT
570 P=P*.1
580 K=(INT(10*(492*(N-.05)/P)))/10

590 S=(INT(10*(Q-K)))/10
600 PPRINT"VARIATION IN LENGTH = ":S:" FT PER 100 KHZ"
610 P=INT
620 INPUT"ANOTHER CALCULATION (Y/N)".C$
630 IF C$="Y" OR C$="y" GOTO420
640 IF C$="N" OR C$="n" GOTO20
650 GOTO620
660 CLS
670 PRINT

680 PRINT"H.F. DELTA LOOP CALCULATIONS"
690 PRINT
700 INPUT "FREQUENCY OF OPERATION (MHZ) ".F
710 IF F=0 OR F>60 THEN GOTO 700
720 PRINT
730 PRINT "OPTIMUM SHAPE IS EQUILATERAL TRIANGLE"
740 PRINT
750 L=(INT(10*(1007/F)))/10
760 PRINT "LENGTH OF LOOP = ":L:" FT"
770 PRINT
780 PRINT "LENGTH OF DIAGONAL SIDE = ":(INT(10*(1007/F)/3)/10):" FT"
790 M=SQR(((1007/F)^2)/12)
800 PRINT
810 PRINT "HEIGHT OF LOOP = ":(INT(10*M))/10:" FT"
820 PRINT
830 INPUT "IS ADEQUATE HEIGHT AVAILABLE (Y/N) ".Z$
840 PRINT
850 IF Z$="Y" OR Z$="y" THEN GOTO 930
860 INPUT "AVAILABLE HEIGHT ".H
870 PRINT
880 A=(L*L*(4*M^M))/(4*L)
890 PRINT "LENGTH OF DIAGONAL SIDE NOW ":(INT(10*A))/10:" FT"
900 PRINT
910 PRINT "LENGTH OF HORIZONTAL SIDE NOW ":(INT(10*(L-(2*A))))/10:" FT"
920 PRINT
930 INPUT "FURTHER CALCULATION (Y/N)".AS
940 IF AS="M" OR AS="m" THEN GOTO 10
950 IF AS="Y" OR AS="y" THEN GOTO 650
960 GOTO930
970 PRINT
980 STOP
990 CLS
1000 PRINT
1010 PRINT "H.F. QUAD LOOP CALCULATIONS"
1020 PRINT
1030 INPUT "FREQUENCY OF OPERATION (MHZ) ".F
1040 IF F=0 OR F>60 THEN GOTO 1030
1050 PRINT
1060 L=(INT(10*(1007/F)))/10
1070 PRINT "LENGTH OF LOOP = ":L:" FT"
1080 PRINT
1090 PRINT"LENGTH OF SIDE = ":(L/4):" FT"
1100 PRINT
1110 INPUT "FURTHER CALCULATION (Y/N)".AS
1120 PRINT
1130 IF AS="M" OR AS="m" THEN GOTO 10
1140 IF AS="Y" OR AS="y" THEN GOTO 990
1150 GOTO1100
1160 CLS
1170 PRINT
1180 PRINT "QUARTER WAVE TRANSFORMERS"

1190 PRINT
1200 INPUT"FREQUENCY OF OPERATION (MHZ) ".F
1210 IF F>60 GOTO 1160
1220 PRINT
1230 INPUT"INPUT IMPEDANCE (OHMS) ".Z1
1240 PRINT
1250 INPUT"OUTPUT IMPEDANCE (OHMS) ".Z0
1260 PRINT
1270 INPUT "VELOCITY FACTOR OF MATCHING SECTION ".V
1280 PRINT
1290 PRINT "LENGTH OF MATCHING SECTION = ":(INT(100*(240*V)/F)/100):" FEET"
1300 PRINT
1310 PRINT "IMPEDANCE OF MATCHING SECTION = ":INT(SQR(Z1*Z0)):" OHMS"
1320 PRINT
1330 INPUT "FURTHER CALCULATION (Y/N)".AS
1340 IF AS="M" OR AS="m" THEN GOTO 10
1350 IF AS="Y" OR AS="y" THEN GOTO 1160
1360 GOTO1320

```

dimensions of the aerials to one place of decimals and the matching section to two.

Partially for this reason, and also because at VHF the length to diameter ratio of the aerial becomes finite and affects the dimensions, the program can only be considered valid to 60 MHz.

The program has been written in standard Microsoft Basic and should run on most machines with little, if any, modification.

In addition to the program, print-outs of each of the options have been included in order that the reader may confirm that the program has been correctly entered.

### Length of HF Wire Aerials

Program valid to 60 MHz:

1. Half wave aerials
2. Long wire aerials
3. Delta loops
4. Quad loops

5. Quarter wave matching sections  
Select 1, 2, 3, 4 or 5.74

### Halfwave Aerials

Frequency of operation (MHz) ?14.1  
Aerial length at 14.1 MHz is 33.1 feet  
Length/frequency variation = 0.1 feet per 100 kHz

Another calculation (Y/N) ?N

### Long Wire Aerials

Length of aerial in halfwavelengths ?3  
Frequency of operation (MHz) ?14.1  
The length of a 3 halfwavelength long wire at 14.1 MHz is 102.9 feet  
Variation in length = 0.7 ft per 100 kHz

Another calculation (Y/N) ?N

### HF Delta Loop

Frequency of operation (MHz) ?14.1  
Optimum shape is equilateral triangle  
Length of loop = 71.4 ft

Length of diagonal side = 23.8 ft  
Height of loop = 20.6 ft  
Is adequate height available (Y/N) ?N  
Available height ?18  
Length of diagonal side now 22.3 ft  
Length of horizontal side now 26.6 ft  
Further calculation (Y/N) ?N

### HF Quad Loop

Frequency of operation (MHz) ?14.1  
Length of loop = 71.4 ft  
Length of side = 17.85 ft  
Further calculation (Y/N) ?N

### Quarter Wave Transformers

Frequency of operation (MHz) ?14.1  
Input impedance (ohms) ?100  
Output impedance (ohms) ?50  
Velocity factor of matching section ?.66  
Length of matching section = 11.51 ft  
Impedance of matching section = 70 ohms

# KENWOOD

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### TS-940S £1,995

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### TS-790E £1,495

Destined to be the new standard by which all VHF/UHF transceivers are judged, the TS-790E gives the dedicated operator everything he ever wanted in a multi mode, multi band home station. Covering 2 metres, 70 centimetres, and (optionally) 23 centimetres, on all modes, whether DX chasing, contest operating or chatting cross town, the TS-790E can handle it all and give you complete satisfaction. See a brochure soon.



### TS-140S £862

The TS-140S was in effect designed by our customers, who demanded Kenwood performance and facilities at modest cost. The TS-140S has all mode, all band HF coverage, and of course a high performance general coverage receiver. 100W output and a first class receiver combine to make the TS-140S a really satisfying rig to own. It's also available in the form of the TS-680S which has all the bands and modes of operation of the TS-140S but with the 6 metre band as well.



### TR-751E £599

The TR-751E is one of those transceivers which actually has no competition at all, combining as it does the all mode performance of a 2 metre base station with the convenience of mobile use as well. Whether you want to operate on FM, SSB, or CW, the TR-751E will do the trick. Real ease of use (in the Kenwood tradition), and sensible facilities, have made the TR-751E a firm favourite all over the world. Call in to any of our branches and see for yourself.

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

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# 25 YEARS IN AMATEUR RADIO

Did he say 25 years in Amateur Radio?

That's absolutely right; the company was registered in 1964 and the first advertisements for J. B. Lowe were soon in the magazines.

Bill Lowe laid down some basic rules of business behaviour which we still follow today, and the most important of these was the idea of service to the customer. The concept of "Flog it and forget it" was not allowed in Lowe Electronics, and those who know us will agree that as far as we are concerned, service is not just an idle promise, it's a fact. Unlike many companies, we employ more people to look after our customers than people to sell the goods, and although this may be unfashionable in today's "Forty quid off, John environment, it does keep the customers coming back to us — and they are always welcomed.

The history of the last 25 years is clearly too long to cover in detail, but we must have done something right, because we are still here when many of those who started down the road at the same time are gone and forgotten. Not only are we here, we have been chosen as the UK distributors by several major manufacturing companies, including Kenwood, Daiwa, JRC, Signal, AOR, Kantronics, Bencher, and many others. Their continuing confidence in us is matched by the confidence of our customers, past, present, and we hope, future.

Obviously we are pleased to be 25 years old in 1989, and to celebrate the event we shall be holding a monthly prize draw for all our customers. Each month throughout 1989, all the names of those customers who have made a purchase of more than £5 will be put into the hat at the end of the month and one name drawn out. The winner will then receive a fairly substantial piece of amateur equipment completely free, and so as not to limit his or her choice, we will publish a list of items from which to choose. It's one way we can say "thank you for your support over the years."

The January List will contain the following:

Kenwood TM-221E, TH-25E, TH-405E, Lowe HF-125, Signal R-535; which should give a reasonable spread of interests.

For purchases made in any of our branches, the branch manager will give you a card to complete, and all the cards will be returned to Matlock at the end of each month for the draw to take place. The winner for each month will be informed right away, and his or her name given in a later magazine — just to prove that the draw HAS taken place.

Having mentioned some of the companies we represent, it is perhaps opportune to give an idea of what they produce.

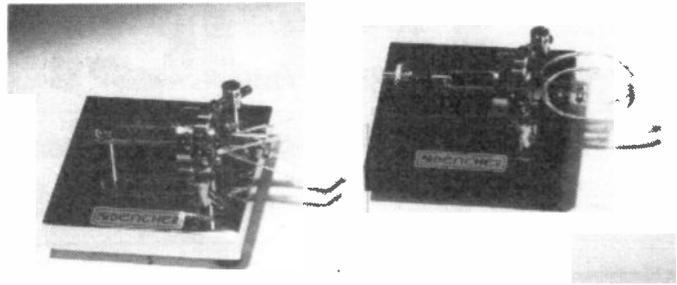
Kenwood amateur radio is too well known to need listing here, and I would refer you to our advertising for the last 13 years or so. Daiwa are noted for their leadership in RF power measurement and high quality power supplies; JRC are renowned for their communications equipment, and the recently introduced JST-135 HF transceiver, following on from the world wide success of the NRD-525 receiver speaks for itself. Signal are specialists in design and manufacture of air band receivers, and AOR are quite simply the world leaders in wide range monitor and scanning receivers. Their soon to arrive AR-3000, which covers 100kHz to over 2000MHz, will set the market on end, and will render everything else completely obsolete.

From the USA we are pleased to represent Kantronics, world leaders in packet radio terminals and systems, and of course Bencher keys, which have to be seen and handled to really appreciate how near perfection a key can be. The Rolls-Royce (or should I say Cadillac) of the keyer market.

Too much to cover in a small space, so why not send off for a complete product listing, enclosing £1 to cover postage. You will find lots of useful reading, and details on everything we stock and sell. If you have a particular interest in one receiver or transceiver, just mention this and we will include extended information.

Good luck in the prize draw.  
John Wilson  
G3PCY/5N2AAC

## WHEN ONLY THE BEST WILL DO



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RF power meters by DAIWA



Packet TNC from Kantronics



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the external 3.579MHz resonator to give a high accuracy and eliminating any need for individual tone alignment. The binary outputs from the IC are fed to the data input lines of IC3, the 4514 which provides the required 12 decimal outputs from the binary input. These output lines are in turn connected to a diode matrix, which is used to program the decoder for the required four-digit sequence. Four diodes are always left open circuit from the reset line (shown as 1, 3, 5 and 7 in the diagram), these instead being connected via wire links to the four input digit lines.

### Sequence Decoding

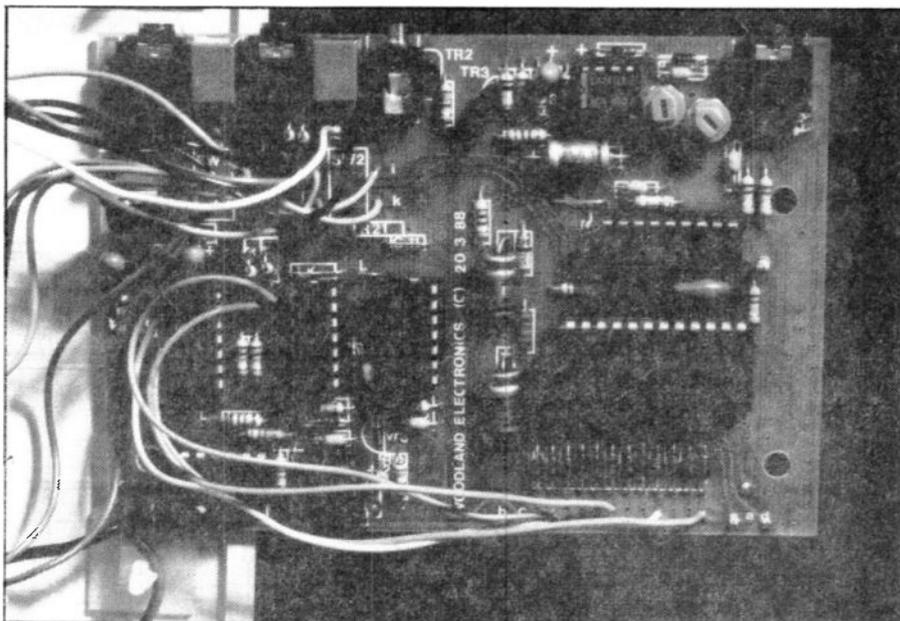
Because decoded un-programmed digit outputs are connected to the reset line, the sequence decoder will only operate with the required digits. IC4 is connected as a monostable, triggered by the positive going edge of pulses on pin 8. This starts the chip's internal oscillator, setting the 'Q' output on pin 11 to zero. With the given values, the time period set is approximately 5 seconds. IC5 and IC6 are D-type bistables, hence a logic '1' on the 'D' input will give a logic '1' also at the 'D' output line at the positive edge of the clock pulse. If the 'D' output is now changed to a logic '0', the 'Q' output will remain unchanged at '1' until the next clock pulse arrives.

The output of IC7d performs two functions:

- a) To clock the last bistable in the decode sequence, and
- b) To trigger the NE555 timer IC, described later.

When the input to IC6 pin 3 goes from a logic '0' to a '1', its output at pin 1 goes high. This in turn lights the 'Call' LED to show that the correct programmed decode sequence has been received. The output of IC6a is also connected to the reset line on IC6b, causing the 'Q' output to go high turning on TR2 via R24, in turn energising RL1 which switches the extension speaker in circuit. The 'Q' output is also switched to logic '0', lighting the 'Monitor' LED.

IC7d is also used to trigger IC8, the NE555 timer. The output of this switches TR3 via R28 which in turn drives RL2 to control an external tape recorder remote control socket. This output connection is energised for approximately 15 seconds with the shown values of C15 and R27, the



time constant setting components. If a timed output of longer than this is required, a preset potentiometer may be connected in place of a shorting link in the VR3 position on the PCB. IC7 sections a, b and c are used to detect any incorrect sequence along with the diodes connected in the reset line. Any signal here provides a reset to IC4, requiring the correct tone sequence to be fully decoded again before an output is given.

### Construction

First of all, make sure you have all the correct components, a steady hand, and a fine point on your soldering iron!

With reference to the component layout diagram, mount all the resistors onto the PCB and solder these in place, noting that R21 is marked on the PCB but is not used in this application. When trimming off the resistor leads, keep a few of these in hand and use them to make 'through' links from the top to bottom sides of the PCB at points a, b, c, d, and e, at both ends of the tracks. Fit wire links also on the component side of the PCB at the marked points LK1, LK2, LK3 and LK4, similarly fit a wire link in place of C11 which also is not used. If the preset 15 second time period is sufficient for your needs, fit a wire link to the VR3 pin connections as shown;

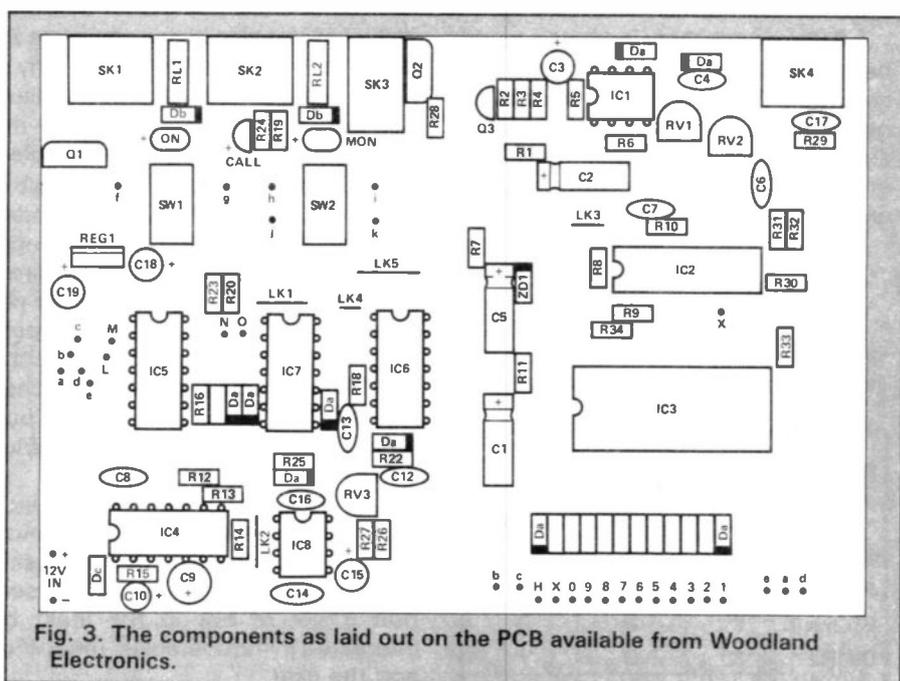
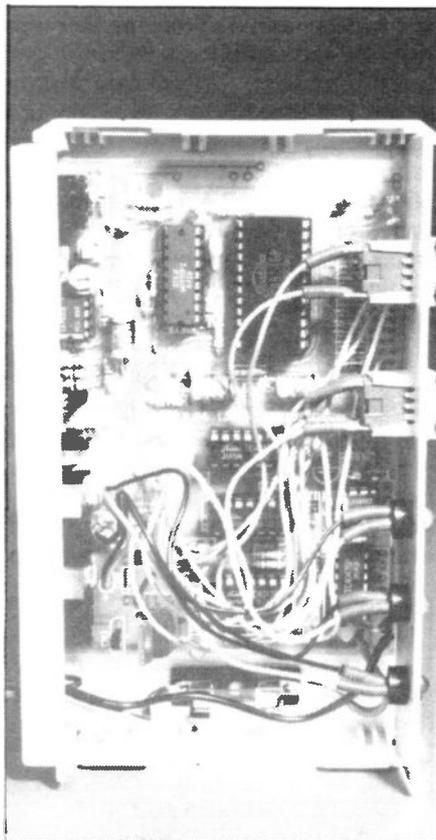


Fig. 3. The components as laid out on the PCB available from Woodland Electronics.

and connect the other ends to the PCB, brown to 'f' and red to 'g'. The monitor switch (with a grey button if using the kit) must have four wires soldered to it, green to pin 3, blue to pin 4, violet to pin 5, and grey to pin 6. Again sleeve these, and connect the other ends to the PCB, green to 'h', blue to 'i', violet to 'j' and grey to 'k'. (the black band on the diode body). The IC sockets may then be fitted, be careful to ensure all the pins are through the PCB holes before soldering these in place as you may damage the boards by trying to remove them if fitted incorrectly. Now fit the rest of the capacitors, diodes, and the three transistors. Note the positions of TR1 and TR3 are incorrectly marked on the supplied PCB: these are reversed. If you fit the two ZTX300 transistors to the marked positions of TR1 and TR2, TR1 placed next to R2, and the BF244A to the marked position of TR3 you'll be OK.

Finally fit X1, VR1, VR2 and the four sockets SK1-SK4. The two relays are sometimes supplied with 5 pins, sometimes with six pins; in the latter case simply cut the unused pin off flush with the relay body, to fit the five drilled holes in the PCB. Then mount REG1 the 7805 regulator, with its metal face towards the socket edge of the PCB.

The externally mounted components now need to be connected, using different coloured lengths of stranded insulated wire to prevent mistakes! Solder a black insulated lead to the shortest lead on each of the three LEDs, trimming the LED leg to around 10mm before soldering the connecting wire. Insulate each solder joint using a short length of rubber sleeving. Now trim the other leg of each LED to the same length and solder a length of wire of the appropriate insulation colour to it, red lead for the red LED etc., and sleeve as before. Strip the other ends of the connecting wires, and solder the leads from the red LED to the two holes marked 'Call' on the PCB, red lead to the '+' mark. Similarly connect the leads from the green LED to the holes marked 'On', green lead to '+', and the yellow LED leads to the holes marked 'Mon', yellow lead to '+'.  
 Now connect the on/off switch, (the red buttoned switched if using the kit) with a brown lead to terminal 3 and a red lead to terminal 4. Again insulate these with rubber sleeving,



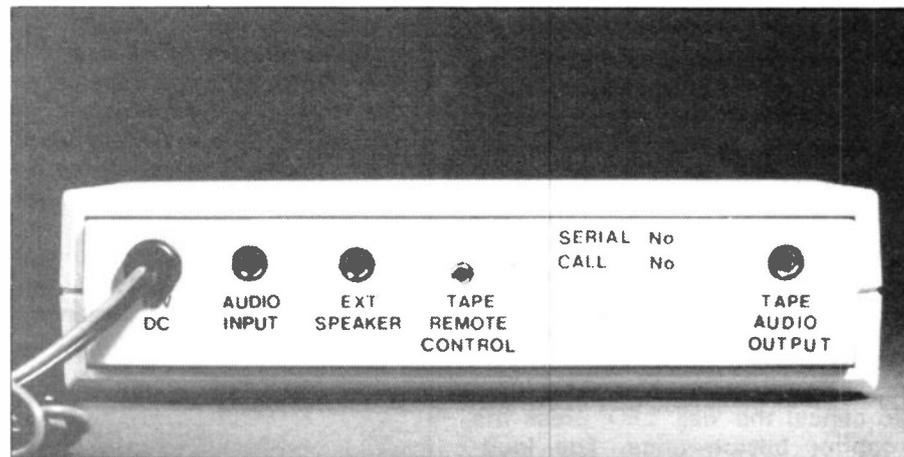
if a longer time period is required instead fit an appropriate value potentiometer such as 1M or 4M7.

Now mount the 100nF and 47nF capacitors, followed by the 1N4148 diodes. The positions of these are marked as Da and Db on the PCB, and are mounted with the '+' position signifying the cathode of the diode. Solder four further short lengths of connecting wire to the PCB, orange to 'L', yellow to 'M', green to 'N' and blue to 'O', note these latter connections

are shown here on the layout plan but not silk-screened onto the PCB itself.

These connection leads are now used in programming the required decode combination. When you have decided which four digits together with the '\*' and ' ' keys if required you wish to decode, carefully cut the tracks away corresponding to the *unused* digits, between the line of solder pads and the PCB connection holes. Then solder the orange wire to the hole marked with the first desired digit, the yellow wire to the second, the green wire to the third and the blue wire to the fourth. Note that each number may only be used *once*, because if two digits were programmed in succession and a signal 'drop-out' occurred while transmitting a single digit, it could be decoded as two successive digits with a resultant incorrect address. If the required decode address needs to be changed at any time in the future, this may simply be done by cutting the appropriate tracks and linking those previously cut with a short wire.

Now make sure you have trimmed off all the component leads correctly, and inspect the board very carefully to ensure no solder bridges have occurred, particularly with those tracks passing in between the IC pins. Do not plug the ICs into their sockets yet. Connect the red/black 12V DC supply lead, with the fuse holder placed in the positive lead approximately 40mm from the PCB, remembering to insert the fuse. Connect your 12V supply, switch the on/off switch to its on position, and check for a voltage of approximately 7.5V across the 7.5V zener diode. Check also for 5V across pins 24 and 12 of IC3. If both of these voltages



are correct, then disconnect the supply and carefully insert the ICs, taking note of the usual CMOS handling precautions to keep both you and the PCB at ground potential.

As a guide, the complete PCB assembly took me just over two hours from scratch to build and check.

### Testing The Unit

Initially set VR1 to its mid position, and VR2 to one-quarter of a turn clockwise from its fully anti-clockwise position. These settings should enable the unit to decode tone audio levels from 100mV p/p to several volts p/p, covering most volume settings. If you find there is insufficient audio level to your tape recorder, if connected, simply adjust VR2 to suit.

Connect the external speaker output of your receiver or transceiver to SK1, the 3.5mm audio input socket of the decoder, and plug in your external speaker lead in turn, to SK2. The easiest way of testing the unit is with another station, or yourself with a handportable, transmitting a suitable DTMF sequence to the receiver connected to the unit. First turn on the decoder, and adjust your receiver volume to the normal listening level. With the monitor LED lit (press the monitor button if not), the unit will allow normal reception via the external speaker. Pressing the monitor switch once will cause the red 'call' LED if lit to extinguish; pressing it again will cause the yellow 'monitor' LED to extinguish and will also disconnect the external speaker. The decoder is now in its standby mode, ready to burst into life on command.

On receiving the correct sequence of tones:

a) The red 'call' LED lights and stays lit to show you have been called.

b) The amber 'monitor' LED lights to indicate your speaker is turned on,

c) The tape remote control connection activates for approximately 20 seconds, allowing you to automatically record the received message immediately following a correctly decoded DTMF sequence.

To cancel the 'call' LED, press the monitor button once. The loudspeaker will now still be connected. To mute it completely press the moni-

tor button again. The speaker can now be repeatedly switched in and out of circuit by further depressions of the monitor button. To replay any received messages on the tape recorder, unplug the remote control lead from the unit and use your tape recorder as usual. Not that in this mode you may manually record off air audio if required through the selcall unit.

### DTMF Encoder

Off-the-shelf DTMF encoders are readily available from highstreet stores such as Tandy, in case your set or that of the station wishing to call you does not have an in-built DTMF encode facility fitted. However for

those who wish to construct a suitable unit, the accompanying circuit shows a simple one IC arrangement, linked to a standard row and column keypad. The output may be taken either directly to the microphone connection, alternatively the unit may be constructed in a small hand-held unit with an internal high-impedance transducer such as a piezo-ceramic sounder, for use with any rig.

PCBs for the decoder project, together with kits of parts if required, a matching case, and suitable encoders are available from Woodland Electronics, 26 Church Road, Bamber Bridge, Preston, Lancs. PR5 6EP. Tel. 0772 562430.

Components		IC5, 6	4013
<b>Resistors</b>		IC7	4081
All resistors 0.25W unless stated		IC8	NE555
R1, 7	1M	X1	3.759MHz Ceramic resonator
R2, 5, 8, 9, 29	100k	TR1	BF244A
R3, 6, 25	10k	TR2, 3	ZTX 300
R4	470R	REG1	7805
R10	330k	<b>Miscellaneous</b>	
R11	150R 0.5W	SK1, 2, 3	3.5mm jack socket
R12, 22	12k	SK3	2.5mm jack socket
R13, 14, 16, 17, 18	56k	RL1, 2	6V DC relay
R15	1M5	SW1	Latching switch
R19, 20, 23	390R	SW2	Momentary push switch
R24, 28	1k8	F1	400mA fuse 20mm
R26	6k8	FH1	20mm fuse holder
R27	3M3	2x8-pin IC sockets, 4x14-pin IC sockets, 1x18-pin IC socket, 1x24-pin IC socket, 12x12mm lengths rubber sleeving, PCB. Connecting wire: 3x125mm lengths black, 1x125mm length brown, 2x125mm lengths red, 1x125mm length orange, 2x125mm lengths yellow, 3x125mm lengths green, 2x125mm lengths blue, 1x125mm length violet, 1x125mm length grey, 1m red/black DC cable. Case and interconnections: 2x2.5mm jack plugs, 4x3.5mm jack plugs, 3m screened audio cable, 4xrubber feet, 2xPCB stand-off pillars, 3xLED mounting clips, 1xcase.	
R30	10M		
R31, 32, 33, 34	220k		
RV1	2k2 pot		
RV2	100k pot		
<b>Capacitors</b>			
C1, 2, 5	1µ F electrolytic axial		
C4, 6, 7, 9, 12, 13, 14, 16, 17	100nF axial		
C3, 10, 18, 19	1µ F tant bead		
C8	47nF axial		
C15	4.7µ tant bead		
<b>Semiconductors</b>			
D1-21	1N4148		
DC	1N4001		
ZD1	7V5 1W Zener		
LED1	5mm Green		
LED2	5mm Amber		
LED3	5mm Red		
IC1	LM741		
IC2	G8870-1P		
IC3	4514		
IC4	4047		

# METREWAVE

The sheer newness of 50MHz made it a talking point for many hams during 1988 — and an operating one, too. Its attraction was enhanced as more and more countries received

## Historical Event

With the Transatlantic challenge mastered, the next big DX target was southern Africa, where ZS-land in

land was worked from the UK, initially by southern stations but before long by those farther up-country.

Then, on September 8, came what can only be termed an historical event where "Six" is concerned: The first contacts with South America were made at a QRB of 7,000 miles or more, which was good going for a vhf band!

The ultimate target, VK-land, is being postulated by many. It may very well have been achieved by the time this piece goes to press.

Super-DX via TEP will probably happen all over again come next equinox, so have your 50MHz ears sharpened by March! Given the right season of the year "Six" will produce DX almost predictably, but still, to many, incredibly. But what of the other seasons of the year? What of "Six" when the DX is not coming through — as it isn't for much of a

## Jack Hum, G5UM, takes his customary look-back over the closing vhf/uhf year of '88

permission to use it. By mid-year two UK operators had achieved 20 countries confirmed and had received certificates to say so — one of the three 50MHz certificates which were introduced by RSGB during the year.

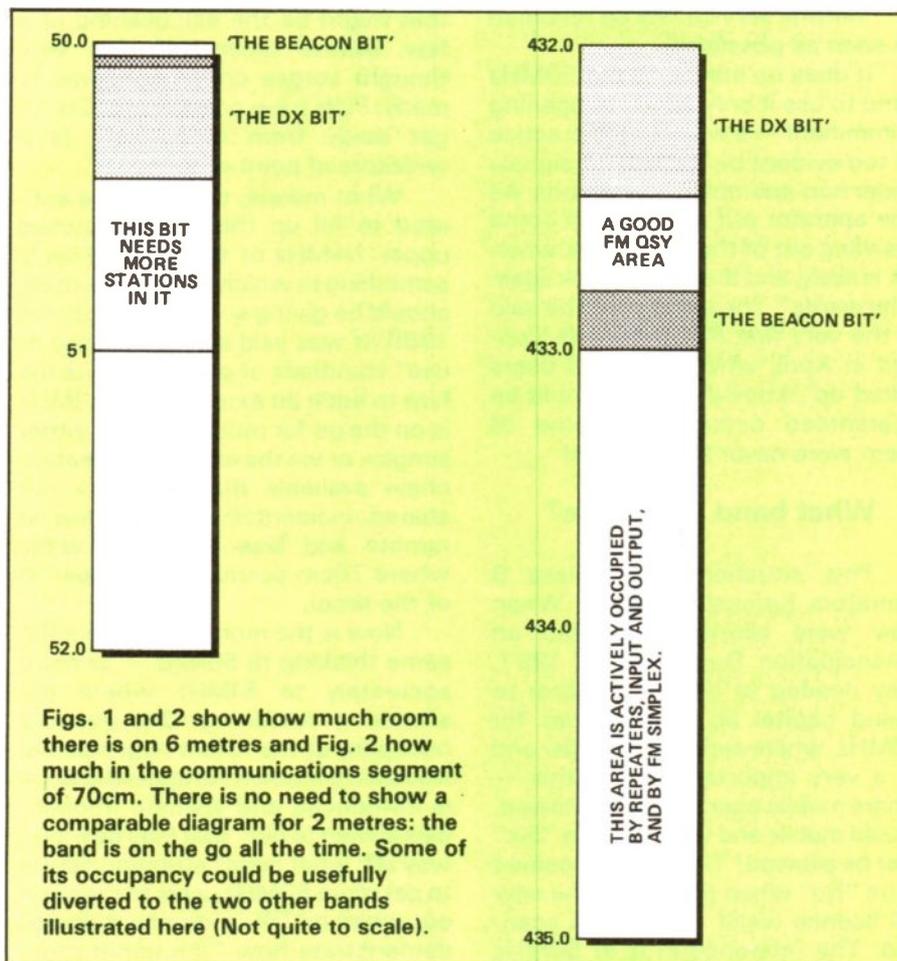
As predicted, the band opened for Stateside at mid-year as it did in 1987. Some of the Americans reported a "solid phalanx" of UK stations lining up to work them, truly an example of the penetrativeness of "Six" when the permitted power differential between American and British stations is taken into account. The W6JKV expedition to an island off Venezuela told of a fantastic four-hour opening to Europe on 50MHz, when 74 G stations and 17 GW stations were worked on June 23/24. To work nearly a hundred stations in four hours suggests that the W6JKV team must have been knocking them off at a rate of one every four minutes — or even less, taking account of the sundry European continentals they worked in between the G/GW stations.

There is an increasing number of operators in the UK who question the value of such contacts and the minimal amount of information they impart. But you need to get QSOs completed quickly to allow next-in-the-queue a chance. The impetus to work DX is well known: the "because it's there" syndrome prevails, just like the challenge of Mount Everest!

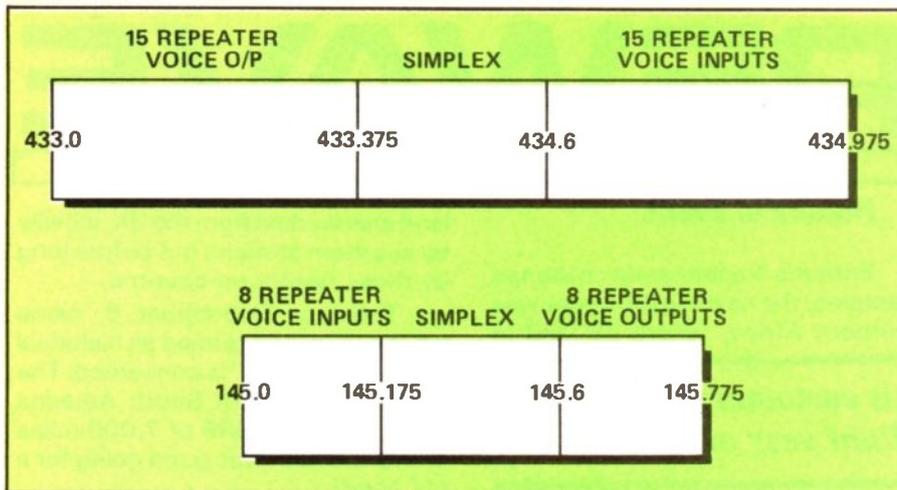
Many differing and often self-cancelling theories were uttered about the Transatlantic openings both last year and this, eg "extended sporadic-E", extended tropo or simply that the maximum usable frequency had gone upwards from 28MHz and had reached 50MHz, as it almost predictably does at the appropriate times.

particular is noted for its 50MHz activity — and a long way away, too, almost twice the distance of Stateside. The Transequatorial path was known to have promise: after all, the Alexandra Palace television station in North London on 45MHz had covered the distance fifty years ago.

What of this year, then? Forecasts by professional propagation experts and a few amateur ones as well, suggested that the equinoctial lift might occur earlier than expected. This it did in September, when ZS-



Figs. 1 and 2 show how much room there is on 6 metres and Fig. 2 how much in the communications segment of 70cm. There is no need to show a comparable diagram for 2 metres: the band is on the go all the time. Some of its occupancy could be usefully diverted to the two other bands illustrated here (Not quite to scale).



**Figs. 3A and B:** How much room there is "up top" is seen in this diagram. It shows the area occupied by 70cm repeaters (A) and by 2 metre repeaters (B); there are 153 repeaters on 16 channels on "Seventy" and 75 on 10 channels on "Two". Those shown are for voice only; there are several more for specialist applications such as RTTY, television and data.

twelvemonth? The answer to this conundrum is that 50MHz is primarily a vhf band and not a DX one, which was why good old 45MHz television was put there, to operate virtually QRM-free except during those significant spells of "Continental interference . . . do not adjust your sets . . . normal service will be resumed as soon as possible".

It does no justice to the 50MHz band to use it only when an opening is imminent — a widespread practice all too evident by the lack of signals under non-anomalous conditions. As one operator put it: "They all come crawling out of the woodwork when DX is likely, and they crawl back again afterwards". The same could be said of the very first RSGB 50MHz Contest in April, when scores of users "fired up", knowing there would be guaranteed occupancy. Some of them were never heard again!

### What band to choose?

This situation gives Class B operators furiously to think. When they were allotted the band on Emancipation Day, June 1, 1987, they needed to decide whether to spend capital on it or to opt for 70MHz, where aerials are smaller and — a very important factor, this — where mobile operation was allowed. Would mobile and verticality on "Six" ever be allowed? The answer seemed to be "No" when the text of the new UK licence (valid 1.1.89) was scanned. The reference in it to 50MHz

reiterated earlier edicts about the power level and the mandatory use of horizontally polarised antennas.

Of course, there is such a thing as Variation of Licence: maybe one of these years vertically polarised operation from the car will be permitted. Dare one say that the next step after that might be the establishing of a few 51MHz repeaters? The very thought verges on an anathema to many: "We have come on to 'Six' to get away from repeaters!" is a widespread point of view.

What means, then, can be initiated to fill up the almost unused upper 1½MHz of the band? This is something to which metrewave users should be giving serious attention in 1989. It was said of 70cm "Lose or use". Hundreds of operators took the hint to such an extent that 433MHz is on the go for much of a day, either simplex or via the extensive repeater chain available there (a view not shared, incidentally, by operators in remote and less populated areas where 70cm seems dead almost all of the time).

Now is the moment to apply the same thinking to 50MHz — or more accurately to 51MHz where the silence is deafening. One possible occupant of the future might be the Novice Operator, if his special licence is introduced and specific frequencies allotted to him. That may be a long way off: what needs attention now is to get more 50MHz users to come on out when no DX is imminent and to demonstrate how "the upper three

quarters" may be filled. Regional nets using fm have an obvious attraction: they would remove some of the weight from 2 metres. Such nets are already in existence, providing guaranteed signals at guaranteed times when all about them is silence. There could be more of them. Look at the diagram to see how much frequency space is waiting for them.

Nets on 50MHz must needs use horizontal aerials, nearly always beams. The resultant system gain, being greater than on the higher frequency bands, enables nets to extend over considerable distances even under the normal conditions that prevail for much of the time. Yes, we've glossed over that little problem which exists when beam positions are not compatible!

### "Next Band Up"

That is a sizeable several paragraphs about "Six" but deservedly so remembering the widespread interest which has been shown in the band during 1988.

The "next band up", 4 metres, has attracted the attention of large numbers of the aficionados for two major reasons. One of them has already been touched on above: the ability to use vertical aerials and the resultant popularity of the band for car-borne operation. Secondly, it is cheaper! For "Six" pricey factory-built transceivers can be had. Not so on "Four": virtually every mobile operator there will tell you he is using an ex-PMR rig obtainable for the proverbial song. In fact, crystals to provide, say, four fm channels can cost more than the rig.

In little more than a year since Emancipation Day the band has been transformed from a quasi-DX area using horizontal aerials to a popular short-haul band using vertical ones. The consequence is that "Four", just like "Two" and "Seventycems" before it, has developed into two bands, "vertical" at the top frequency area and "horizontal" at the bottom.

To operate effectively in both areas means having two aerials, one of them "horizontalis" the other straight-up.

On 2 metres and 70 centimetres there is enough signal scatter and bouncing of transmissions from local solid objects to make these bands unusable (up to a point) with non-

compatible aerals. Not so on "Four": the exclusion of each polarization from the other is very marked. It is only necessary to check, say, the GB3BUX beacon with a horizontal aerial and then with a vertical one to be persuaded of this.

Quite apart from this short-haul development, which has been taken up by Class B folk with special enthusiasm, the DX-seeker down on 70.2MHz plus-or-minus can cover up to 300 miles (probably on cw) under what seem to be discouraging conditions. Given one of those sporadic-E manifestations when Polish patriotic music thunders through users begin to wish that other countries had "Four" — though during the year one "other country" that did was Gibraltar, where a well mounted expedition and some superb operating by ZB2IQ (any significance in that "IQ"?) gave numerous UK stations their first taste of 70MHz DX. Jimmy Bruzon, who pioneered 70MHz activity from Gib all those years ago would have been proud of ZB2IQ (and probably was). But it would be pleasant to be rid of that Polskie music!

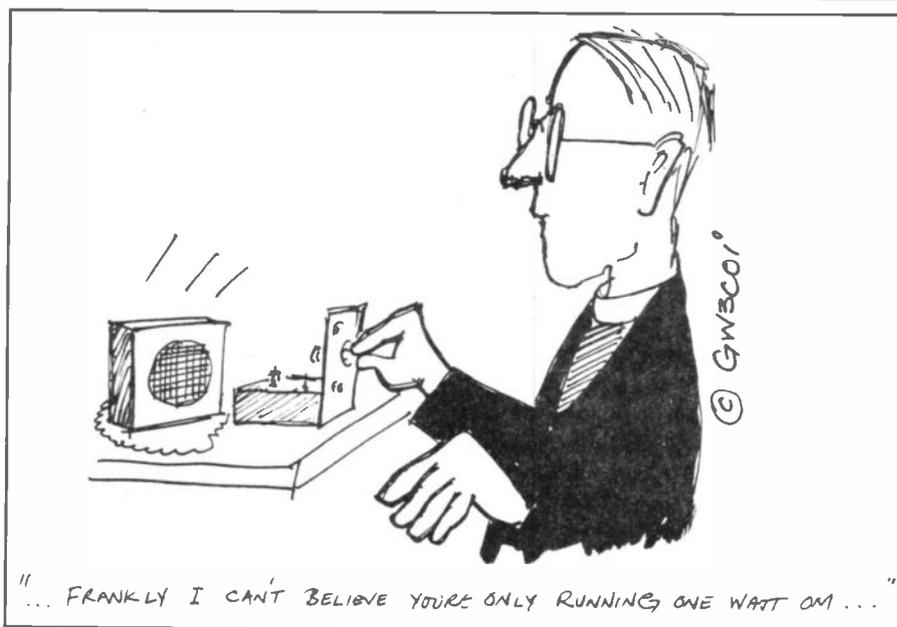
### The Expedition Ethic

Reference above to well-mounted expeditions prompts one to pay homage to the several which activated rare squares and even countries on all metrewave bands during 1988. Some of these expeditions cost a bomb to organise — and had the weight of one! The sheer lugging of gear and the putting up of elaborate aerial systems often in hostile environments are all in the cause of giving service to the Amateur Service. Without them many snug home-based operators would never achieve that last elusive square. Or indeed elusive country.

### Top Of The Spectrum

Not so spectacular as the results achieved on the lower frequency metrewave bands but shot through with more significance was the opening up of the 24GHz band. Why the significance? Because with microwave technology proceeding at the pace it is, the higher gigahertz bands may see amateur occupation develop to an at present undreamed of level by the end of the century.

Already there are three award



categories for 24GHz called Beginners, Intermediate and Advanced. Eight stations already have won performance certificates in this part of the spectrum. Noting that on "the next band down", meaning 10GHz, almost a hundred performance certificates have been won, who dare forecast how 24GHz will go over the next several years? Its potential for handling such things as video and data has yet to be explored.

Now, having mentioned data . . .

### Fat Packets

Another major development on the metrewave front during '88 has been packet radio, taken up in a large way by the amateur fraternity and causing animated discussion when it was featured at conventions and club meetings throughout the land. Its recognition in the new form of Licence effective 1.1.89 was seen with satisfaction.

Inevitably, there were those who charged packet with "... not being real ham radio". Only time will show whether this criticism has any validity or not, and whether packet radio slims down as the months pass. For most of any 24 hours the distinctive burble of packet can be heard on 144.65MHz. Already, an occupancy problem has loomed as any observer of 144.65 can see for himself. As a local packet transmission ceases, more distant ones can be heard on the same frequency. The time is already ripe for transferring some of this activity to other metrewave

bands, though this is a development which calls for lot of adequate preparation.

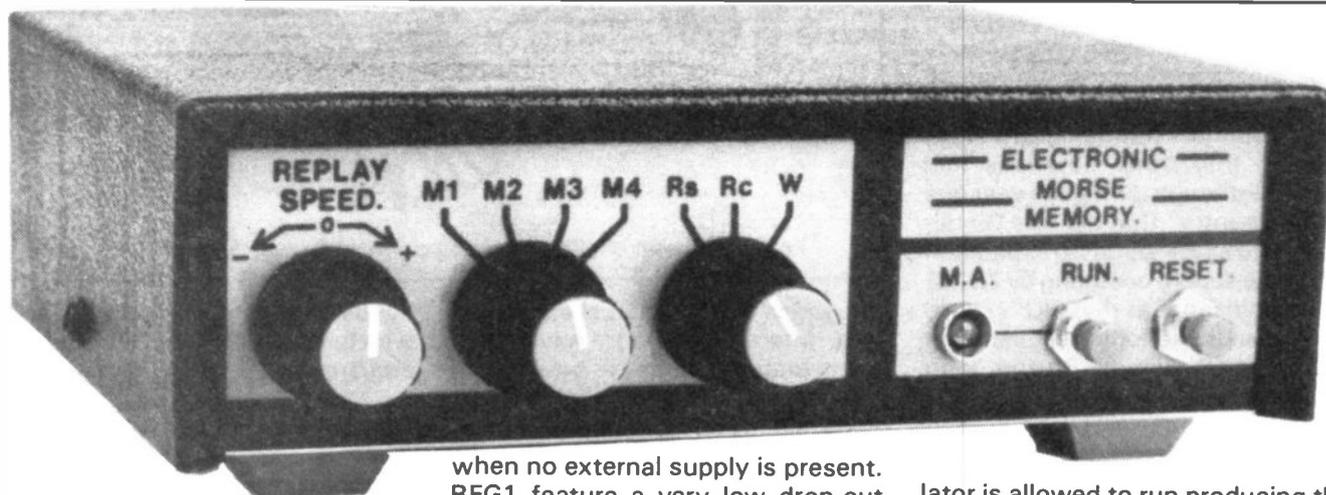
One special useful aspect of packet is its ability to alert users with advance warning of "lifts". Already, this facility has been of great advantage to 50MHz types, who, if apprised of likely anomalous propagation can man their rigs at crucial moments instead of waiting for hours for something to emerge from an apparently dead band.

### Coda

Much, much more could be said about Metrewave Year 1988. Meteor scatter, for example, where dedicated operators have worked phenomenal DX. And what about repeaters? Their occupancy during 1988 has continued with the intensity of previous years and their value to mobiles in particular cannot be over emphasised. It is all too easy to take repeaters for granted and to give little thought to all the remarkable expertise behind the scenes that builds them and keeps them 24 hours on air.

If a stranger to ham radio asked you where all the aciton was to be found, the answer surely would be "In the upper half of 2 metres". Here, as with packet, saturation point is nearly here ("I can't find a vacant channel to QSY to"). Preparations to diversify to other bands — and notable to channelised 70cm — should impel many people to go out any buy appropriate transceivers — and that would be no bad resolution for 1989.

# MORSE KEYER



The Electronic Morse Memory described in this article is designed to be used in conjunction with the 8044 Electronic Keyer published in the June and July 1988 issue of HRT. The unit is based around the HM6167P 16K ×

when no external supply is present. REG1 feature a very low drop-out voltage — typically less than 0.4V — allowing the battery pack to be used right up to the end of its useful life, an end voltage of 6V. Furthermore, the quiescent current demand is very low, typically 75µA. C10 and C11

lator is allowed to run producing the waveform shown. R10 and D3 are responsible for the duration of time period T1 (mark); RV1 and RV2 provide control over the duration of time period T2 (space). IC1 is a 12-stage binary ripple counter with the output lines Q1 to Q12 forming the memory address bus. With pin 11 (reset) held at logic 0 (0V) the positive-going edge produced by the oscillator — transition 'A' — will strobe the clock input (pin 10) of the counter through IC4a, this results in the address bus count being incremented by one. The logic 1 level present on pin 11 ( $\overline{CS}$ ) of IC2 deselects the memory while the count changes. Transition 'B' returns pin 11 of IC2 to logic 0 reselecting memory allowing data to be either read into or out of the addressed memory location depending upon the setting of SW2 (READ/WRITE). With this switch in the WRITE (W) position pin 9 (WE) of IC2 is held at logic 0 by IC5d so data will be written into memory; in the READ SINGLE (Rs) or READ CIRCLE (Rc) position data will be read out of memory. The input terminal of SK2 monitors pin 14 (keyed output) of the Curtis 8044 Keyer IC housed in the Electronic Keyer unit. R11, C9, D4, ZD1 along with IC5b and IC5c interface the keyer output to Din (pin 12) of IC 2. A

***Terry Grice G4PSL has produced a Morse Memory for use with the Morse Keyer published in June/July 1988.***

1-bit static CMOS RAM ic. The memory is configured to provide four individual memory 'blocks' each capable of storing a morse code message of one minute duration.

## The Circuit Description

The complete circuit diagram is given in Fig. 1. The unit may be powered from an external 12VDC PSU via rear panel mounted socket SK1. The wiring arrangement for matching plug PL1 is shown in Fig. 2. D5 and D6 form a diode switching circuit which automatically switches out the internal 9V battery power source, B1, when the external supply is connected. R13 grounds SK1 input

respectively provide regulator input and output decoupling, while C12 provides DC smoothing. C13, C14 and C15 are distributed around the pcb in order to decouple the supply lines at regular intervals.

IC2 is a 16K × 1-bit static CMOS RAM. SW1 (MEMORY SELECT) along with D1 and D2 control the logic levels present on the two MSB memory address lines arranging the memory as four 4K × 1-bit blocks the start address for each block being 000(HEX), 400(HEX), 800(HEX) and 000(HEX) for respective switch positions M1 to M4.

The system clock oscillator is built around IC4b. When a logic 1 (+5V) is present on pin 6 the oscil-



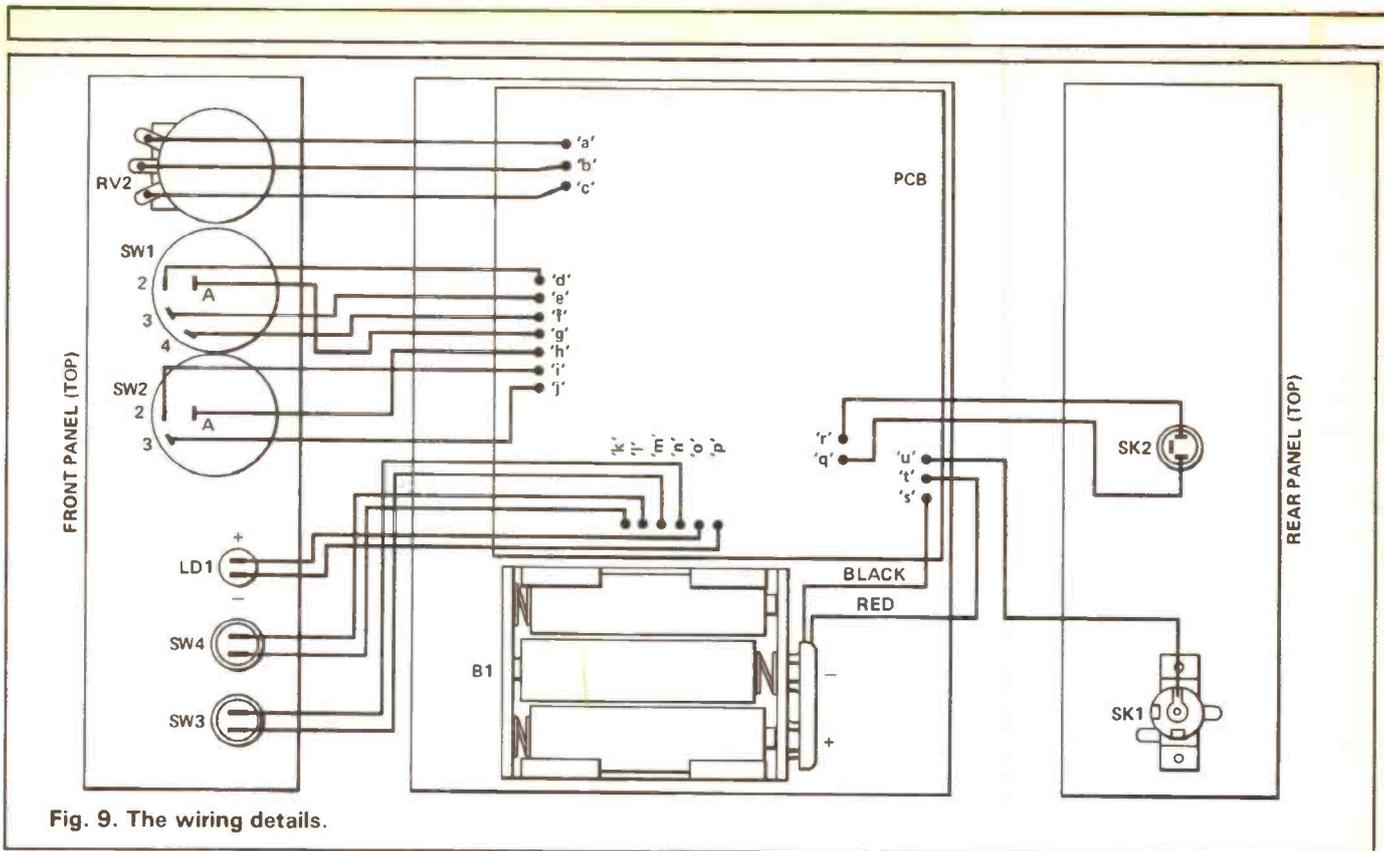


Fig. 9. The wiring details.

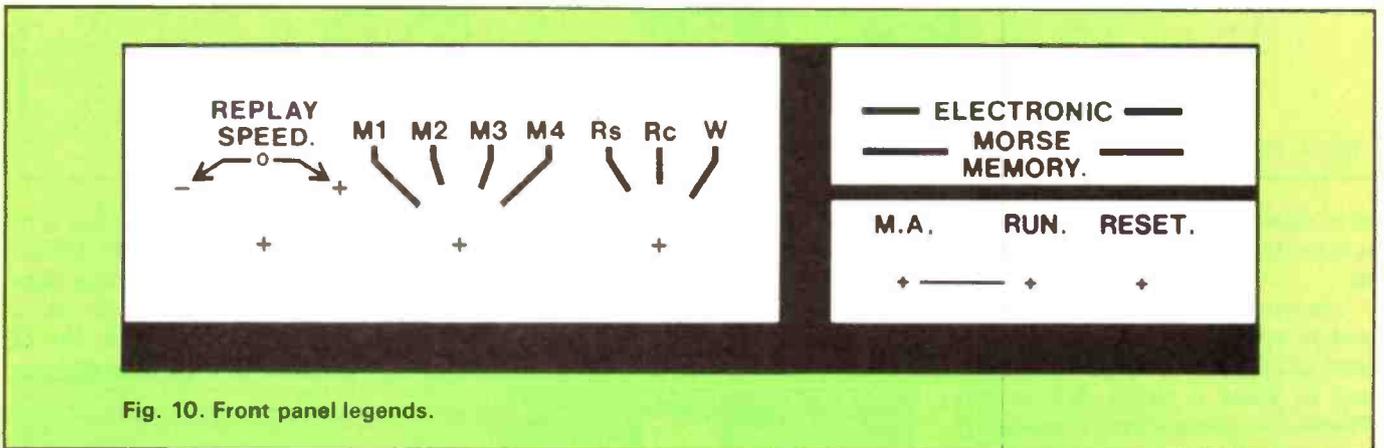


Fig. 10. Front panel legends.

10. Next, install all chassis mounted components with the exception of SK2. Note that SW1 is a 1-pole, 12 way rotary switch incorporating an adjustable limit stop which must be set to reduce the number of 'ways' to four. Crop off all solder pins with the exception of pins 'A', '2', '3' and '4' which are used, to allow the switch to fit comfortably into place. SW2 is also a 1-pole, 12 way rotary switch, this component must be reduced to three way operation, and again all unused pins should be removed with pins 'A', '2' and '3' only left in place. Both switches are of the break-before-make type.

**Fixing Knobs**

Reduce the spindle length of these switches along with RV2 to 8mm and install with the shakeproof washer in contact with the inside of the chassis. Do not overtighten the fixing nut of these or any other front panel chassis mounted components as this will cause the label protective film to wrinkle. Attach the three control knobs and check for correct operation. Use the spring washers supplied when fitting SW3 and SW4 check orientation when fitting LD1. A

chrome shrouded LED was used in the prototype unit.

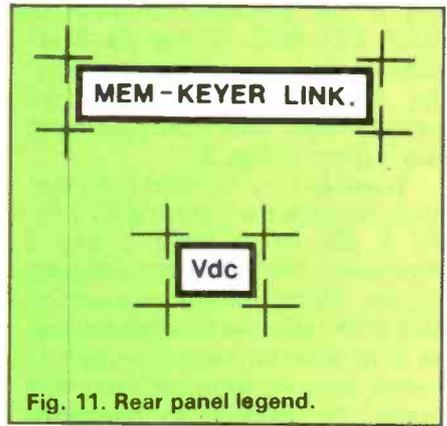


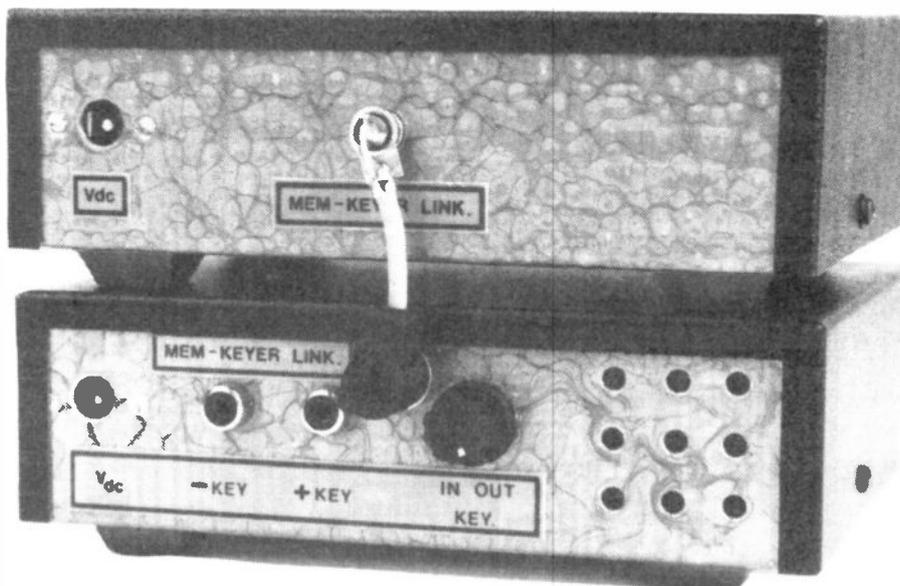
Fig. 11. Rear panel legend.

The pcb may now be located — place four M3 × 12mm counter-sunk head screws up through the four holes in the base of the case. Place a ¼in M3 plain spacer over each screw, fit the pcb in place over the screws and secure using four M3 nuts and washers except for the screw nearest to SK1 which should be secured using an M3 nut and solder tag. Now fit SK2, a 3.5mm stereo jack socket in a tubular metal screen, ensuring that the solder tag common to the screen is towards the base of the case. The rear panel label legends are shown full size in Fig. 11. These are manufactured in the same way as the front panel label and attached below the rear panel sockets SK1 and Sk2.

Fit four rubber feet to the case base. Mechanical construction is completed by drilling a single M2.5 fixing hole in the case lid, counter-sink, debur and remove a small amount of lacquer from around the inside of the hole. Secure an M2.5 solder tag to the inside of the lid using an M2.5 × ¼in countersunk head screw, lockwasher and nut. The two black self-tapping lid screws supplied with the case MUST have their length reduced to 3mm to prevent damage to the pcb and battery pack. M2.5 and M3 hardware may be replaced with 8BA and 6BA fixings respectively.

The unit is wired using insulated hook-up wire, 7/0.2 or 1/0.6 being a good choice. Observe polarity when wiring to LD1 and also when soldering the PP3 battery clip to the pcb pins. Do not connect the battery pack at this stage. Connect a 150mm (6in) length of wire between the M2.5 solder tag on the case lid and the M3 solder tag attached to the pcb fixing screw. This ensures that a solid electrical connection exists between the upper and lower halves of the case.

All five CMOS ics may now be installed. Touch a grounded piece of metalwork before touching the CMOS ICs. Check orientation prior to insertion. Quite often it is found that the two rows of ic pins are too widely spaced for insertion. This may be remedied by placing each row of pins in turn against a flat metal surface, and, while holding the ic applying gentle pressure, enough to move the pins in about one millimetre.



### Testing and Setting-up

Before connecting the memory unit to the keyer unit the following tests should be carried out: set both the pcb mounted oscillator preset potentiometer, RV1, and the chassis mounted replay speed control, RV2, to mid-position. Switch the chassis mounted memory select, SW1, and READ/WRITE, SW2, to their respective M1 and Rs positions. Connect a voltmeter set to read 5VDC or greater across the output of REG1. A suitable point for placing the meter positive lead may be clipped to any part of the chassis. Connect an external 12VDC power source to chassis mounted socket SK1 and check for a meter reading of 5VDC. Position the 9V battery pack in the memory unit and connect the PP3 battery clip. Disconnect the external DC power source and confirm that the meter still reads 5VDC.

All being well, remove the meter leads and set the meter to read 50mADC or greater. Break the outermost connection between the PP3 battery clip and the battery pack, and connect the meter positive lead to the exposed battery pack terminal and the negative lead to the disconnected clip terminal. Operate the chassis mounted RUN button (SW4). A current drain in the order of 40mADC should register on the meter. Depress the chassis mounted RESET button (SW3); the current drain should now

be reduced to approximately 100µADC. Disconnect the ammeter and reconnect the battery pack.

It is now necessary to adjust the clock oscillator timing to provide a 'write time' of one minute duration. Ensure that front panel mounted replay speed control (RV2) is set to the mid-position and switch the READ/WRITE switch to 'W' position; should the MA (memory available) LED be alight, depress the RESET button. Depress the RUN button and observe that the MA LED lights up — record the time period over which the LED remains lit. If it is for less than one minute, rotate the pcb mounted oscillator preset potentiometer, RV1, counter-clockwise slightly and repeat until the MA LED remains lit for one minute. If the LED is alight for more than one minute clockwise adjustment of RV1 is required. This completes the testing and setting up procedure.

### Keyer Modification

The necessary changes to be made inside the 8044 Keyer Unit are shown in Fig. 12. When installing SK5 correct orientation is with the solder tag common to the screen uppermost. This socket may be labelled in a similar way to SK2 on the Memory Unit. R24 (mod) is included to ensure that the KEYED OUTPUT (pin 14) of the 8044 Keyer ic is not shorted directly to ground when

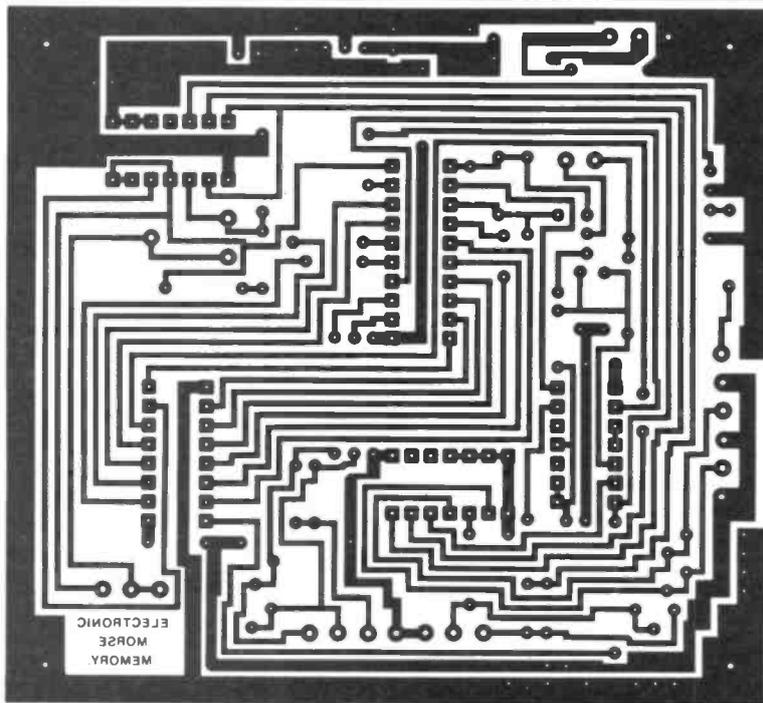


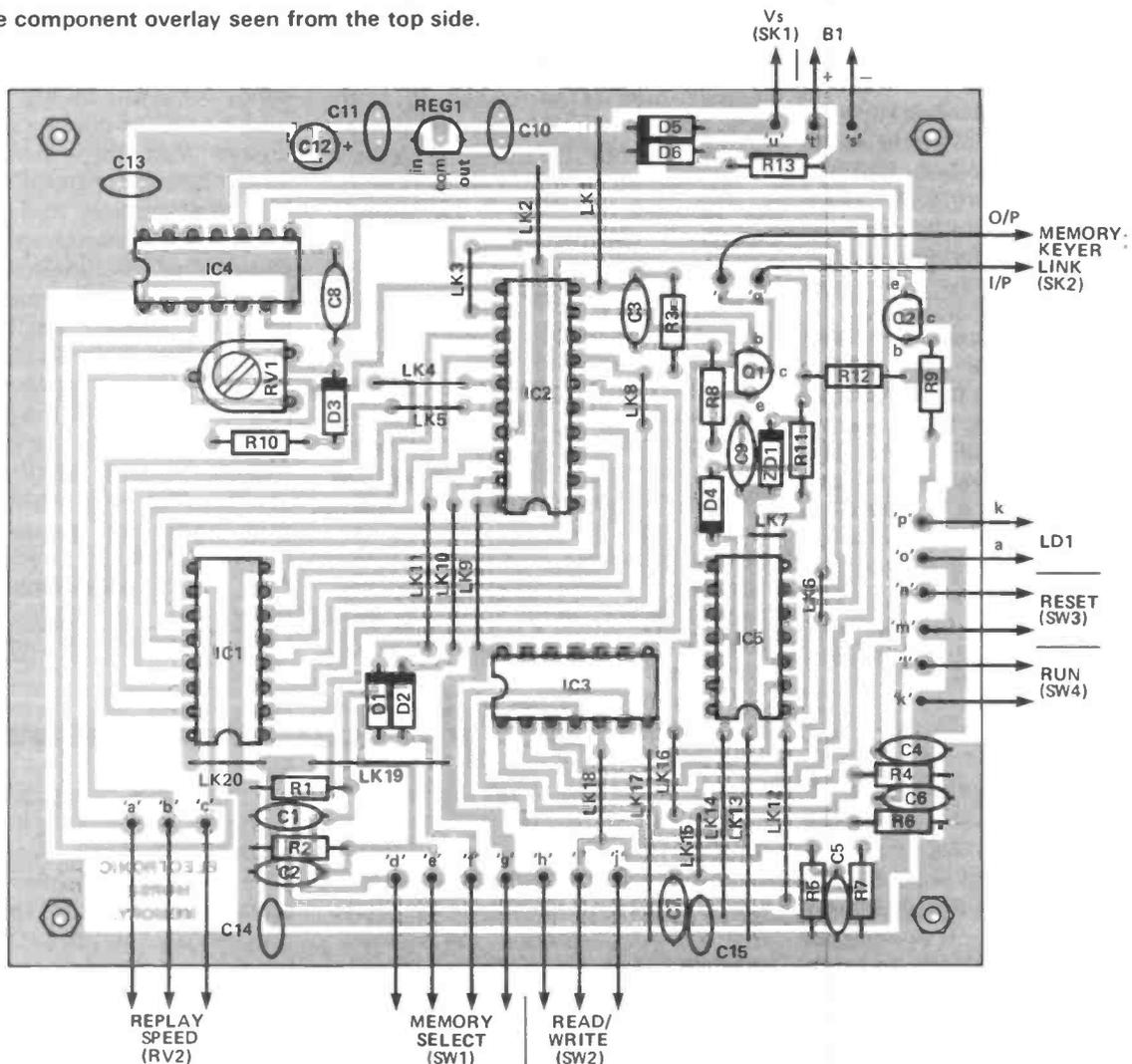
Fig. 3. The master pcb artwork, from the copper side.

automatically assumes a complementary logic level. For SW 2 (READ/WRITE) positions W and Rs a logic 0 will be read to the Q output placing the flip-flop in the reset state, with SW2 in the Rc position the state of the Q output remains unchanged allowing the message stored in memory to be repeated indefinitely. IC3a may be reset manually at any time by momentarily depressing SW3 (RESET).

IC4c 'ands' the Q output of IC3a with the write position of SW2; when this switch setting is selected and the Q output is at logic 1 then logic 0 will appear at the NAND gate output. This switches TR2 on, illuminating LD1 (MEMORY AVAILABLE) via current limiting resistor R9. The LED will remain lit until the Q output returns to logic 0 indicating that the memory is full.

R1 to R7 are pull down resistors which ensure that inputs are never

Fig. 4. The component overlay seen from the top side.



left floating, C1 to C7 are included to provide rf decoupling at each input.

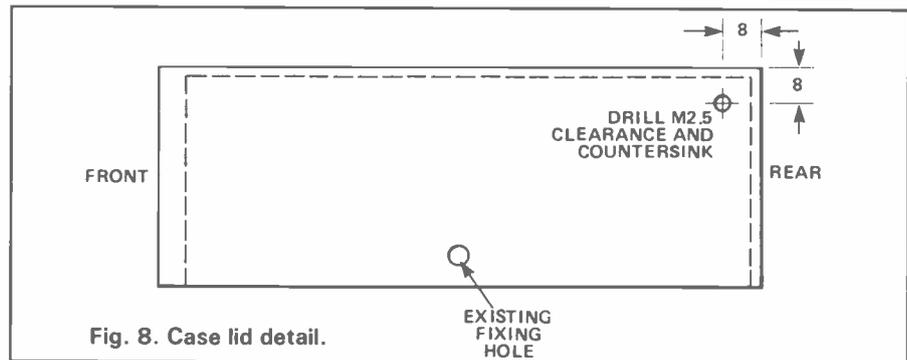
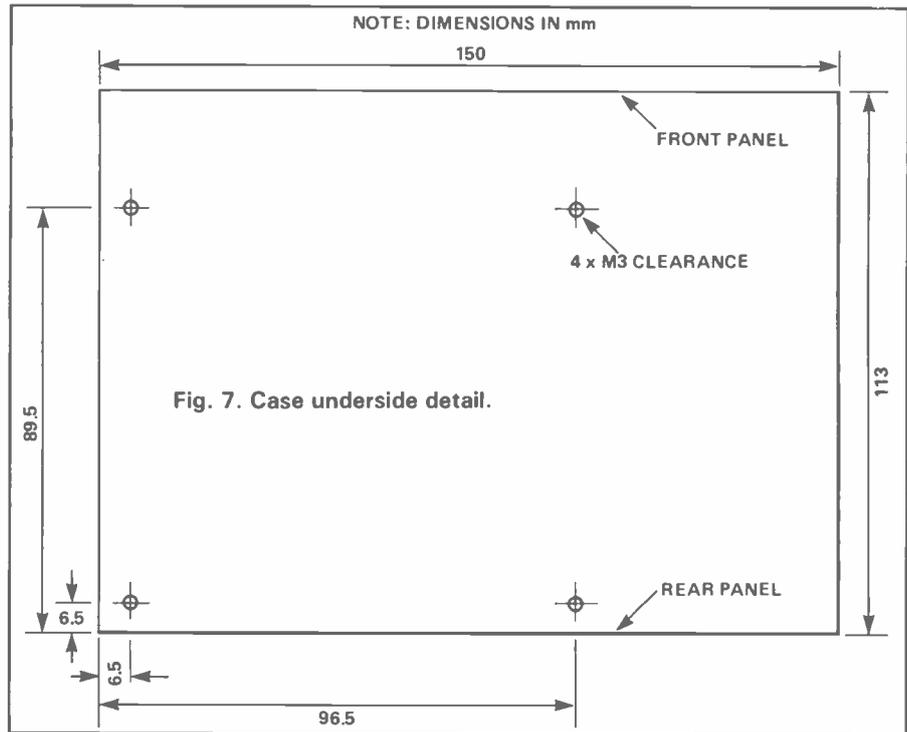
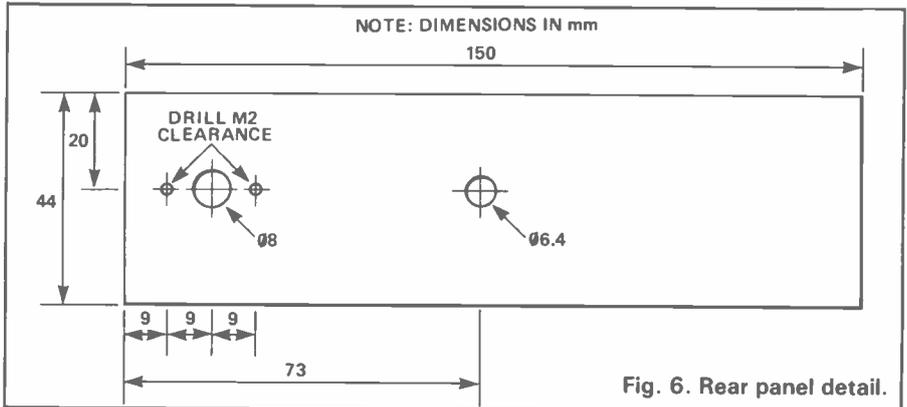
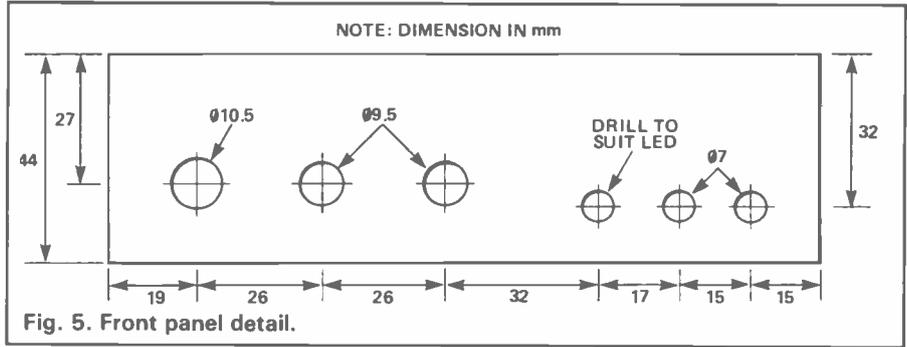
### Construction

The artwork for a single sided pcb is shown in Fig. 3. Refer to Fig. 4. for the component layout. PCB holes for components RV1, D5, D6 along with pcb holes 'a' to 'u', which accommodate veropins, need to be drilled to 1mm diameter. All remaining holes are drilled 0.8mm diameter. The four pcb fixing holes should be drilled to provide M3 clearance.

Commence assembly by soldering the twenty-one Veropins and the twenty pcb links into place. Install and solder down resistors R1 to R13 along with capacitors C1 to C15 observing polarity of C12. Next fit variable resistor RV1 and the five ic sockets, checking orientation before soldering into place. The use of good quality ic sockets of the turned-pin variety is recommended. DO NOT install any of the ics at this stage — they must remain in their protective packaging until final assembly is complete. Observing the polarity, install diodes D1 to D6 and zener diode ZD1, attaching a suitable heatshunt (such as a small croc clip) to each leg in turn when soldering. Transistors TR1, TR2 and voltage regulator REG1 are the last components to be installed; again observe polarity when installing and use a heat shunt when soldering. During assembly components may be held close to the board for soldering by bending the component leads over by about forty-five degrees after insertion. Trim all component leads after soldering. When pcb assembly is complete a visual inspection of the board is recommended to ensure that no solder bridges exist between tracks.

### Drilling and Assembly

Refer to Figs. 5, 6, 7, 8 and 9. The bottom half of this two-part housing constitutes the base, front and rear panels. Commence assembly by drilling and deburring all chassis holes. On completion, the front panel label is attached. This can be manufactured and affixed in a similar way to that described for the keyer unit in the July 1988 issue of HRT. The front panel legend is shown full size in Fig.



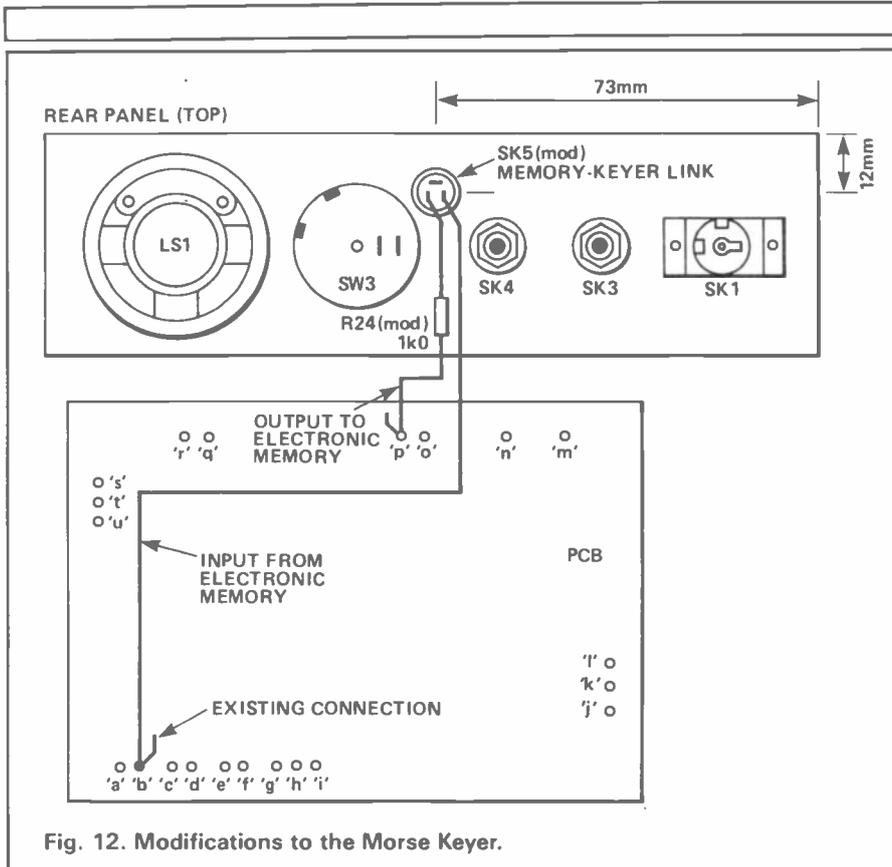


Fig. 12. Modifications to the Morse Keyer.

inserting or removing the interconnecting memory-keyer link. Along with R11 it also sets the correct bias current for ZD1. Installing two extra wires as shown completes the modification to the Keyer Unit. Place the Memory Unit on top of the Keyer Unit and interconnect using the memory-keyer interconnecting lead. Both units are now ready for use.

### Using The Memory

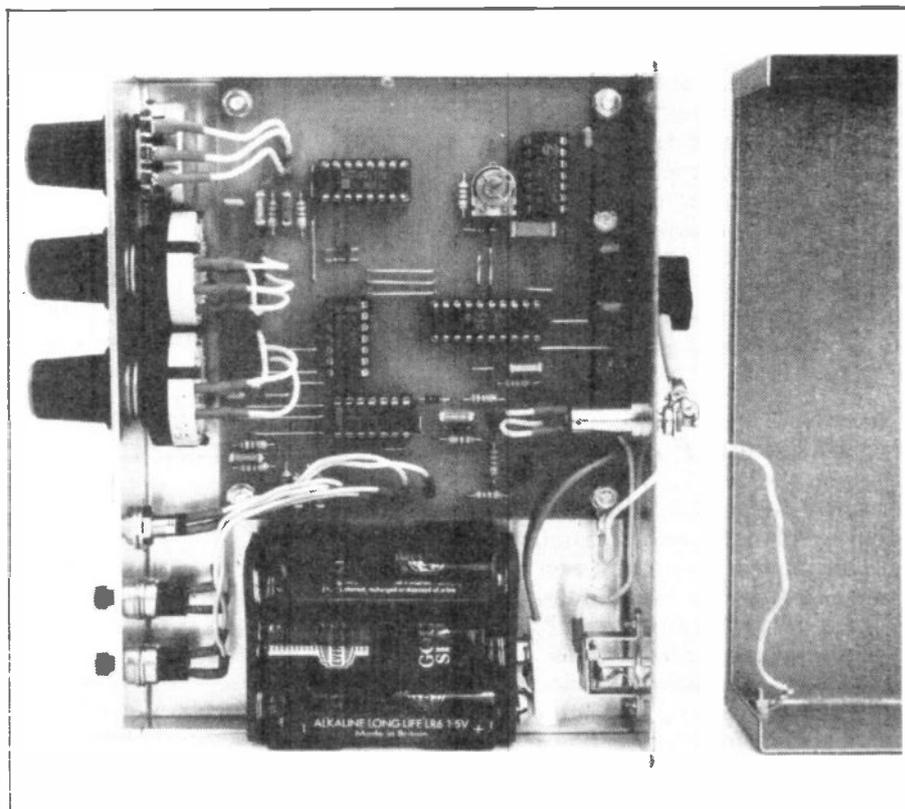
To store a message select the required memory M1-M4 using the memory select switch. Place the replay speed control to the central 'O' position. Set the READ/WRITE switch to 'W'. Momentary operation of the RUN button will illuminate the MA LED to indicate that memory is available. A message of one minute duration may now be keyed into memory. The LED will extinguish at the end of this time indicating that the memory is full. When a message of less than one minute duration is written to memory allow the unit to time out, this will ensure that previous memory contents are completely erased.

To read a message from memory select the required memory M1-M4 using the memory select switch and

set the READ/WRITE switch to 'Rs'. Momentary operation of the RUN button reads the stored message from memory one time only with the unit automatically resetting itself.

When used with the READ/WRITE switch in the 'Rc' position the message will repeat until the RESET button is operated. With the replay speed control set to the central 'O' position a message will be read out at the speed at which it was recorded. Adjusting this control permits an increase or decrease in replay speed of several wpm. Note that the Keyer weight control is functional when 'writing to' and 'reading from' memory, and it may therefore be desirable to set this control to a minimum setting when writing to memory so that the required amount of weight, if any, can be added on replay. The Keyer volume control is used to control the audio level when replaying from memory.

Finally, because of the modest current demand when in use along with the very low quiescent demand many months of use can be expected from a single set of six AA size alkaline manganese batteries based on one hour's daily use. Should the cells be used only for quiescent back-up life expectancy is substantially more than one year. When it does become necessary to replace the batteries disconnect the memory-keyer link from the memory unit before replacing the batteries.



## Buying Guide

The 6167P CMOS RAM (order code HM6167P) at £5.29 inc. VAT, or 6167HP-45 (order code HM6167HP-45) at £6.21 inc. VAT and the LP2950CZ voltage regulator (order code LP2950CZ50) at £1.97 inc. VAT can be obtained from Farnell Electronic Components Ltd., Canal Road, Leeds, LS12 2TU. Tel. 636311.

The instrument case (order code LH37S) at £3.50 inc. VAT and all other components can be obtained from Maplin Electronic Supplies Ltd., PQ Box 3, Rayleigh, Essex SS6 8LR. Tel. 0702 554161.

## Parts List

### Resistors

All 0.25W 5% carbon film unless specified.

R1,2,3,5,7,

12 1M

R4,6,8,13 10k

R9 220R

R10,24 1k

R11 500R  
RV1 1M hor. s-min preset  
RV2 500k pot. 1in.

### Capacitors

C1,2,3,4,5 10nF polyester  
6,7,9  
C8 150nF polyester  
C10,11 100nF ceramic  
C12 10µF 16V elect.  
C13,14,15 10nF ceramic

### Semiconductors

D1,2,3,4 1N914  
D5,6 1N4001  
ZD1 BZY88C 4V7  
LD1 LED, panel mount  
TR1 2N3704  
TR2 2N3702  
REG1 LM2950CZ 5.0  
IC1 4040B  
IC2 HM6167P  
IC3 4013B  
IC4 4093B  
IC5 40106B

### Miscellaneous

SW1,2 1 pole, 12-way rotary  
SW3,4 spst 'push to make'  
(momentary action)  
SK1 2.5mm power socket  
SK2,5 3.5mm stereo jack  
socket  
PL1 2.5mm 'long' power  
plug  
PL2,5 3.5mm right angle  
stereo jack plug

Instrument case, 'AA' battery box — 9V, battery clup, PP3, ic holder, 14 pin (3 off), ic holder, 16 pin, ic holder, 20 pin knobs, rubber feet, M2.5/M3 hardware.

(Note: R24, SK5 and PL5 are for Keyer mod).

### Costing

Estimated cost of circuit components and hardware is £24.70; Estimated cost of pcb and label manufacture is £5.00. The total estimated construction cost is £29.70. Ham Radio Today hopes to be able to offer a pcb for the Morse Memory. See page ●●● for details.

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Top mount bracket for above £6.85 + £1 p&p  
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| <p><b>11 Jan</b> Hornsea RC: UHF Techniques by G3ZTR. The Mill, Atwick Road, Hornsea. 8pm.<br/>Norfolk ARC: CQ for a copy, a debate. The Norfolk Dumpling, Livestock Market, Harford, Norwich, 7.30pm.<br/>South Bristol ARC: VHF activity evening. Whitchurch Folk House, East Dundry Rd, Whitchurch, Bristol.</p> <p><b>12 Jan</b> Southgate ARC: Award Hunting by G4OUL. Yeovil ARC: Transposing formulas by G3MYM. The Recreation Centre, Chilton Grove, Yeovil. 7.30pm.</p> <p><b>13 Jan</b> Coventry ARS: Computer Night — bring your own if you can. Baden Powell House, 121 St Nicholas Road, Radford, Coventry, 7.30pm.<br/>Mansfield ARS: Antenna construction.<br/>Wimbledon DARS: Meet the Committee night.</p> <p><b>14 Jan</b> Dunstable Downs RC: Club Dinner and Dance.</p> <p><b>16 Jan</b> Todmorden DARS: Natter night. 8pm. Queen Hotel, Todmorden.</p> <p><b>17 Jan</b> Biggin Hill ARC: AGM. The Victory Social Club, Kechill Gardens, Hayes, Kent. 7.30pm.<br/>Chichester DARC: Cellular radio by Mike Browne, St. Pancras Hall, Chichester, 7.30pm.<br/>Delyn RC: Micro Wave Modules (to be confirmed).<br/>Workshop ARS: Darts and dominoes. Contact sec. G4ZUN (0909) 486614 for details.</p> <p><b>18 Jan</b> Hornsea RC: Gems by G4ODD. The Mill, Atwick Road, Hornsea. 8pm.<br/>South Bristol ARC: HF activity evening. Whitchurch Folk House, Dundry Rd, Whitchurch, Bristol.</p> <p><b>19 Jan</b> Yeovil ARC: Kilve review by G3MYM. Recreation Centre, Chilton Grove, Yeovil, 7.30pm</p> <p><b>20 Jan</b> Coventry ARS: Night on the air and Morse tuition. Baden Powell House, 121 St. Nicholas St., Radford, Coventry.<br/>Dunstable Downs RC: Fault finding by G4ENB. Room 3, Chews House, 77 High St., Dunstable.<br/>Taunton DARC: Robotics film and talk by Doug G5JJ. County Hall, Taunton (Emergency Planning HQ).</p> <p><b>23 Jan</b> Stourbridge DARC: to be confirmed. Robin Woods Centre, Beauty Bank, Stourbridge. Information from Sec. G1WAI, 0562 885602.</p> <p><b>24 Jan</b> Verulam ARC: New Licence Question Time. Dr. Julian Gannaway, G3YGF chairman. RAF Association HQ, New Kent Rd., Marlborough Rd., St. Albans.<br/>Workshop ARS: Natter night.</p> <p><b>25 Jan</b> Hornsea RC: Annual Dinner.<br/>Norfolk ARC: Homebrew spectrum analyser by Mike Lemin G4UUB. Bring your HF rig along for checking. The Norfolk Dumpling, Livestock Market, Harford, Norwich. 7.30pm.<br/>South Bristol ARC: Club video activity evening.</p> | <p><b>26 Jan</b> Southgate ARC: Homebrew Amnesty: Help for problem projects. Holy Trinity Church Hall, Winchmore Hill, London N21. 7.45pm.<br/>Yeovil ARC: Natter night.</p> <p><b>27 Jan</b> Coventry ARS: Annual Dinner.<br/>Mansfield ARS: Junk sale.<br/>Wimbledon DARS: Homebrew UHF and VHF Yagi Antennae by John Simkins G8IYS. 7.30pm. St. Andrews Church Hall, Herbert Road, Wimbledon, London.</p> <p><b>29 Jan</b> NARSA: Norbreck Radio &amp; Electronics 1989 Exhibition at the Norbreck Castle Exhibition Centre, Blackpool. Details from Peter Denton, G6CGF on 051-630 5790.</p> <p><b>31 Jan</b> Delyn RC: Talk and exhibition/demonstration by Glyn Jones of G &amp; G Photographers. Daniel Owen Centre, Mold.<br/>Workshop ARS: Magazine sale.<br/>Hornsea RC: Morokulien Adventure by G4YTV.<br/>Norfolk ARC: Informal and committee meeting.<br/>South Bristol ARC: Photographic equipment rally.<br/>Horsham ARC: How brew evening, Guide Hall, Denne Road, Horsham. 8pm.<br/>Yeovil ARC: Feedback by G8AWB. The Recreation Centre, Chilton Grove, Yeovil.</p> <p><b>1 Feb</b> Coventry ARS: Night on the air, and Morse tuition.<br/>Taunton DARC: Radio Quiz — details from Peter GOEYR on 0823 275972. County Hall, Taunton, Emergency Planning HQ.</p> <p><b>2 Feb</b> Basingstoke ARC: Packet Radio by G1WKK (provisional). Forest Ring Community Centre, Sycamore Way, Winlebury. 7.30pm.<br/>Stourbridge DARS: Natter night.</p> <p><b>3 Feb</b> Workshop ARS: Natter night.<br/>Hornsea RC: Telegraphic Communication by G4IGY. The Mill, Atwick Road, Hornsea. 8pm.<br/>Norfolk ARC: Mast planning problems by Chas Matthews G8NXU of the RSGB Planning Panel.<br/>South Bristol ARC: Activity evening.<br/>Southgate ARC: Quiz evening by G4UKR.</p> <p><b>5 Feb</b> Coventry ARS: Quiz night. Baden Powell House, 121 St. Nicholas Road, Radford, Coventry. 7.30pm.<br/>Mansfield ARS: To be confirmed.<br/>Wimbledon DARS: Bring and Buy Book Sale. 8.30pm. St. Andrews Church Hall.</p> <p><b>6 Feb</b> Delyn RC: Valentines Night. Daniel Owen Centre, Mold.<br/>Workshop ARS: Junk sale. Contact Sec. G4ZUM (0909) 486614 for details.</p> <p><b>7 Feb</b> Hornsea RC: 5Z4 Kenya by G1TFT. The Mill, Atwick Road, Hornsea. 8pm.<br/>Norfolk ARC: Informal meeting.<br/>South Bristol ARC: Activity evening. Whitchurch</p> |
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	Folk House, East Dundry Road, Whitchurch, Bristol.		
17 Feb	Coventry ARS: Night on the air and Morse tuition. Taunton DARC: Talk by member of the First Class Operators Club. County Hall Taunton, Emergency Planning HQ.	19 Mar	<b>Wythall Radio Club are holding their 4th Annual Radio Rally at Wythall Park, Silver St., Wythall, Worcs. The site has three large halls, a flea market, trade stands, a large bring and buy stand, RSGB Morse tests (subject to confirmation), bar and snacks and talk in on S22. There is free parking "and more of it this time", and the site is just off the A435 south of Birmingham. Admission is 50p. Details from Chris GOEYO on 021 430 7267.</b>
20 Feb	Stourbridge DARS: Constructors Competition. Robin Woods Centre, Beauty Bank, Stourbridge.	20 Mar	Stourbridge DARS: Annual general meeting. Robin Woods Centre, Beauty Bank, Stourbridge.
21 Feb	Workshop ARS: Natter night.	21 Mar	Workshop ARS: Natter night.
22 Feb	Hornsea RC: Natter night. Norfolk ARC: 38 Years with Air Traffic Control by John Stephens G8LGB. The Norfolk Dumpling, Livestock Market, Harford, Norwich, 7.30pm.	22 Mar	Hornsea RC: Computer operating systems by Simon SWL. The Mill, Atwick Road, Hornsea. 8pm. Norfolk ARC: The Shefford Club Project 2m DC XCVR, Dick Bacon G8LGB. The Norfolk Dumpling, Livestock Market, Harford, Norwich. 7.30pm.
23 Feb	Southgate ARC: Club meeting, Holy Trinity Church Hall, Winchmore Hill, London N21. 7.45pm.	24 Mar	Coventry ARS: Talk from the British Amateur Television Club (provis). Mansfield ARS: Foxhunt.
24 Feb	Coventry ARS: The indoor direction finding contest (cup qualifier), Baden Powell House, 121 St. Nicholas St., Redford, Coventry. 7.30pm. Mansfield ARS: Open forum. Wimbledon DARS: Antenna Matching Units by Alan Bartle G6HC. St. Andrews Church Hall, Herbert Rd., Wimbledon, London SW19. 7.30pm.	26 Mar	<b>Cunningham DARC: Mobile Rally to be held at the Magnum Leisure Centre in Irvine (the site of the Scottish National Convention in 1987). New annual rally, 10.30am onwards. Leisure centre facilities available for non-amateur family members. More information from Bob Lowe GMOECU, 2 Craigie Place, Crosshouse, Ayrshire KA2 0JR.</b>
28 Feb	Delyn RC: Open night. A chance to discuss the forthcoming AGM. Daniel Owen Centre, Mold. Workshop ARS: Official Club Meeting.	28 Mar	Delyn RC: RSGB film or video. Daniel Owen Centre, Mold. Workshop ARS: Astronomy by Kevin G4MDQ. Details from Sec. G4ZUN (0909) 486614.
1 Mar	Hornsea RC: SWR by G3TEU.	29 Mar	<b>Cambridgeshire Repeater Group: 7th Annual Junk Sale Rally Extravaganza to be held at the Philips RCS (Pye Telecom) Canteen, St. Andrews Road, Chesterton, Cambridge from 10.30am. Trade stands and monster junk auction, nearly new bring-and-buy. Refreshments and ample car free parking. Talk-in on S22 and RB14 (GB3PY) by G5PI. All proceeds to finance the six local repeaters operated by the Group. Enquiries to GODAH, tel 09547 405 after 6pm.</b>
2 Mar	Norfolk ARC: "Any Questions?"; ask the panel.		
3 Mar	Horsham ARC: Spring Junk Sale, Guide Hall, Denne Road, Horsham. 8pm.	31 Mar	Coventry ARS: Night on the air, and Morse tuition. Baden Powell House, 121 St. Nicholas St., Radford, Coventry.
4 Mar	Coventry ARS: Night on the air, and Morse tuition. Taunton DARC: Talk by Eric Godfrey G3GC. <b>Tyneside ARS: Blue Sar Radio Rally at High Gosforth Part (Newcastle Racecourse). All the usual attractions, talk-in available. Further details from Terry (G6VEG) on 091 264 8196.</b>	4 Apr	Workshop ARS: Natter night.
6 Mar	Stourbridge DARS: Natter night.	5 Apr	Hornsea RC: Audio Visual by G4YTV.
7 Mar	Workshop ARS: Natter night.	6 Apr	Horsham ARC: Cellular telephone systems by John Pitty G4PEO, Guide Hall, Denne Road, Horsham. 8pm.
8 Mar	Hornsea RC: Committee Meeting. Norfolk ARC: Surplus equipment auction/bring and buy. The Norfolk Dumpling, Livestock Market, Harford, Norwich. 7pm.	12 Apr	Hornsea RC: Addu Attoll by Harry SWL. The Mill, Atwick Road, Hornsea. 8pm.
10 Mar	Coventry ARS: Members' slide/video show. Baden Powell House, 121 St. Nicholas St., Radford, Coventry. 7.30pm. Mansfield ARS: To be confirmed.	14 Apr	Mansfield ARS: Guest speaker.
14 Mar	Delyn RC: AGM. Workshop ARS: Video — W5LFL lecture. Details from Sec. G4ZUN (0909) 486614.	28 Apr	Mansfield ARS: Inter-club quiz.
15 Mar	Hornsea RC: Omega entertains by G4YTV. The Mill, Atwick Road, Hornsea. 8pm. Norfolk ARC: Computer aided printed circuits, Paul Sergeant G4ONF. The Norfolk Dumpling, Livestock Market, Harford, Norwich. 7.30pm.		
17 Mar	Coventry ARS: Night on the air and Morse tuition. Baden Powell House, 121 St. Nicholas St., Radford, Coventry. 7.30pm. Taunton DARC: RSGB video. County Hall, Taunton, Emergency Planning HQ.		
19 Mar	<b>Tiverton South East Radio Club 1989 Mid Devon Rally, at the Painter Market, Tiverton, Sunday March 19th. Easy access, minutes from junction 27 of the M5. Excellent free parking. Two halls of trade stands, bring and buy, mobile snack bar. Displays and full refreshment facilities in Club Room bar, open all day. Doors open 10am. Talk in on S22. Further information from G4TSW, Mid Devon Rally, P.O. Box 3, Tiverton, Devon.</b>		

**We need your dates at least three calendar months in advance to get them into the nearest issue. For example: the last possible issue for dates from mid-August to mid-September is the September issue. The September issue normally appears on the first Friday in August, and we need club dates by the second Friday in June. Club dates received four months in advance will normally be run in two issues. We don't run full meeting place details with every entry, but if you scan the columns you will find details under one or more entries.**

# Free Readers Ads!

## FOR SALE

**RADIO** Amateurs Examination. Complete rapid results college 1987, study course of seven books plus "How to Study", £15. Tel: 0279 723336 (after 6 pm or weekends) (Herts).

**EXCHANGE** FT7 Fox QRO TX/RX, any age but must be working. Anneski, c/o Top Right, 1 Dunphail Rd, Glasgow G34 0BX.

**MIDLAND** 6001, £75; Stalker St 9 FM DX, £60, both GWO and easily converted to 10M, also Breml BRI 210, 100W PEP, mains, linear, £55; six digit frequency counter, £35; ES 880 echo chamber, £25; 15 amp PSU, £45. Tel: Norwich (0603) 614928 (ask for Tony).

**JAYBEAM** Multibeam, MBM28/700, 28 ele, 70cm antenna, £15 ono, brand new, unused; Pye F27AM base transmitters, less PA valves but with 24 volt inverter, £5 each, no offers please. John, Kings Langley (09277) 68253 (evenings only).

**COMMODORE** MPS 801 printer, hardly used, £70 ono; VIC 1212 programmers aid cartridge, VIC 1211 super expander cartridge, £3 each, lots of games cartridges. Phone for details: 0506 412374 (evenings).

**SATCOM** Scan HOF 40CH transceiver, 6 months old, boxed, as new, £80 ono. Tel: 0912688466.

**SSB** on 2 metres: Belcom Liner 2 transceiver, 144-10 - 144-560MHz, continuous, not "tweaked", but fitted Wood & Douglas band-pass filter and muter pre-amp, complete with manual, circuit diagram, drawings, excellent condition, £60 only. Eric, GOHRU, 0939-33638 (anytime).

**YAESU** FT-757, GX HF, all mode computer transceiver, absolute mint condition, little used, £625 ono; S.E.M. tran-z-match A.T.U. with ezitune, as above condition, £79; Datong D70 morse tutor, as new, still boxed, £39. For viewing/trial etc phone Leeds (0522) 585806.

**YASHICA** 8T cine camera, twin turret, D mount, screw in lenses, f1.4-13mm normal, f1.4-38mm telephoto, handbook, leather carrying case, in good condition, swap for 13.9 DC power supply or W.H.Y. Reading 0734 588503.

**TS-430S**, mint condition, with matching PS-430S power supply, both boxed with manuals, etc, also converted DNT 40 with PA, 25W on 10 FM. Contact GOAYU QTHR or 0484 605157.

**FOR sale** or swap, dual beam oscilloscope, DC-15MHz, solid state with battery back up, complete with all leads and manuals, £100 wanted, 2M/70cm, hand held or W.H.Y. Phone John 0606 550258.

**KENWOOD** TS520SE HF, TXRX 160M to 10M, 100 watts, wide and narrow cw filter, first mike and external speaker, excellent condition, £425 ono, plus post and packing. Contact GOCUO, Tyneside 091-4107884 (anytime).

**FOR SALE.** Dymar 880 2 metre 1 watt FM transceiver fitted and working, fine on S20, S21, S22, S23, £45; Dymar 880 2 metre ½ watt FM, 3 channel, good working condition but no crystals fitted, £20. Walters Post Office brass morse key, about 1925 era, £30. GW37GM, telephone 0437 2015.

**FRG7** Schematic for photostat copy, please send £3 plus large SAE to R. Gant, 25 Worcester Avenue, Garstang, Preston, Lancs PR3 1FJ. Also wanted: frequency counter.

**DATONG** D70 morse tutor, plug, hi-mound, HK 708, key with earpiece and connection, boxed, excellent condition, £40. 0743 246948.

**SEM** Ezitune, as new, £20, factory built and tested. 0743 246948.

**SPECTRUM** receive pre-amplifier, RP105, factory built and tested, unused, £20. 0743 264948.

**UNIDEN** CR 20-21 amateur and broadcast bands, boxed with manual plus PSU, excellent condition and working order. 0743 246948.

**FT707, FP707, Shure** mic, £300; **TET 3 EL** beam, £100; **rotator HD**, £100; **Ocean Fax RX/printer**, £100; **26in colour monitor**, £30. Tel: Windsor 0753 863742 (after 6 pm).

**FOR sale.** Yaesu FT747GX transceiver, with FM microphone, mint condition, £570, includes Carr Cap Co A.T.U., SPC 300, mint condition, £180, includes Carr Daiwa NS660P SWR P.E.P. meter, mint condition, £98, includes Carr Yaesu YH55 phones, £10; Trio DM801 DIP, £45. Tel: John G4YDM QTHR, Washington 091-4162606.

**FOR sale,** ICOM IC-2906, boxed, with mobile bracket and scanning microphone, A200 amplifier, 10W in, 80W out, Wood & Douglas pre-amp, £300 for the lot. QTHR G1SES. Phone Runcorn (092 85) 69882.

**TH21E,** Trio Mini, handheld, recently recased, new PA transistor, PLL retuned and xtal replaced due to malfunction, excellent working order, boxed with charger, PB21 Nicad, rubber duck, soft case, EB2 external K1 type case, ¼ wave whip, £135. G1ZSN. Stockport (061) 4907515.

**STANDARD** C58 portable 2M multimode (similar to FT290 but smaller), nicads, charger, microphone £240 ono, would consider deal on 2M h/held also Pye PF2, UHF, h/held, £10. Contact Paul G1XVL, 25 White Lodge Gardens, Bilborough, Nottingham NG8 4BL.

**YAESU** FRG8800, gen cov RX, mint condition, limited use, boxed, manual, reason for sale just licensed, bargain, £400 ono or exchange HF equipment TS130 etc or W.H.Y. Gwynedd 0758 740171.

**TRIO** TS520, HFSSB, TCVR, CW filter, new PA valves, plus Kenwood 520 remote VFO and manual, £375 ono. GW0EWG GLYN, phone (Deeside) (0244) 816434 (evenings preferred).

**DRAKE** TR7 transceiver, PS7 power supply, MN2700 2kW ATU, B1000 Balun and mic, will not separate, any sensible offer considered. Nigel G4XOR, 01-830 7476 (evenings/weekends).

**TRIO** TS-530 SP HF transceiver, 270Hz CW fltr, matching SP-230 speaker, CN620A cross-needle SWR meter, two ATUs 3-28 MHz, AF-606K, active all-mode filter, DK-200 keyer, RCA morse keyboard, accept best offer for complete station, including handbooks. Jon, 27 Balton Way, Harwich, Essex CO12 4UP.

**YAESU** FT101ZD Mk III with FM/AM boards, in mint condition, £475; oscilloscope by Cosser Instruments, £30, also 4 element Yagi beam, suitable for 10mtrs, with brand new rotator and control box, £45. Ring Paul (0706) 68838 (after 5 pm).

**934 MHz** rig and 26 ele Yagi beam antenna with co-ax, £120 ono, will split, would consider exchange for 2M, 70cm or CB multimode. Phone Ian, Chester (0244) 535725 (after 5 pm).

**YAESU** FT 757GX transceiver, FC757 automatic ATU, FP 757HD, heavy duty power supply, as new, £800, will not separate. Tel: 01-517 3588.

**FOR sale.** Plessey PR1551-RX spares, including manual, Drake R4C/CW/filter, Lafayette H380-G/C RX prewar RX parts; wanted, deluxe tuning knob for Trio 820; Eddystone 940 RX; GEC BRT 400 RX SM220 monitor scope. Mr Wright, 54 Queen Mary Avenue, Basingstoke, Hampshire, 0256 468649.

**HI-FI,** acoustic research legend turntable, VMS 20 E II, Linn LVV arm, £110 (or £170 with Rega RB 300); NAD 3020A amplifier, £50, all excellent condition, going HF. Write, all letters answered, Mark Cooper, 33 Park View, Royston, Barnsley, South Yorkshire S71 4AA.

**YAESU** FT790R, nicads, case, charger, as new, £285; Yaesu FT 708, hand held, charger case, £159. Phone 0695 624211 (evenings) (Wigan area).

**2 METRE** hand held Trio 2500, complete with 2 battery packs, leatherette case, charger and service data, £140; 70 cms

hand held Trio TR 3500, complete with 2 battery packs, speaker/mic and service data. Tel: 02407 3696 (Bucks).

**FL 2100Z** Yaesu linear, two brand new valves, plus one spare valve, £650 ono; Sommerkamp TS208, 45 watt, 2 metre FM TCVR lightweight tower in 3 x 10 foot sections, plus crown unit, £50 ono. G40FR QTHR, 0752 880784 (Plymouth).

**EXCHANGE/SALE** standard C7800 70cms mobile base station transceiver, 10W/1W FM with mobile bracket, manual and in original packing, hardly ever used, £180 or exchange for FRG 7 communications receiver or other HF equipment or W.H.Y. Ring Mick, 01-304 9197 (after 6 pm).

**ZETAGI B550** mobile linear, all bands, current list, price £220, exchange for Yaesu ATU or sell £165; also Maplin R.T.T.M. terminal, TS1000, less than price at £25, plus P&P. John, 0734 411501.

**VINTAGE** items, rare No 17 military searchlight control transceiver in mint condition with original packing and manual, £125; Marconi TF801A sig gen, £50; Marconi TF4288/1 valve voltmeter, £25; early radar receiver, £30; old unused TX valves, £20 each. Bookham (0372) 52569.

**COMPLETE** packet station, Trio TR2300, Alinco linear, pack-comm TNC-220 with 32K Ram, BBC model-B with disc-drive, AMRAC Rom, Sanyo Hi-Res VDU, microline 82A printer, £490, connections CX2450 satellite television receiver with SPC LNB, £150. Tel: (Chelmsford) 0245-400825.

**CAP-CO** magnetic loop antenna model AMA5, 3.5MHz to 11MHz, as new, with control box, £200. Phone Worthing (0903) 40072 (evenings).

**ICOM R70 FM**, FL44 filter, global at 1000, 2 mtr, Datong converter, Slimjim, service manual, boxed, mint condition, £475. Derby 662712.

**YAESU FT101E**, immaculate condition, £375; also

matching frequency counter, YC-601B, £95. Phone Nigel, Sheffield 872464.

**BURNDPTS UHF** on demo channel, also charger, Pye PE70 charger and mobile adapter, Westminster, low, mid, high UHF, AM/FM, PF8's, plus charger, high band duplexer, Molano high band PMR Yaesu FR69600, many Pye spares. Phone and haggle, Tony, 0273 516033.

**PANASONIC RF-3100** short wave receiver, AM-FM coverage, £100 cash. Wanted, signal generator, not too large. Phone Southport 0704 42904 (after 6 pm).

**PRO-2004** programmable scanner, general coverage, AM/FM monitor receiver, 300 memory channels, £250, nearly £100 less than list price. Phone Southport 0704 42904.

**VERTICAL** trap 5-band antenna, 18 AVT/WB, £35; Microdot RTTY/CW communication terminal, built in VDU, £190 ono; Yaesu YC355D frequency counter, up to 200MHz, £55 ono. G3JXG, 0482 842386.

**EXCHANGE** Yaesu FRG 7700, FRT 7700, FRV 7700, all mint, with boxes and manuals, for basic Yaesu 9600 or similar quality scanner. Ring 0642 22376.

**PRO 2008 FM** scanner, 68-88MHz, 144-174MHz, 410-512MHz, immac, £100 ono; Admiralty receiver, type B400, superb condition, spare set of valves, AM, FM, SSB, FSK, CW, £80; 64KHz to 30.500MHz, SEM Tranzmatch with Ezitune, good condition, £60, buyer to inspect and collect, B40D. S. P. Martin, 24 Collingwood Close, Worle, Weston-Super-Mare, Avon BS22 9PQ.

**SOMMERKAMP TS788DX** mobile 26MHz-30MHz continuous coverage, SSB, FM, AM, CW, excellent 10 meter rig, scanning mike, lovely audio on all modes, 75 watts output, £200 or exchange multimode 2 meter, Yaesu Icom or Trio. Phone (Andover) 0264 58476.

**YAESU FT757GS**, FC757AT, FP757GX, scan mike, FDK757, mobile G4MH, mini beam antenna rotor, 2 metre antenna, external dual speaker, etc, going QRT, offers each rig.

42 Parkside Gardens, Nottingham NG8 2PQ.

**TRIO TS130S** transceiver, SSB/CW, 80M to 100M, also Yaesu FC707, ATU with dummy load, VSWR and power meter, £350. Phone Dave GONSH on 0689 42157, New Addington, Croydon.

**BARGAIN** for sale, RX Hammarlund SP600JX, 20 valve comm RX, excellent condition, 54KC to 54MHz, plus handbook, £150 ono. 54 Ardfillan Rd, Catford, London SE6 1SS.

**YAESU FT290**, 14 ele parabeam and 100W, 2M linear amp, £350 or swop for HF rig, buyer collects. Ian (0782) 771058.

**FOR** sale, TR9000, Trio (multimode), £260, good condition, with mobile bkts. Tel: 0302 859451.

**SIRTEL CB27/81**, hand portable, 4 watts output, 6 channels, large S/RF-batt meter, sockets, external antenna, power and charger with rubber duck, £25 inc post; Minolta SRT 100X, body only, SLR, £20. Wanted, Tandy's realistic 40cm hand portable CB. Tel: (074785) 639 (Dorset).

**COMMODORE 64** for exchange or sale, anything considered. Please ring (0666) 823490 (after 5 pm).

**COMMODORE C64C**, excelerator plus, disk drive, freeze machine, neos mouse + cheese, cassette unit C2N, two power supplies, £300 of software, all boxed, in very good condition, £300. Tel: Alva 61299 (after 5 pm).

**YAESU FTDX401** transceiver, 80 metres to 10 metres inclusive, 560 watts, PEP, very good condition, £200 ono. Contact Malcolm G3TUY, tel: 0734 771152.

**HF** station, FT707, FP707, Oskerblook SWR300, S.E.M. Z match, YM35; all in makers boxes with handbooks, £350. Also various items of test gear, all working offers please. Shrewsbury (0743) 63360.

**SALE** or exchange, Bearcat 220FB and satellite 3400 professional, both in good condition, little used, exchange for double beam scope and sig gen. Tel: Doncaster 842459.

**TS 520S**, mike, fan, manual, as new condition, £350 or exchange for 101ZD with cash adjustment. Phone 0787 280259.

**YAESU FT101**, six band HF SSB, CW, AM, spare valve, mike, fan, manual, good condition, £250. Phone 0787 280259. Yaesu FT101ZD wanted.

**"EXCHANGE"** FT208R base charger, mobile mic, 25 watt amp, magmount for 2 mtr SSB/FM rig; also black Jaguar scanner for home base scanner, must have air band. Tel: 01-987 2296 (evenings) or 01-240 1277 (days).

## Wanted

**WANTED:** German WW2 ex-service equipment, parts, literature, W.H.Y. British WS No 1, WS No 11, Eureka, s-phone, WS 66, WS 65, H2S, will collect. OZ8RO, Rag Otterstad, Vejdammen 5, DK-2840, Holte, Tel: 010-452-801875.

**WANTED** urgently! Cheap Vega RX for S.W.L. who is temporarily detached from his shortwave gear. Local-ish replies please, as only transport is rusty pushbike, phone Exeter (0392) 74202 (after 5 pm and ask for Andy).

**WANTED.** Yaesu YM34 microphone or similar for FT707, also FC 707 antenna tuner or similar, also wanted Spectrum computer with accessories and amateur programs. Tel: Norwich (0603) 614928, ask for Tony.

**WANTED.** Copies of HRT April 1986 and January 1986 to copy articles on Pye pocket-phones and Westminster, all expenses covered, also Lo Band and Hi Band Westminster and pocketphones on FM. T. Laycock, 27 Bank Street, Mirfield, West Yorkshire WF14 9QF.

**WANTED.** Please could anyone supply handbook or circuit diagram for TR10 7500 2 metre FM transceiver, manual or photocopy, expenses covered. G8CTB, 0525 715211, 24 Primrose Close, Flitwick, Beds MK45 1PJ.

**WANTED.** Practical Wireless 1930, 1960s, good price paid, Radio Constructor, Aero-modeller, please give home address when calling. 0793 485124.



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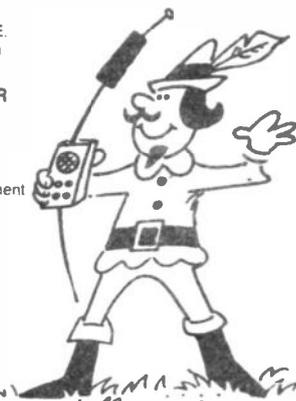
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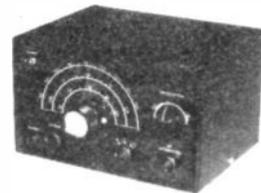
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It is amazing, the amount of bits and pieces which are stored in the average amateur station junk box. In spite of this, it often comes in useful. I proved the point only a few weeks ago when I decided to build a simple

present problems at RF are much fewer. This means that standard chip resistors and ceramic chip capacitors can be used quite happily to well in excess of 1Hz with very few problems. For the radio amateur in par-

destroy chip capacitors or resistors quite easily. This is because if heat is applied for too long, the tinning on the terminations will be 'leached' out, destroying the connection. Ideally low temperature solder, and a suitable soldering iron should be used to overcome this. However, most of us who do not have access to either of these have to use an ordinary iron with ordinary solder and a great deal

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power supply. It was to be nothing too fancy, but capable of delivering 12 volts at about an amp for powering up various station ancillaries.

On searching through the 'junk box', almost all the components for the new supply were found. The transformer was the first to come to light, followed quickly by a box, bridge rectifier, smoothing capacitor, front panel switch, LED indicator and terminals. In the end the only component which had to be bought was a fuse holder.

As a result of this, the supply was started that evening and completed much earlier than if all the components had to be bought. The other obvious advantage was the cost saving. Had the components all been bought new, the supply would have cost around ten or fifteen pounds. As it was the total outlay was in the order of a pound or so.

All of this goes to show that even though friends and relations may moan about the amateur radio junk around the house, it is still worth hanging on to some of it!

### **SMD Precautions**

SMDs (surface mounted devices) are becoming more an everyday part of amateur radio. Not only do they offer vast savings in space, but they also make boards easier to produce. This makes SMDs a very attractive proposition for companies which mass produce electronic equipment. On top of the production advantages, improvements in electrical performance can be obtained. As they are physically much smaller and have no leads, the stray effects which always

ticular this can be useful because all of us are aware of the disastrous consequences of stray inductance and capacitance on a circuit.

However, no new development is completely without disadvantages, whatever the sales literature says. These include the way that SMDs have to be soldered and desoldered. There are a few points to note when wielding a soldering iron around them.

The first involves the method of soldering. If the component is soldered using an ordinary iron and standard solder, it is possible to

of care, applying the iron only for the minimum time. This approach is normally quite acceptable, unless the component has to be soldered or desoldered several times.

The next problem to be overcome is desoldering. As both joints hold the device firmly in place, both ends have to be desoldered at the same time. This can be accomplished using two irons, or alternatively, a large bit. This should be large enough to contact both the tracks or pads for the component and melt the solder at both ends at the same time. If this is done then it is more likely that the com-

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SUSCEPTIBLE  
TO DAMAGE BY  
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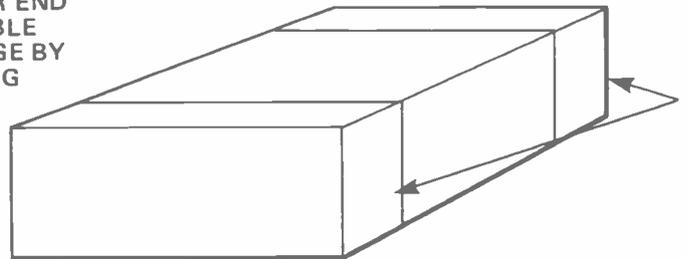
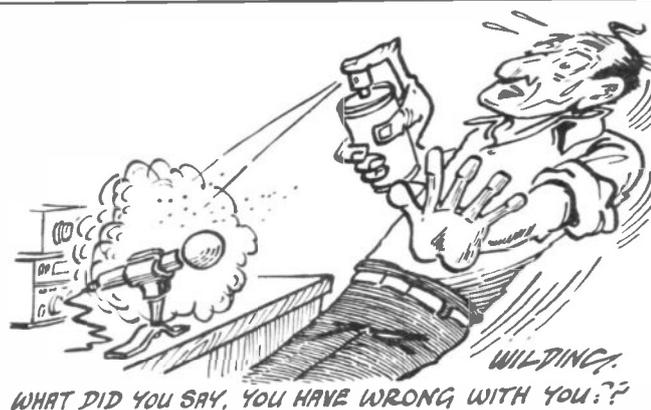


Fig. 1. The plain exterior of a surface mounting component



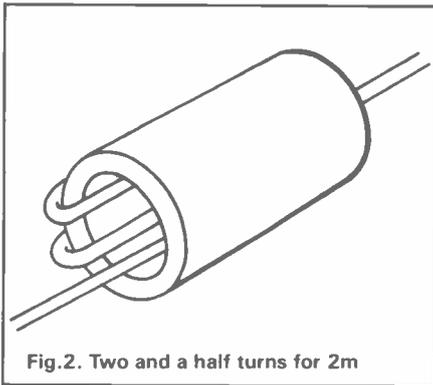


Fig.2. Two and a half turns for 2m

ponent can be re-used, or at least the board is less likely to be damaged.

One final warning: as SMDs are so susceptible to damage by being soldered and desoldered, take care when re-using, such components, as there is a high possibility that they won't work.

### Inductance of Ferrite Bead Chokes

It is widely known that small ferrite beads can be used to make excellent VHF chokes. For example, a standard recipe for a cheap and useful choke is two turns of enamelled wire on a FX1115 bead. However, I often wonder exactly what sort of inductance these chokes have, and if they could be used for

lower frequency applications. Obviously the main criterion is the inductance value.

Rather than trying to slog through all the maths and equations required to obtain an approximate value, it seemed better to measure it. As the inductance would be fairly small, a larger number of turns were placed on the bead and then this was measured. I found that seven turns gave an inductance of around 100µH which was more than I had expected. This value seemed to be reasonably constant over several samples.

Having got this value it is a relatively trivial step to calculate the inductance for different numbers of turns. This can be done by using the fact that the inductance varies according to the square of the turns or by using the formula:

$$\frac{N}{N_2} = \sqrt{\frac{L}{L_2}}$$

N = number of turns  
L = inductance

From this it will be seen that the two turns on an FX1115 gives an inductance of around 8µH — quite sufficient at 2 metres. Other values

can be wound for other purposes, although remember that as the number of turns increases the maximum current limit will have to be reduced, otherwise the core may saturate.

### Handling GaAs Devices

In the past few years the GaAsFet revolution has hit amateur radio, and many of these devices are being used in high performance receiver front ends. GaAsFets can give large improvements in performance over equivalent state-of-the-art silicon devices, but owing to their structure they can very easily be destroyed. Unlike Mosfets where the gate is physically insulated from the channel by a thin oxide layer, the GaAsFet gate consists of a minute Schottky barrier diode whose dimensions are measured in microns. Consequently any forward current in the diode, even caused by a static charge, is likely to fuse the diode and render the device useless. Though some of the more modern devices are less susceptible to damage in this way it is still wise to take the precaution against static damage.

Firstly, when handling GaAsFets the source should always be touched first so that any discharge goes to the channel and not via the gate. Similarly, when placing the Fet into a circuit, hold both the board and the device so that both are at the same potential. Then, when soldering the GaAsFet into place, earth the iron to the board and, preferably, unplug the iron from the mains. It is also wise to construct the rest of the board before installing the GaAsFet so that the board undergoes the least possible soldering while it is in circuit. Finally GaAsFets should never be handled in a room which is known to give static sparks after walking across it.

If these precautions are implemented then there should be few problems with handling and installing delicate devices. These rules can be applied to any static sensitive components despite the fact that great improvements have been made in recent years in improving static immunity — manufacturers of electronic equipment still, if they are wise, use special static free stations for installing sensitive devices and those who do not go to this trouble and expense soon find out why it is worth while.

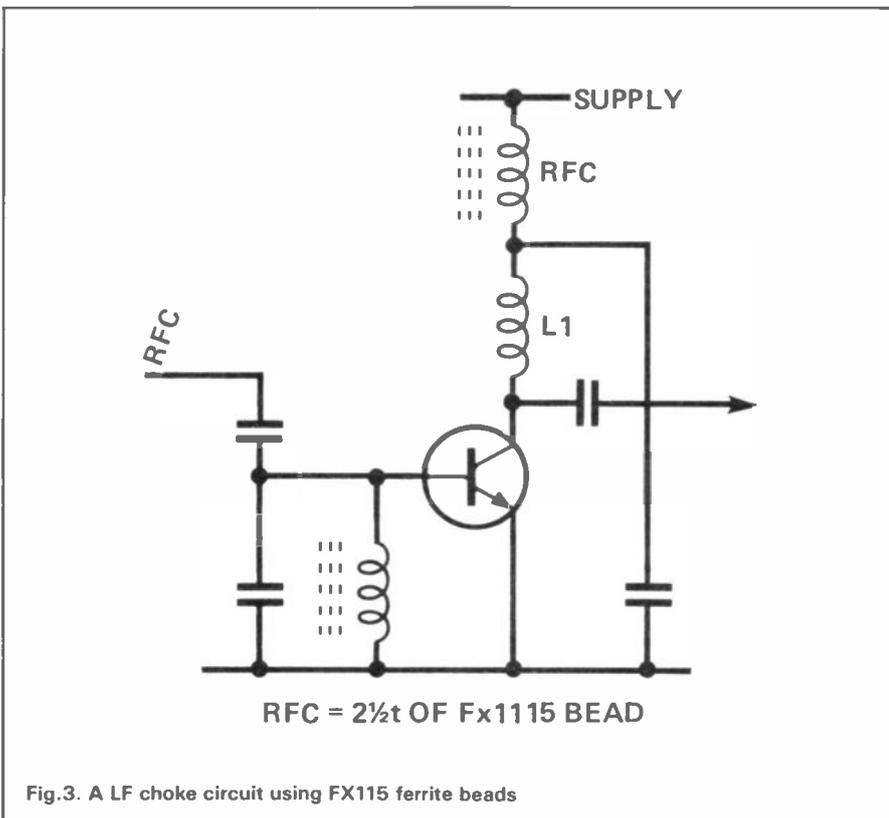


Fig.3. A LF choke circuit using FX1115 ferrite beads

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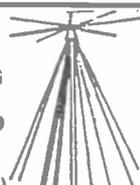
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