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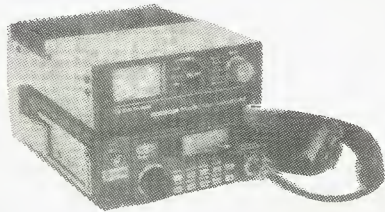
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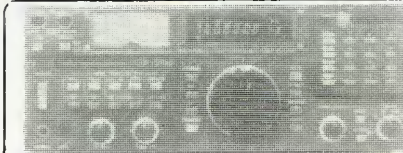
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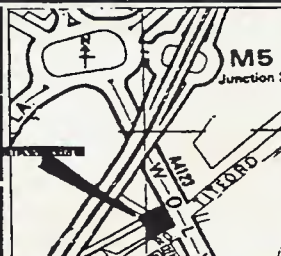


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VOLUME 8 NO 7 JULY 1990

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Helen Armstrong BA  
**Technical Editor**  
Andrew Armstrong BSc CEng G3YZW  
**Reviews Consultant**  
Chris Lorek BSc (ENG) G4HCL  
**Technical Illustrator**  
Jerry Fowler  
**Advertisement Manager**  
Cass Gilroy  
**Classified Sales Executive**  
John Brasier

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# LETTERS

## Letter of the Month

In your reply to G. Broadhurst G1FGA you post the question "Why morse anyway?" I would like to add a further point of view.

If the CW test was abolished it would only be a matter of time before the CW operator was an endangered species in this country. Before anyone says "So what?", I would like to suggest why CW should be retained in amateur radio.

It is a mode of communication that can be used internationally with no language barriers (a kind of Esperanto?)

In this country amateurs have a special obligation to learn CW. Although English is a language recognised worldwide, it presents an extra hurdle to non-English-speaking

amateurs working into English-speaking areas. Many English speakers expect to converse internationally in English. They might give some thought to those who cannot converse in English (or in the language of the next-door country) and who find CW is their only practical means of international communication.

Imagine how we would feel if more of the amateur world spoke, for instance, Russian, instead of English. — **George Armstrong G0L1W, Silloth, Carlisle.**

**A very interesting point. Morse is a language which can be totally transparent to users whatever their native tongue. We could cut ourselves off from communication with other parts of the world to a greater degree than we imagine if forget this.**

fund or help a novice licence when we have the RAE, which is not that hard to pass if one puts his or her mind to it. So, like many other good amateurs, I will not be renewing my membership this year.

I know I have no chance of getting this letter published in Radcom, as Radcom will not publish anything that is critical of the RSGB. It's a well-known fact that the RSGB does not like criticism. This is why I am writing to you, in the hope that you may publish my letter, as you are not biased like Radcom.

— **M G Butler GWOMNP, Bridgend, Mid. Glam.**

**Let's be fair. We are biased, of course, in our own favour. We think we are great. But we do print letters criticising us from time to time. You cannot suppress real dissatisfaction simply by keeping quiet about it.**

**The RSGB is arguing that it needs more money to promote its plans for the novice licence and everything that goes with it — in order to get in more members. The increase in membership has levelled off somewhat after the post-CB rush a few years back.**

**The RSGB is at the kind of crossroads where an organisation can gradually forget that its purpose is to serve — for example — not just Amateur Radio, but Radio Amateurs. Amateurs who remain members (and there will be lots of them, because it has a lot to offer) should watch their RSGB carefully, and read *Parkinson's Law* by C. Norchcote Parkinson, any edition. Don't forget, will you?**

## Time Puts Us to the Test

Looking at the stories in the last six month's HRTs, it would seem that we now have science-fiction, true life miracles and the long years of hardship and toil as new and very authentic reasons for continuing morse code as the accepted means of entry into the realms of A licensing.

Morse code is a user system, just the same as phone, rtty, sstv, fax and packet, no more and no less. As such it should be now have taken its rightful and well earned place as such. But no, by some outdated quirk of fate, it has become worldwide, the measure by which we judge an amateur's ability to perform on the HF bands. It is said that

## RSGB Out of Range

I am writing to inform you that I shall not be renewing my membership of the RSGB this year. I think that the £4.50 increase to the basic subscription for home corporate members is totally unjustified. This increase amounts almost to 22% of the annual subscription. I know that the Society has not increased in membership rates in the last 20 months, but in the last 20 months the membership to the Society should have increased, in fact, the membership should be higher now than ever before.

With the membership increasing every year, and advertising rates in Radcom which should increase in line with inflation, I can see no justification for such an increase.

The Society should be looking for ways to increase its membership, and not depleting it as they will do by increasing the membership fees.

The Society should ask itself: if it is so good, why are there so many radio hams and swls who are not members of the RSGB?

My income like many others has not increased by 22% over the last 20 months, and please don't go on about the price of our equipment, etc. Like many others I don't drink or smoke, my family have not had a holiday in 11 years, and my car can only be described as a banger. So that I can go on HF I am having to sell other things that I own to buy a second hand HF rig. There are many other radio hams like me, on a low income.

The RSGB is no longer in the range of my pocket. I also have no wish to

## £10 FOR THE LETTER OF THE MONTH

**You've got a gripe about the bandplans, or your'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.**

**Sent your epistles to: Letters Column, Ham Radio Today, ASP Ltd, Argus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST.**



the rest of time will tell. Tell what?

It would be better and far more fair, if, and I stress IF, a system uses time and testing to achieve this: first, the Novice Licence (Class N) then the standard RAE (Class B) then advanced RAE (Class A). Where time is concerned, a minimum of two years each should be spent on Class N and Class B before taking class A. This would ensure that operators have a better working knowledge of the licence uses a band operation, before moving onwards. It would also mean that those who would operate on HF if they could, but now don't because they have no interest in morse code, would be able to use HF and use it well.

— John D. Bolton G4XPP, Timperley, Cheshire.

Just to put the record straight — in case anybody did misunderstand — my personal hobby horse is that morse will never be outmoded — not necessarily that it should stay the sole test for HF operation. There are arguments either way on that, and as I speculated last month (last month is still at the printers as I type, so J.D. isn't responding to that point), the time and effort involved in learning it may have beneficial side-effects which are nothing to do with morse's communications value. Perhaps we will have some genuine

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.

democracy here, and morse will remain the HF qualification while the majority of amateurs want it to.

That aside, a three-tier system based on three, time-separated tests, seems on the face of it a jolly good idea. It would certainly encourage people to get experience as well as qualifications — HPA.

### 10m: Home and Commercial

On the subject of manufacture and sale of single band 28 to 29.7MHz apparatus, there is a world of difference between commercial manufacture and home construction. Recognising the widespread appeal to amateurs of single band 28 to 29.7MHz construction, we issued the General Authority which allowed amateurs to legally carry out such work, removing the need for amateurs to apply for individual authorities. Anyone wishing to manufacture on a commercial basis requires an individual authority issued by the Department on behalf of the Secretary of State (see *Letters*, HRT May 1990).

It has in fact been unlawful since 1968 to manufacture, as well as to import, apparatus operating on 20 to 29.7MHz except under an authority issued by the Secretary of State (*not the same Authority — Ed.*), although many amateurs seem to have been unaware of this. However, the sale and possession of such apparatus is not, and never has been, restricted.

The General Authority mentioned above precludes the manufacture of apparatus for a commercial purpose. The intention of the Authority, as set out in the Authority, is to allow licensed radio amateurs to manufacture apparatus for their personal use. However, the occasional

sale or supply of such apparatus to another licensed radio amateur (*This does not include 'illegal' CB or multimode sets for conversion. — Ed.*) where there is no element of gain to the licensed radio amateur who manufactured it would be unlikely to be interpreted as being in contravention of the Authority, although actual interpretation of the Order is, of course, a matter for the Courts.

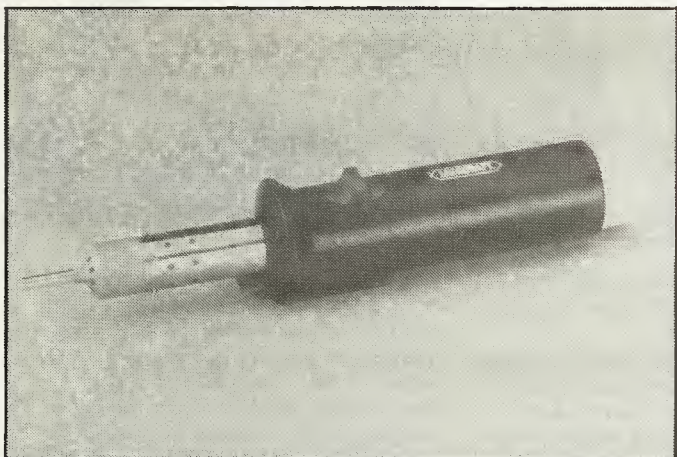
Were a licensed amateur to manufacture and sell for gain, ie on a commercial basis, then it is likely that such action would be construed as being contrary to the General Authority. As I have said, there is no restriction on the possession of single band 28 to 29.7MHz apparatus, and therefore it is legal to purchase such equipment. The caveat as always is that the apparatus must not be designed or adapted, or have facilities permitting its adaptation for transmitting spoken messages in the frequency band 26.1 to 28MHz.

The sale and possession of apparatus capable of operating between 28 and 29,999MHz is not restricted. The test of legality is whether the set is capable of transmitting or can be adapted to operate also on the 26.1 to 28MHz band.

— D N Raynes, RIS, Waterloo Bridge House

Thanks to the DTI for this clarification. The Authority is not entirely clear, and even the DTI has to admit that the final arbiter of the Order is the Courts. This statement should however be a reasonable guide. We did receive letters wondering if it was even legal to construct a 10m set for another club member — such is the doubt and uncertainty when the law enters into a "new" area.

# RADIO TODAY



## Cordless Soldering

Black and Decker do not only make heavy-duty hand tools and lawnmowers. They have now added a new cordless soldering iron to their Minicraft range of miniature tools for diy and crafts. The new MB650 is light and has a built-in stand configured into the handle. The power comes from a screw-in butane cartridge, giving, say the makers, a minimum of three hours' continuous use, independent of power sockets.

The Cordless Soldering iron, with a cartridge ready to use and two soldering bits costs \$24.99 inclusive of VAT from hobby and craft shops.

## Six Newsletter

*On Six* 6m newsletter on packet GB7NEW from G110V, carries the report that the VHF Committee of the RSGB have allocated four working frequencies, 51.21 MHz, 51.95 MHz, 51.97 MHz, to Raynet. The channels are nominally 20kHz spacing, but no information about recommended modes had been received at time of writing. The frequencies will be added to the UK 6m bandplan.

*On Six* also reports that many ARRL Directors were disturbed by bad operating standards displayed after the 3Y5X expedition, to the

extent that members of the DX Advisory Committee meeting on March 10th wished to disqualify the 3Y5X operation to forestall the possibility of similar incidents. The committee fears that sanctions and restrictions to the DXCC Program are a real prospect to be seriously avoided. The advice is that, if a DX Station is giving and receiving 59 reports while 52 with your station, don't call but wait until conditions are better or the pile up eases off.

**On Six from Cliff G110V via packet GB7NEW.**

## RIS Now an "Agency"

The Radiocommunications Division of the DTI has been relaunched as an "Executive Agency" by Secretary of State Nicholas Ridley.

The new agency will be responsible for radio spectrum management and frequency allocation, enforcement of Wireless Telegraphy legislation through the RIS, and international negotiation on radio matters and licensing of radio equipment. In this respect, nothing much has altered.

So what do the changes imply? The new Executive Agency will have "more financial autonomy." The new Chief Executive — Radiocomms Division head John Mitchell — will be able to achieve "improved response and turnaround times."

There was no specific comment at the time of the agency's attitude to amateur radio, but the RSGB is currently talking to the DTI, after a build-up of feelings of neglect by the amateur community.

It was stressed that the Agency is still directly accountable to the Secretary of State for Trade and Industry, but will have more direct control over its funds, allowing, it is hoped, more flexibility of action.

## Special Signals

1990 is the 70th Anniversary of the foundation of the Royal Corps of Signals. Scarborough Special Events Group, along with members of the RSARS, RNARS, and RAFARS are holding a special event station from the Royal Signals Training Centre, Burniston Barracks, Scarborough from 10th June to 7th July 1990.

Operation GB70SIG will be around 3725 and 7055 kHz on the HF bands, with 2m SSB and FM, as well as activity on the RSARS nets. Special QSLs available. **More information from Roy Clayton G4SSH QTHR.**

## Seventh in Slough

The Burnham Beeches and Maidenhead DARSCs are holding the seventh McMichael Rally on July 22 1990. The venue will be the Haymill Centre, Burnham Lane, near Slough, and doors will open at 10.30 or the general public 10.15 for disabled. Admission is once again £1, and the popular car boot sale £5 for car and driver.

As well as the usual traders, displays will include the Royal Naval ARS, Datacomms Symposium, the UK's leading Chiltern DC Club, a packet radio demo, and Doctor-DX CQWW CW Test by computer - try your hand. Foods, refreshments, bar, free parking and GB4MR. **More information from Bob Hearn GOBTY, tel. 0494 29868.**

## Hunt for Junk

The Huntingdonshire ARS 1990 Junk Sale and Auction to be held on 27 August (Bank Holiday Monday) at the Medway Centre, Goneygear Rd., Huntingdon, Cambs, and at the Church Hall across the Carpark. (We said it was double-sized.) Car-boot pitches in the car park.

As well as the boot sale, there will be traders, junk, bring and buy, and the Auction "which we hope will start earlier than last year". The event runs from 10am to 4pm, talk in on S22, queries to G1YVS tel. **0836 611025 or 0487 830212 evenings.**

## Bigger Cirkit Cat

The Summer 1990 Cirkit catalogue arrives as we write. 184 pages, perfect bound with a glossy cover, the new catalogue looks prosperous and well-filled with components, test equipment and Cirkit's well-known small kits and modules, mostly priced from £5 to £50.

The catalogue also contains a competition to win a Bearcat 210XW scanner, with runner-up prizes of meters and soldering irons, and up to £10-worth of discount vouchers on substantial orders. The newsagent price of the catalogue is £1.60, and Cirkit promise same-day dispatch for orders received by post, fax or phone before 4pm.

Cirkit, Park Lane, Broxbourne, Herts EN10 7NQ. Tel. 0992 441306 (enquiries) and 53 Burrfields Rd., Portsmouth, Hants PO3 5EB. Tel. 0705 669021.



## From the RSGB

The Radio Society of Great Britain is calling for members to join its Amateur Radio Observation Service, which is in the process of being re-organised and re-launched in co-operation with the DTI Radio Investigation Service (which has itself recently been reorganised as an "Executive Agency" by the Secretary of State of Trade and Industry).

Chief Executive David Evans, writing in the April edition of *Radio Communication*, names repeater abuse and jamming, and abusive messages circulating on packet radio as two examples of behaviour anagalous to "football hooliganism" by a small minority of amateurs. He also wonders why so few amateurs seem to be willing to provide "well-documented" spectrum abuse reports for the RSGB to pass on to the DTI/RIS.

Some amateurs have claimed that complainants and other amateurs attempting to act against fellow

## DXCC in the Far East

There has been an operation from Bhutan, by Jim Smith VK9NS, in early April. The DXpedition followed several years of negotiation with the Bhutan government, and was the first Amateur operations there for eight years. Further, Japanese operation (S21U) in Bhutan in March has been accepted as creditable for DXCC, and two further Japanese expeditions hope to operate from Bangladesh, probably by the time this has appeared. Bangladesh has not previous issued Amateur Radio licenses for nearly ten years shortly see also QRZ this month for further DX news.

## Surplus Sale

Following the death of the late John Glastonbury G8KBQ, an auction of his VHF/VHF radio equipment will be held on Saturday July 7 at 2.30pm, at "The Centre" in Shepton Mallet, Somerset. Proceeds will go to the local ARC and to Musgrove Park Hospital, Taunton.

More information if required from **Richard GOJCV**, Secretary, **MSARC, QRTHR**.

operators who they believed to be abusing amateur bands have been victimised in various ways, from cold-shouldering by local groups to threats of physical violence and actual damage to property.

Disturbingly, they believe that the police are inclined to treat complaints as "domestic disputes", to be fought in the civil courts, if necessary, by victims. Such an attitude would be similar to asking victims to prosecute their own muggers. Ordinary citizens do not have the means to resist intimidation peacefully without the law behind them

A more positive response is needed by those who do have executive powers.

One the subject of the Novice Licence, Radcom reports that the text of the licence, the training course manual and the first RSGB book for novices are substantially complete. The text of the licence will follow closely the version which appeared in the Discussion Document of July 1989. The Society is calling for volunteers to be Novice Instructors.

The RGSB delegation to the IARU Region 1 Conference in Torremolinos, Spain, April 1-6, presented papers covering subjects including HF equipment standards, allocations of a beacon frequency band between 28.175 and 28.200MHz, the question of licence qualification acceptance by different countries, a code of practice for QSL managers, and also third party traffic, conference venues and operator behaviour. Additionally, many delegations are interested in establishing forward arrangements, probably in the form of a permanent Committee, to ensure that amateur radio interests are properly prepared and represented at the World Administrative Radio Conferences. The next WARC is in 1992.

A further area which the RSGB is taking an interest in is HF equipment standards. It is recommending "the introduction of informal specifications for amateur radio equipment, covering harmonics, spurious signals, key clicks, intermodulation products, etc, which could be used by reviewers to evaluate commercial gear".

This latter issue may be seen against a background of increasing speculation about EMC type-approval standards, possibly affecting all equipment construction and modification down to the level of published constructional articles, as 1992 approaches. HRT understands that type-approval for amateur (homebrew) equipment has been discussed within the RSGB, and that at least one of their regular advisers has professional connections and experience in type approval.

The RSGB apparently intends to resist any DTI moves to bring kits, homebrew and published projects within the European Community EMC Directive, arguing that this would price small kit manufacturers out of the market and restrict the self-training and experimental purpose of Amateur Radio to its detriment.

HRT, and no doubt all other amateur radio and electronics publications will be watching the implementation of the EC EMC Directive closely as it unfolds.

Lastly, the valuable RSGB Slow Morse broadcasts now have their own callsign, GB2CW, to identify them.

## Rubber "Welding"

A company called Geedon Performance Coatings of Colchester has launched a new insulating tape, called Rubbaweld. Rubbaweld, true to its name, is said to be a self-amalgamating tape that 'welds' itself to an object on contact when stretched and wrapped around the area to be sealed. It is electrically insulating and also protects against water penetration and contact chaffing. GPC recommends it for outdoor aerials, general electrical work and hose and pipe connections and repairs.

Rubbaweld is available as a 3m by 25mm roll with instructions, by mail order for £2.65 all inclusive, from Geedon Performance Coatings, Commerce Park, Whitehall Rd., Colchester, Essex CO2 8HX, UK. Tel. 0206 47556. GPC also sent HRT a 3-inch sample, which is enough to try out on a pipe or antenna joint, and offers a free sample on application.



## Rally News

Two interesting rallies coming up for Sunday 16 September: the British Amateur Radio Teledata Group is holding its 1990 rally for the first time in the larger Surrey hall at the Sandown Park Racecourse.

Further West, the Bristol Radio Rally 1990, which was cancelled in 1988 owing to problems with booking the venue, is confirmed for Brunel's Great Train Shed at Bristol's Temple Meads Station. More details next month.

## Motherwell Open

The Mid-Lanark ARS Open Day will take place on Sunday 10 June at the Newarthill Community Education Centre, High St., Newarthill, Motherwell. As well as the usual traders, there will be bring and buy, a packet radio demo, a talk by John Branegan GM4IJJ

on his experiences with satellites, RSGB morse tests (application must be in advance via the RSGB), presentation of the annual trophy, and refreshments. Talk-in on S22.

**More information from David Williams GM1SSA, tel. 0698 732403.**

## Radio at Duxford

The Duxford Radio Society, based at the Imperial War Museum radio station GB11WM, Duxford, is not so much an amateur radio club as a society which combines amateur radio with special interest and experience in the history of radio restoration, operation (especially military and clandestine radio) and documentation of old radio.

Originally founded in 1986 as the Duxford Airfield Radio Society, the group publishes a newsletter and is involved in running and publicising appropriate special events stations.

Recent events notified included operation by a "B Mk11 and other sets" from Duxford on May 6 and 7 commemorating special forces worldwide (Ham Radio Today has a feature on the B2 in the pipeline); the Museum at Alesund, Norway, as LAIZ, commemorating the Invasion and Liberation of Norway on April 6 to 9; NorskRadioHistorisk Forening operation LAID on May 5 from the War Museum in the Akerhus Fortress, Oslo, and the Freedom Museum in Copenhagen operated on May 5 to 7 (Freedom Weekend) as OZ5MAY.

**For more information about the Society and newsletter contact G3EUR QTHR tel. 0708 852371.**

PLEASE CAN YOU GET DETAILS OF YOUR LOCAL RAE CLASSES FOR 1990/1991 TO US AS SOON AS POSSIBLE FOR THE SEPTEMBER ISSUE.

## Satscan-II in USA

Amsat-UK has released its latest satellite tracking program in North America. Satscan-II, written for PCs and compatibles by Trevor Stockill G4GPQ, is a direct update of the popular Sat-Scan used in the UK. In graphics mode, Satscan-II provides a graphic display of Earth in full colour on a EGA screen. The world map includes a footprint of the coverage given by a particular satellite. CGA PCs can use Satscan-II for output in non-graphic format.

Satscan-II is menu driven and gives azimuth and elevation tracking information including squint angle data. This information can be sent to a printer or to a disk file. Satscan-II can also work out mutual visibility windows for up to four stations, including mutual squint angle data, so that best operation times can be calculated. Keplerian elements can be imported into Satscan-II as a text file in Amsat-NA multi-line format, two line NASA element format, DCE format as transmitted by UoSAT Oscar-11, or by hand.

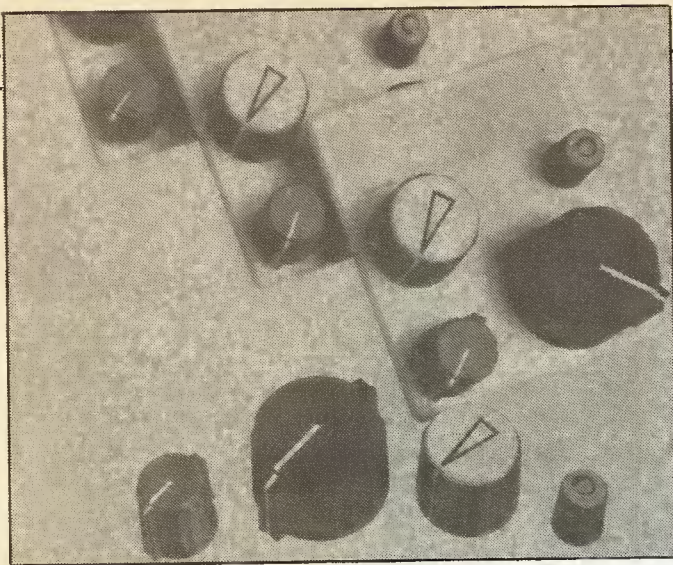
Satscan-II is available from Amsat-UK in the UK, and now also in North America from Project Oscar. All profits received are put toward to future Amateur Radio satellites. For information contact Project Oscar with a stamped sae or IRCs at Project Oscar Inc., PO Box 1136, Los Altos, California 94023-1136, USA.

## Towards Vietnam

Picked up on the packet network: a DXpedition to Vietnam is in the planning staged in the US. Cash is needed upfront and John Parrott W4FRU has agreed to collect donations. His address for enquiries etc. is P B Box 5127, Suffolk, VA 23435, USA. The message originated with the Tristate DX Association VHF Packet Cluster, and relayed to TG9VT by W2JGR. That's all we know at the present.





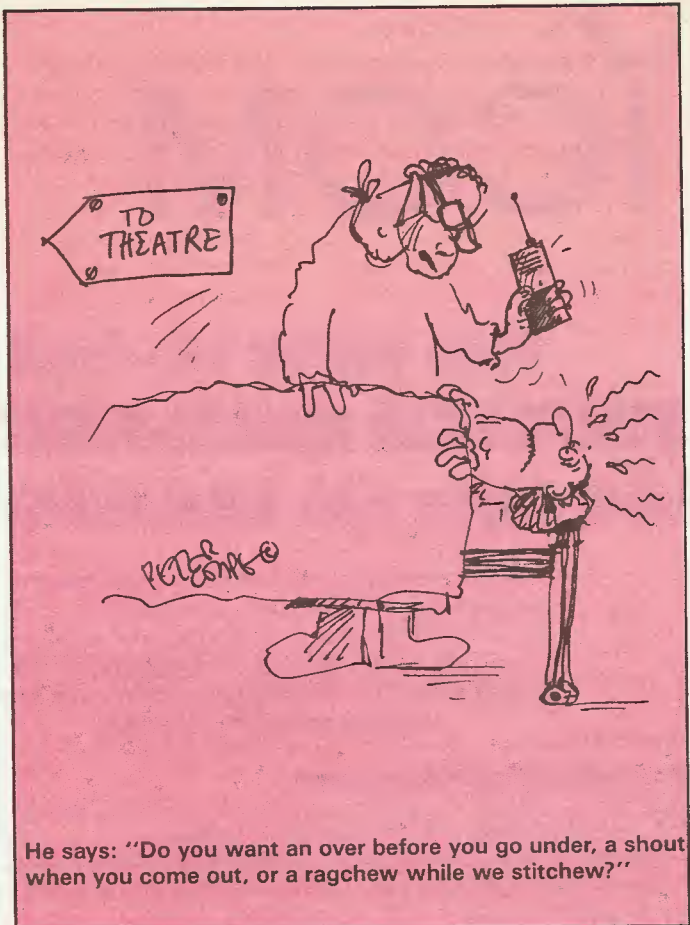


### Bright Knobs

The professional Ritel range of collet/push-fit control knobs is handled by A F Bulgin & Co. The knobs vary in diameter from 8mm to 45mm in four basic colours. There are round, wing- and arrow- shaped formats, together with low-profile version. Snap-on caps with a wide choice of colours and markings allow for considerable customisation.

Ritel knobs and temperature-stable between -20°C and 70°C and all collets, and nuts are brass. Further information and a catalogue is available from **A F Bulgin & Co. Plc., Bypass Rd., Barking, Essex IG11 AOZ. Tel. 01 594 5588.**

Bulgin is also continuing to carry general purpose miniature plugs and sockets alongside more specialised lines, under PX Series brand name.



He says: "Do you want an over before you go under, a shout when you come out, or a ragchew while we stitchew?"

### Final Draft

On April 19th the DTI Radio communications Agency formally announced a "New Licensing Scheme for Amateur Radio Novices ... "to encourage more young people to take an interest in Amateur Radio".

The final draft of the Novice Licence has been produced, and although we have not studied it closely at the time or writing it is understood to follow very closely the

Maximum 5 watts input on all bands. Licensees must pass a 5 wpm Morse test to qualify for Class A operation on HF bands.

discussion document produced in mid-1989. A single duplicated copy appeared on the Project Year stand at the RSGB Convention at the weekend.

Plans for the Novice Licence are not yet complete, but are "for introduction within the next 12 months". Answering a Parliamentary Question from Andrew Mackay, MP for East Berkshire, Industry Minister Eric Forth said: "Work is also in hand on setting up arrangements for the training and examination of potential licensee. Those arrangements will necessarily take some time to put in

hand, but the Agency would hope to be ready to issue the first novice licence in early 1991."

"There will be no minimum age for novice licensees and at present it is envisaged that the licence fee will be waived for applicants aged under 21. Licence fees will be reviewed annually but it is intended to keep fees at the minimum level possible."

Further details of the proposed scheme are available from The Radiocommunications Agency, Room 613, Waterloo Bridge House, London SE1 8UA.

Novice Licensees Schedule of Frequencies			28.225-28.300	Morse A	1240-1325	Morse B
Frequency	Mode	Class		Morse A		Phone
1.950-2.000	Morse	A	28.300-28.500	Data	10000-10500	Data
	Data			Rtty		SSTV
	Rtty			Phone		FSTV
3.565-3.585	Phone		50.620-50.760	Data B		Morse B
	Morse	A		Data		Phone
10.130-10.140	Morse	A	51.250-51.750	Morse		Data
21.100-21.149	Morse	A		Phone		Rtty
28.100-28.190	Morse	A	433.000-435.000	Morse B		SSTV
	Data			Phone		FSTV
	Rtty			Data		

# icom

## THE NEW IC-2SE, SIMPLE OR MULTI-FUNCTION 144 MHz FM TRANSCEIVER

Icom's tradition of building high quality, reliable handhelds continues with the IC-2SE an incredibly compact handheld designed with features that exceed larger, bulky handhelds. The IC-2SE proves that superior quality comes in all sizes.

### Slim and unbelievably compact.

The IC-2SE measures only 49(W) x 103.5(H) x 33(D)\* mm with the BP-82 Battery Pack. Hold the IC-2SE in your hand to truly appreciate its miniature size. Weighing just 270g† with the BP-82, the IC-2SE will easily fit anywhere – on belts in shirt pockets, handbags, etc. \*1.9(W) x 4(H) x 1.3(D) in. † 9.5 oz.

### Simple design for operating convenience.

Even with its tremendous versatility and a wide variety of functions, the IC-2SE is easy to use. All functions are performed by a total of just six switches and three controls. The IC2SE includes both simple and multi-function modes. The result is two transceivers in one: both an easy-operation and multi-function transceiver. Simple mode ensures totally error-free operations. Multi-function mode allows you a variety of function settings depending on your operating requirements.

### Other advanced features:

Reduced size doesn't have to mean reduced quality. The IC-2SE proves this with a wide variety of advanced functions.

- Tuning control on the top panel for quick QSYing.
- Monitor function that allows checking of the input frequency of a repeater.
- Function display that clearly shows all information required for operations.
- Splash resistant design and durable aluminum die-cast rear panel for dependable outdoor operations.

### Options

• **BA-11, Bottom Cap.** Protective cap for terminals on the base of the IC-2SE.

#### Battery packs and case.

- BP-81 ..... 7.2V, 110mAh
- BP-82 ..... 7.2V, 300mAh
- BP-83 ..... 7.2V, 600mAh
- BP-84 ..... 7.2V, 1000mAh
- BP-85 ..... 12V, 340mAh
- BP-86 ..... Case for six R6 (AA) size batteries

#### BC-72E, AC Battery Charger.

Desk top charger for the BP-81 - BP-85.

#### CP-12, Cigarette lighter cable with noise filter.

Allows you to use the IC-2SE through a 12V cigarette lighter socket. Also charges the BP-81 - BP-85.

#### FA-140BB, 144MHz flexible antenna.

Flexible antenna for 144MHz band operation. Some type supplied with the IC-2SE.

#### HM-46, Speaker/Microphone.

Combination speaker and microphone equipped with an earphone jack. Clips to your shirt or lapel.

• **HS-51, Headset.** Headset with VOX function that allows you hands-free operation.

#### Carrying Cases.

Carrying Case    Battery Packs,  
Battery Case

- LC-53 ..... BP-81
- LC-55 ..... BP-81, BP-83 or BP-86
- LC-56 ..... BP-84 or BP-85

#### MB-30, Mounting Bracket.

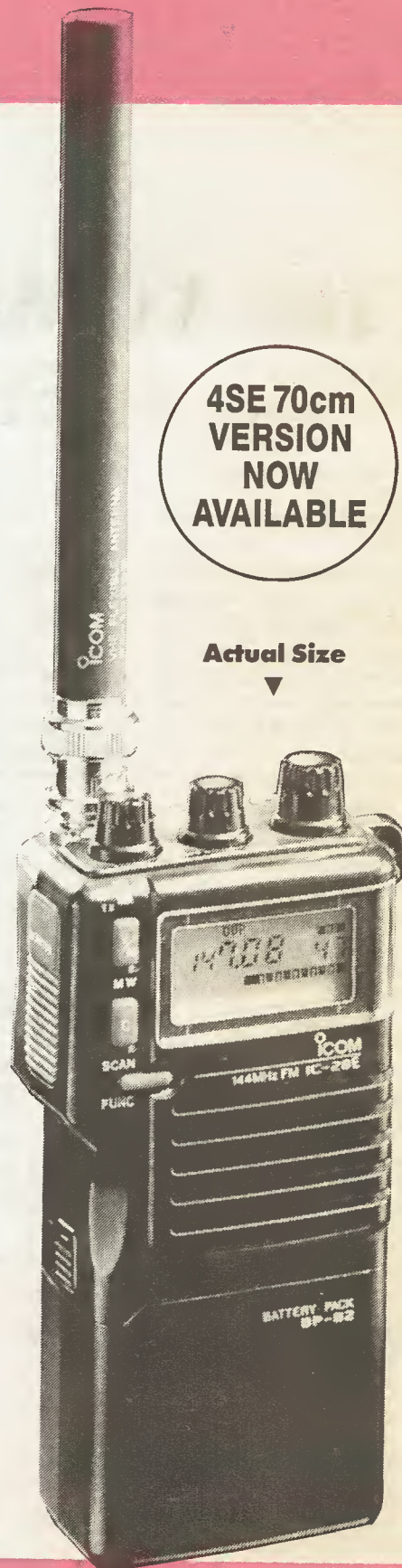
Mounts the IC-2SE in a vehicle or on a wall.

#### OPC-235, Mini DC Power Cable.

For use with a 13.8 V DC power supply

4SE 70cm  
VERSION  
NOW  
AVAILABLE

Actual Size



Icom (UK) Ltd.

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

# Count on us!

## THE COMPACT HANDHELD WITH A ~~SPLIT~~ PERSONALITY

### 5 Watt Output Power.

Utilizing a specially designed ultra-small highly efficient power module, the IC-2SE delivers a full 5 W\* of output power. Bring those distant repeaters into range.

\* At 13.8V DC

### 48 Memory Channels.

The IC-2SE has 48 fully-programmable memory channels and one call channel. Each memory and call channel stores an operating frequency and other information required for repeater operations.

### Convenient Repeater Functions.

The IC-2SE is equipped with programmable offset frequencies for accessing repeaters. All memory channels and a call channel store repeater information for your convenience. The IC-2SE includes a newly designed 1750 Hz tone call transmit function. A 1750 Hz tone call transmits when the PTT switch is pushed twice quickly.

### Power Saver for longer operating time.

The power saver ensures lower current flow during standby conditions. Operating times are much longer than with older, more conventional transceivers.

### Built-in Clock with timer functions.

The IC-2SE is equipped with an advanced 24-hour system clock with timer function. The transceiver automatically turns on when real time matches a pre-programmed time. This is perfect for scheduling QSO's. Auto power-off timers and other settings can be made in clock mode.

### Convenient Scan Functions.

The IC-2SE is equipped with VFO and memory scan.

- **VFO Scan.** VFO Scan repeatedly scans all VFO frequencies. In addition, unnecessary frequencies can be skipped.

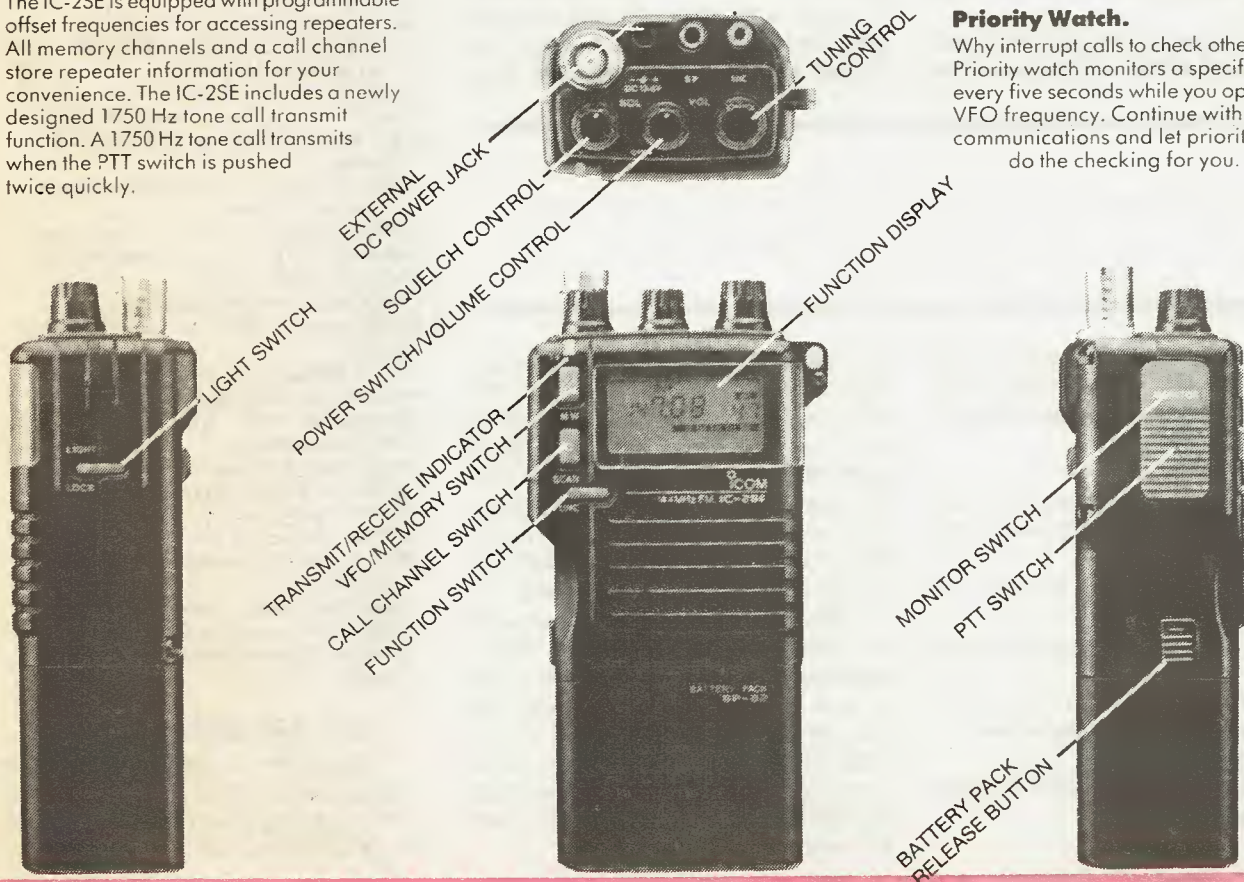
- **Memory Scan.** Memory scan repeatedly scans memory channels.

### Auto Power Off Timer Function.

If you ever forget to turn the IC-2SE off, don't worry. It will turn itself off. Power-off time can be selected or deactivated using multi-function mode. Preserve battery pack power for the times when you need it most.

### Priority Watch.

Why interrupt calls to check other stations? Priority watch monitors a specified station every five seconds while you operate on a VFO frequency. Continue with your communications and let priority watch do the checking for you.



**Helpline:** Telephone us free-of-charge on 0800 521145, Mon-Fri 0900-13.00 and 14.00-17.30. This service is strictly for obtaining information about or ordering Icom equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders, thank you.

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

**Visa & Mastercards:** Telephone orders taken by our mail order dept. instant credit & interest-free H.P.



# Packet Radio

## Roundup

The German group, Nordlink, some time ago gave us the popular The Net node system. This found its way into many network nodes, and indeed yours truly currently uses this in each of the five interlinked The Net nodes operating from QTH under the G4HCL call. Lately, Detelf DK4EG and Georg DF2AU have been burning the midnight oil yet again and have now come up with 'TheNetNode'. Rather than being a replacement plug-in eprom for each tnc as with TheNet, together with a large diode matrix arrangement for interconnecting several nodes, TheNetNode runs entirely within a PC or Atari computer and uses TNC2s with a special KISS eprom as an "intelligent interface". The new features offered are:

- up to 255 Channels on one computer
- Call for forwarding (just connect MYBOX, and node will know what

*From Germany comes new PC-based node software which the user can update to suit.*

- call to connect you with and how to get there. If a BBS is down the sysop may set a route to an adjacent box)
- Converse mode
- Monitor heard list
- Help system expandable by sysop
- Software updating through the radio port
- Watchdog hardware for tnc and computer
- Sysop has full remote access to use DOS
- Statistics available for each channel (quality, throughput, etc.)
- Written in C (Turbo-C 2.0)
- TNC-KISS firmware with TOKEN-RING protocol

The PC and all the tncs are connected together in a 'token ring',

and if a tnc fails the watchdog will close the ring around it and reset the hardware. If sometime later the tnc comes up again it is recognised automatically and put into service. If a catastrophe happens and the computer fails it is even re-booted.

TheNetNode also features a Reconnect system, familiar to users of the latest Kantronics KA-Nodes. Using the TheNetNode, if the station you are calling disconnects, you'll find yourself re-connected to the remote node's command processor. If the station that initiated the connect disconnects, the whole link will be disconnected. But if for example you connect to Node A, and from there to Node B, and from there to Node C, and then issue a QUIT you'll be re-connected to the command processor of B, if you QUIT again you'll be at A again, and the next quit then will disconnect you from A. You can 'travel' throughout a node link with-

out rebuilding the whole link, and if digis of other types are involved in the link, the reconnect will end up at the last TheNetNode connected. This is quite different from the current TheNet system, although TheNetNode is fully compatible with TheNet, functioning with other TheNet neighbour nodes without any restrictions.

Because the designers have written the software in Turbo-C, sysop boffins can modify the program, test it, and upload it to their node. The current release for the PC version is 1.22, and Detelf tells us it has been running on several sites in Germany for weeks without problems. An Atari ST version is also available.

How do we get one? The German manual is now complete, and as soon

as a German-English translation is done (any volunteers?) the UK should be seeing it in use. For those who can't wait, Table 1 gives you an idea of the commands available (some only to the Sysop).

Table 1 — TheNetNode command overview

AKTUELL:	Gives actual news for the digi
BEACON:	All around the beacon
BCNODES:	Sends the beacon across other nodes
CLEAR:	Clear statistics
CONNECT:	Make a connection
CONVERS:	Enter converse mode, same as TheNet 1.1C
CQ:	Call cq
CTEXT:	Sign-on message on connect
DISABLE:	Disable a channel
DOS:	Prefix for DOS commands
EDIT:	Enter a message text
ENABLE:	Enable a channel
HARDWARE:	Gives a hardware description of the node
HELP:	Gives a help info
INFO:	Gives general information
IO:	Controls output bits of the printer port (eg for aerial switching)
LINKS:	For connects across other nodes
LOAD:	Upload a file on the node's disk
MAP:	Gives a small map of neighbouring nodes
MHEARD:	Tells you who was heard when on what channel
NODES:	Gives a list of all its known nodes
PARAMETER:	Read/modify parameters
PROMPT:	Modify prompt
QUIT:	Disconnect from the node
READ:	Read an ASCII file from the node's disk
RESET:	Force a re-boot for the node
ROUTES:	Sets/tells all existing routes
SOFTWARE:	Gives a software description
STAT:	Read statistics
START:	Start a program on the node
SUSPEND:	Suspends given callsigns
SYSOP:	Verify a sysop
SYSPRO:	Sysop log file
TEST:	Transmit test pattern on a port for alignment
TIME:	Gives current time
USER:	Shows who is on the node
VERSION:	Gives software version of the node

### 10m FM BBS in London

Elsewhere in this issue you'll see a cheap way to get onto 2m packet without tying your expensive multi-mode rig up, by using a modified expmr rig. But for those in the London area, another possibility exists: using

a converted FM CB rig on 10m. Terry G4GHU tells us that the GB7GHU bbs, located near Ealing in West London, is operating on 29.250MHz NBFM as well as its 70cm and 2m ports. It runs 7W transmit power into a vertical half wave aerial, and can be accessed by connecting to GB7GHU direct or by connecting to the Node G4GHU-1 and entering 'bbs'. An 'MH' (monitor heard) facility is available on the Node, which can be used to see who else has been active on 10m FM packet. Reception reports to G4GHU @ GB7GHU, we're sure Terry would like to know how it's getting out towards your location.

### Where's My Local?

This is a regular cry from new packet operators, who may have little problem connecting to a bbs, but don't know which one may be on their doorstep. Well, if you log into any UK bbs and enter 'L>LIST', you'll see the message numbers of a detailed list that Del G4FQO has compiled. This is to help newcomers to packet locate local bbs, and those who want to know which bbs is local to an area. Del adds that it is good practice to get to know the operation of your local bbs and read the info and help files, which you can do by typing the commands 'I' and 'H' respectively. Save these to disk, or to print them out — even experienced packet operators can't remember every single command available.

### BBS in Space

Once you've got used to your local bbs, how about expanding your horizons? Many packet operations know of the Fuji-Oscar 20 mailbox, but few know how to use it. You'll need a 2m FM transmitter capable of F2 modulation for the uplink, with an aerial gain of around 10dBi for 10W transmitter output power. There are four uplink channels to 'spread the load': 145.850MHz, 145.870MHz, 145.890MHz and 145.910MHz.

For the downlink you'll need a 70cm receiver which can deliver a bi-phase PSK signal to a PSK receive modem fitted to your tnc, together with a 10-15dBi gain aerial. You'll need to vary the frequency of your receiver in the standard satellite sub-band to counter the effects of doppler shift, and if this can be done automatically from your demodulator then all the better (James, G3RUH says he is

looking into doing this via the cat interface on his FT736 2m/70cm transceiver).

You'll need to set up your tnc initially with:

```
AX25L2V2 ON, FRACK 6,
MAXFRAME 2, and PACLEN 100.
```

JAS-1B uses PACLEN 128 and MAXFRAME 1, and you may send a maximum of seven series frames up (ie keep your MAXFRAME to less than seven). FRACK, the wait timer for an ACK signal, should always be six or above, but you may find it useful to increase this if many stations are using the mailbox at the same time as yourself.

When the satellite is in view and you receive signals from it, enter the usual 'Connect' command to connect to the callsign of 8J1JBS. If all is well, you'll receive '\*\*\*CONNECTED', and the bbs will respond:

```
FO-XX/JAS-1b Mail box Ver. 1.11
commands B/F/H/M/R/U/W
Use H command for Help
JAS>
```

The 'H' command gives you:

```
B: List file headers for All
F: List latest 15 file headers
F*: List latest 50 file headers
F<d>: List file headers posted on day
<d>
H: Show this message
K<n>: Kill a file numbered <n>
M: List file headers addressed to
current user
R<n>: Read a file numbered <n>
U: List current user(s)+SSID
W: Write a file
JAS>
```

User commands you can enter:

```
B: Bulletin command, messages for all
(ALL) shown.
F: Shows newest 15 messages posted.
F*: Shows newest 50 messages
posted.
F<d>: Shows all messages written on
day <d>.
H: List of user commands and simple
explanation.
K<n>: Deletion of message <n>.
When another station is reading the
message, it cannot be deleted.
Message only deletable by sender or
addressee.
M: Shows most recent messages to
your station.
R<n>: Messages designated <n>
will be transmitted.
U: Call signs and SSID of stations
connected to JAS-1b.
```

W: Enters (Writes) a message in JAS-1b.

When you enter a message, the bbs will respond with the required addressee and message title, which you enter first and then enter your message text. To end your message, use '<CR>.<CR>'.

There is no command to log off from the mailbox, just use your tnc 'Disconnect' command, but DO remember to do this BEFORE the orbiting bbs goes out of your range. The bbs doesn't have a digipeater function, nor does it respond to digipeated signal frames, so don't waste time trying! My thanks go to the Japanese national radio society JARL, for the above information.

### End of Message — CTRL-Z

My thanks to all out there for your contributions, remember this IS a two-way affair. I'm especially pleased to hear from packet repeater groups, if I can publicise your activities then it helps us all. Phil Anderson, the President of Kantronics, phoned me from the USA to say their experimental 'Data Engine' previously reported here is now available. This is one of the next generation of tncs, capable of operation at radio data rates of up to 56kbaud, and comes complete with a pbbs, gateway between the two radio ports, and a 1200baud modem as standard, currently \$369 in the USA. We also chatted about a possible receiver improvement in their DVR 2-2 packet Tx (you saw it here first) which could well be of interest to users in RF-congested areas. You can get the latest details on these from their UK distributors. Lowe Electronics on 0629 580500. Their packet boffin is Richard Hillier.

Last month I mentioned the commercial network 'Paknet', a nationwide network prompted by the pioneering of amateurs. BBC TV's *Tomorrow's World* must read HRT, as they featured the system on April 5th, and a commercial communications glossy commented that this was the first national system using this technology . . . we know better! It may take a while before they get their own orbiting packet satellites, and catch up with we amateurs.

I'll leave you with that thought this month! Keep the messages coming, 73 de G4HCL @ GB7XJZ.

# MORSE FORUM

With the HF bands at their peak as the sunspot cycle has reached its maximum, conditions have been good, producing lots of interesting contacts all over the world. The LF bands have also given a large number of good CW contacts. So let's move on to some of the news.

over the reins to someone else. The new editor is Geoff Arnold G3GSR, editor and publisher of *Radio Bygones* and a past editor of *Practical Wireless*. In addition, Geoff used to be a sea-going radio officer, so he has an excellent first-hand and professional knowledge of the subject.

£8.50 for Europe and Eire, and elsewhere £8.50 surface mail or £10.50 Airmail. This still represents good value as it is an excellent and interesting read and in addition to this MM is run on a non-profit-making basis. The address for all enquiries is *Morsum Magnificat*, 8A Corfe View Road, Corfe Mullen, Wimborne, Dorset BH21 3LZ. Cheques should be made payable to "G. C. Arnold Partners", or payment can be made by credit card.

## *Ian Poole G3YWX looks forward to CW contests in June and July.*

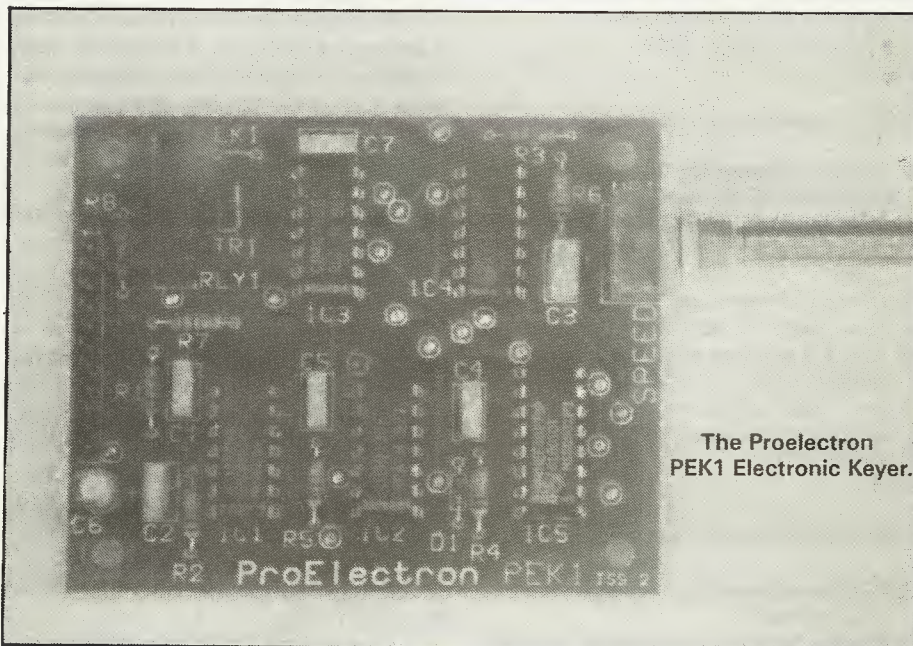
### Shop Window

There seems to be a number of new suppliers of kits and ready-built modules coming onto the amateur radio scene at the moment. This is at least partly due to a backlash from the ever-increasing number of black boxes on the market. Often people want to upgrade some equipment themselves and tailor it to their own requirements in one way or another. Alternatively, others will be interested in building up something from scratch either from a magazine design, a kit or even from a ready-built module which requires linking together with some other bits and pieces. The idea of ready-built modules seems to be catching on.

It was therefore with interest that I noted a new iambic keyer module. It is manufactured by Proelectron, a company which has set out to build a reputation for high quality modules.

The keyer is the PEK 1 and it can be used either with single or dual paddles for ordinary or iambic operation. The keyer is assembled on a double sided glass fibre board and has a silk screen overlay to identify all the components. This was designed using cad (computer aided design) techniques, something which is very rarely seen in kits and modules like this.

The keyer uses either a reed relay or a vmos transistor so that it can key almost anything. The specification states that it can key up to 60 volts at 300 milliamps using the vmos transistor and 200 volts at 150 milliamps using the relay.



### New Magnificat Editor

Any one interested in the history of morse will be familiar with *Morsum Magnificat*. This publication has been going for several years now and has built up quite a reputation for providing an interesting and useful source of information about the whole field of morse past and present.

Unfortunately, Tony Smith who has been running it single handed for a while, feels that it is time to hand

Tony, whose amiable style has given so much to the magazine, will be staying on as a consultant editor. It has also been stated that the format and style will stay very much the same, calling on people's experience and stories of the past together with news of what is happening in the morse scene at the moment or in the future.

For anyone considering taking the magazine, the annual subscription is now £8.00 per year for the UK,

It can also be made to consume virtually no current because all the circuitry uses cmos ics and it is possible to disable the relay if it is not in use. This makes an on/off switch for the keyer redundant as the current consumption will hardly run the batteries down before they exceed their shelf life. In fact the keyer has a standby current consumption of 0.1 microamps which rises to 0.5 milliamps for keying using the vmos transistor and 12 milliamps with the relay in circuit.

Another feature of the keyer is that it includes a side tone and the output is sufficient to drive most of the piezo electric sounders available from many of the components stockists. Although most of the rigs on the market today have their own sidetone circuitry, it can come in very useful for homebrew or QRP equipment which may not have that luxury.

The keyer is supplied as shown in the photograph. It measures 74 by 61 by 21mm and has holes in the corners for fixing. There is also an 11-way connector for all the connections. A suitable mating connector can be bought from Maplin for a few pence.

In operation the keyer performed very nicely and would be ideal for operation with any of the paddles currently available on the market. It also did not mind being left open to all the RF when it was used on the bench. The cad techniques used in its production have resulted in a very professional finish and the quality of construction also seemed good.

The cost of the module is £22.00 including postage and packing for the UK. It is available from Proelectron, 35 Cromwell Road, Cheltenham, Glos GL52 5DN.

### Advance News

Many people will already know that the bi-centenary of the birth of Samuel Morse is coming up on the 27th April 1991, just under a year's time. Many people are aiming to organise special events and other activities to celebrate this day. There should be a good number of special event stations on the air as well as other activities, and preparations are well in hand for some of them. If you intend to organise anything, Tony Smith G4FAI (QTHR), who is the chairman of EUCW, would be very please to hear from you.

No doubt there will be more about activities nearer the time.

### Events

The EUCW Straight Key Day takes place again this year. It is organised by SCAG (Scandinavian Activity group) on behalf of EUCW. It takes place all day on the 23rd of June and is open to all CW operators who enjoy using hand keys. The event is not a contest; the idea is to put aside any electronic keyers for the day, blow the dust off the hand key and use it for enjoyable CW QSOs.

Stations who are participating should call CQ-SKD on frequencies between 3540 and 3570kHz, 7020 and 7040kHz, 14050 and 14070kHz, or anywhere in the 10MHz band.

Anyone who has more than five contacts in the event can vote for the person with the best "fist". There is one vote for each of the three stations considered best. A Straight Key award will be sent free of charge to every operator who receives at least two votes. Votes should be sent before 17th July to the SKD Manager, Daniel Klintman SM7RXD, Adjunktgatan 3D, S-214 56 Malmoe, Sweden.

### Contests

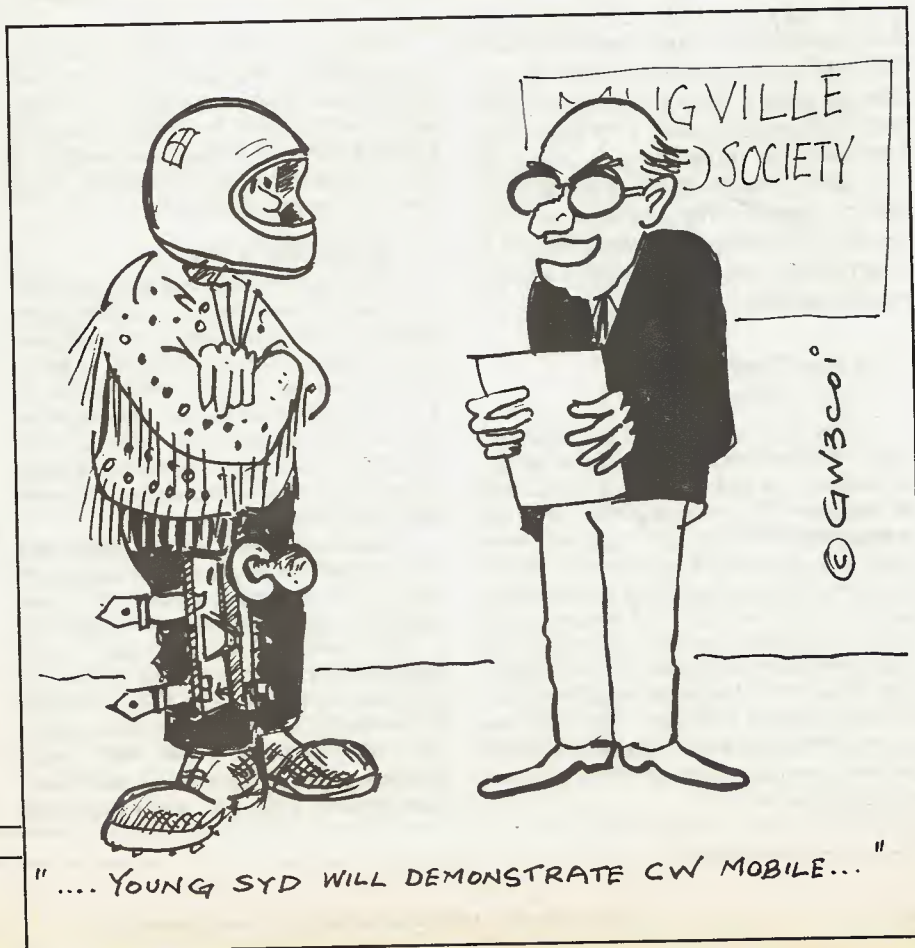
As always there are a few contests which may be worth a look

for those who are interested in such things. The first is HF Field Day. This year it takes place between 1600 GMT on Saturday 2nd of June and 1600 GMT on Sunday the 3rd. As usual the contact exchanges are the report plus serial number. On occasions like this it is nice to get on the air and give a few points to those boys who are out in the fields and have probably spent a wet or cold night under canvas.

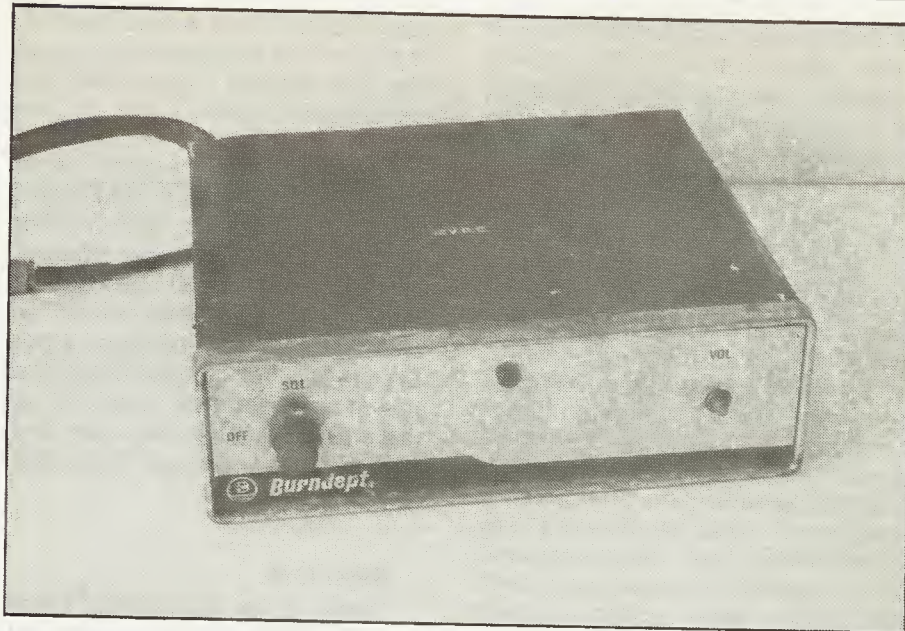
The other contest which is worth looking out for is the IARU Radiosport contest. This will take place on 14th and 15th July. Again the contest exchanges are report plus serial number. This contest is CW plus SSB, but normally there is as much if not more to be found at the CW end of the band. It also seems to have built up quite a following over the years and there are usually a number of juicy DX pickings to be had.

### Sign Off

That's it for this month folks! Remember to send in letters with any comments, news, views and so forth. They are always welcome. As usual the address is 144 Worple Road, Staines TW18 1EQ. Alternatively, letters can be sent via the editor at HRT. So 'till next time 73 es CUAGN de Ian.



# Converting the Burndept



## *Chris Lorek G4HCL finds another unemployed ex-PMR rig and gets it a job on 2m.*

A couple of years ago, the pioneering HRT series on the conversion of ex-pmr (private mobile radio) gear onto amateur bands was a resounding success. We promised you more of the same, and true to our word here we go again. (We confess — our resident conversion expert did take a short break to write up a book based on the series).

### **Low Cost, High Performance**

PMR rigs are designed to extremely high specifications. Before a model can go on commercial sale in the UK it must pass a stringent DTI type-approval test, to make sure the sets don't suffer from adjacent channel reception and other unwanted signals, and that transmitters put out very low levels of harmonics. As technology advances and pmr specifications get more stringent, so the earlier sets that can no longer be legally used in the pmr service find their way onto the second-hand market at a fraction of their original cost, even though many of them are brand-new.

OK, so you see a pile of scruffy-looking sets on the radio rally stand, but if you know what to look for you could end up with a useful 2m FM rig. This could be used either as a dedicated packet, or as a permanent 'stick it in the car' rig on your local natter channel.

### **Beginner's Rig**

We hear too often that amateur radio is a cheque-book hobby, and that some amateurs have never used a soldering iron in their lives. This may be true in some cases, but it need not be. What better for a club project than to convert a number of low-cost ex-pmr sets onto a given natter-net frequency, and what a good way to keep new licensees in touch with other club members.

One of my very first transmitters was a converted Pye Vanguard complete with valves, that I bought as a student for a few pounds to get on the air. With help from a local amateur (thanks Greg, I still remember) it was converted to 2m and gave me many pleasant QSOs, as well as an eventual career in radio communication. We certainly need more radio engineers, with nearly every radio communications company bemoaning the

lack. We also need more young amateurs, who need to get on the air without spending a fortune. Couple an ex-pmr rig to a packet radio tnc and terminal (see next month's HRT for a low-cost system using Digicom), and you have worldwide error-free communication. What more could a keen youngster want?

### **The Burndept BE448**

A recent 'newcomer' to the ex-pmr rigs on sale is the BE448, a small FM transceiver which, depending on the PA circuitry fitted, gives either 5W or 25W transmitter output. The types available on the market cover 'Low' band version is fine for 4m, the 'Mid' band version is, in my strong opinion, best avoided, and the 'High' band version will tune to 2m, albeit with a slightly 'deaf' receiver. However, with a few additional capacitors which I have detailed it will give a good receive performance. The sets are crystal controlled on both transmit and receive, and come in either single or multi channel versions.

The receivers are normally fitted with a crystal filter for 12.5kHz channel spacing, giving a receive bandwidth of  $\pm 3.75\text{kHz}$ . This is quite OK for club nets and the like using similar rigs, and for packet use providing the distant station's deviation has been correctly set to below the level of its transmit clipper, that is, typically 3kHz. If the other station is producing a full 5kHz deviation, you will find your receive audio is distorted on speech/data peaks unless you replace the set's filter with a 25kHz spacing type, ie  $\pm 7.5\text{kHz}$ , available from suppliers such as Garex Electronics.

### **Identification**

On the side panel of the transceiver will be a serial number plate, which is duplicated on the inner chassis, and gives details of the transceiver type. If you're offered one with these removed, avoid it! Following the 'Type' designation, a single channel High band 5W unit for UK use will show the following:

BE448/5/GB/1/12/H

Common sense suggests that the 'BE448' is of course the equipment type number, '5' is the power, ie 5W, GB is the market variant, ie the UK version, '1' is the number of channels provided, '12' is the dc supply voltage, and 'H' indicates High band coverage. By using a bit of deduction, you can be your own expert when you search through the pile at the rally.

If you can obtain a set with the



# Dept BE-448 for 2m

mating speaker/microphone unit then all well and good, but if not then don't worry as I'll show you how to interface your own speaker, microphone, and power lead to the multi-way connection lead coming from the set.

## Before Buying

Before parting with your cash, open the set up by removing the two fixings at the rear of the case, and slide the outer metal sleeve back. Make sure none of the circuitry is obviously missing, as sometimes old sets are 'robbed' of bits for spares. Likewise ensure that extensive repairs haven't obviously been carried out, as such a set may work but there's a high chance of it not doing so. And this article only contains the conversion, not a complete workshop manual on how to fix dead sets! Don't worry if you find the plug-in channel crystals are missing from their sockets — you won't need them, and these are often removed as standard practice prior to disposing of the sets. Then, making sure the set is of the correct band and so on by looking at the serial number plate, the haggling can begin!

## Crystals

You'll need one transmit and one receive crystal for each operational frequency, but be careful with your sums as a multi-channel set may often prove expensive to crystal-up fully. I'd advise using one as a low-cost single channel set, on 144.650 or 144.675 for example for packet radio, or on your dedicated

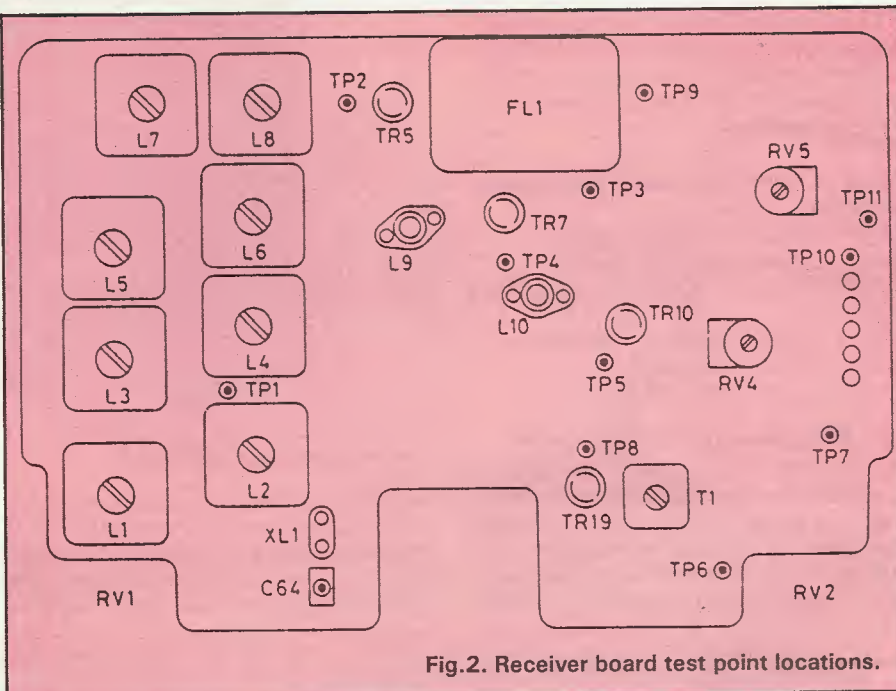


Fig.2. Receiver board test point locations.

natter channel. The formulae for the crystal frequencies are given in Fig.1.

Suitable crystals may be obtained from suppliers such as Quartslab Ltd, PO Box 19, Erith, Kent (Tel. 0322 330830). The commercial specification of the crystals are the Burndept spec. No. X857-1210/14, but whichever crystal supplier you choose ensure that you state they are for use with the BE448, other-

wise you'll find you're off your intended frequency.

## Fig.1 Crystal Frequencies

145MHz:

$$\text{Tx Xtal (MHz)} = \frac{\text{Transmit freq. (MHz)}}{16}$$

$$\text{Rx Xtal (MHz)} = \frac{\text{Receive freq. (MHz)} - 10.7}{4}$$

70MHz:

$$\text{Tx Xtal (MHz)} = \frac{\text{Transmit freq. (MHz)}}{8}$$

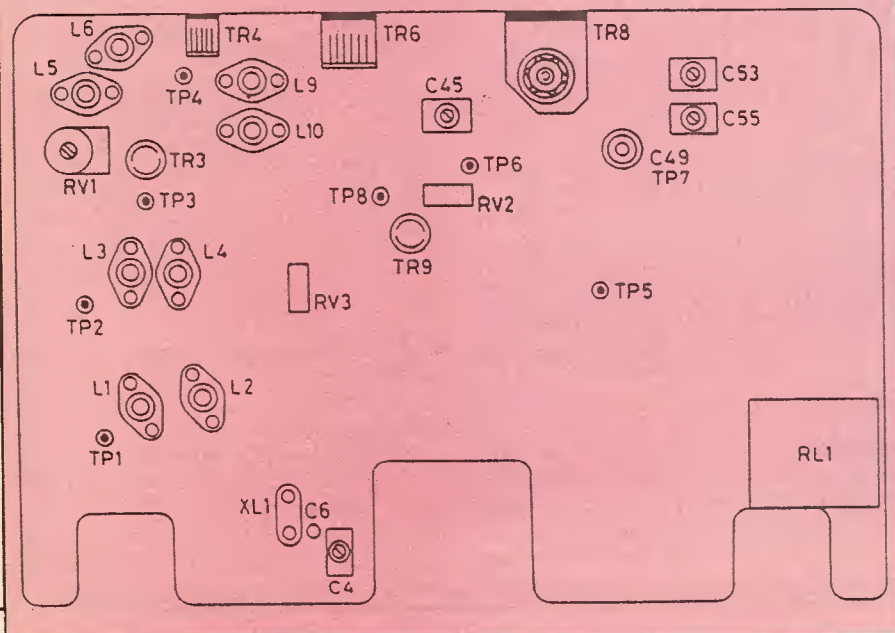
$$\text{Rx Xtal (MHz)} = \frac{\text{Receive freq. (MHz)} - 10.7}{2}$$

## Connections

The coaxial aerial lead coming from the rear of the set is normally terminated in a BNC socket. This may be left in place or changed to suit. The other thick lead coming out of the rear carries all the other functions. If you have the suitable interface with its mating socket then well and good, but if not then remove the attached plug on this lead by unscrewing the two cable clamp screws, then the four plug screws, and carefully pull the lead out through the plug body.

The connections you need for normal amateur use are given in Table 1, note that not all the connections are listed, and you may simply insulate the remaining leads that are present on the connector. The required speaker impedance is a nominal

Fig.4. Transmitter board test point locations.



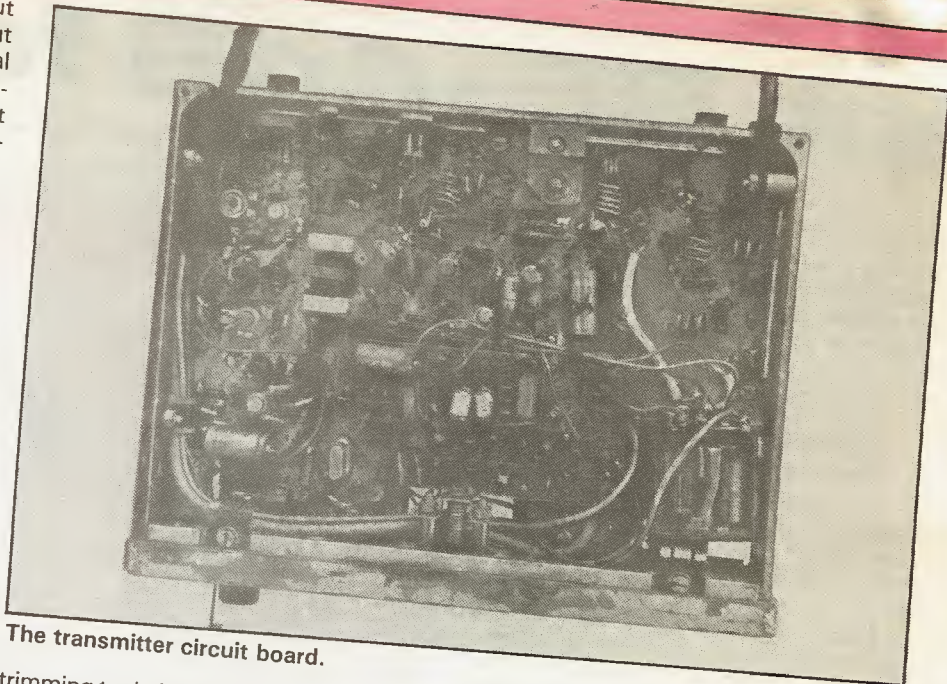
3 ohms, the set providing 2W rms output to this connection. The microphone input requires a few millivolts rms at a nominal impedance of 300 ohms. A simple low-cost dynamic microphone will be perfect here, or an electret condenser microphone with suitable bias arrangements. The dc power leads should be suitably fused, the set typically drawing 1.5A (5W version) or 4.5A (25W version), and the front panel squelch control doubles as the set's power On/Off switch.

**Table 1. Multi-Way Lead Connections Required**

- Red — 13.8V dc Positive supply
- Black — 13.8V Negative supply
- Clear Insulated screen — Common Ground
- Yellow insulated inner — Microphone
- Grey — Receiver Speaker
- Pink — Tx ptt, Ground for Tx

**Alignment Preliminaries**

First of all take a look at the trimmer capacitors in the transmitter power amplifier, and the ferrite adjusters in the coils, the latter which have slotted and hexagonal holes in them for adjustment. You'll need to obtain suitable non-metallic

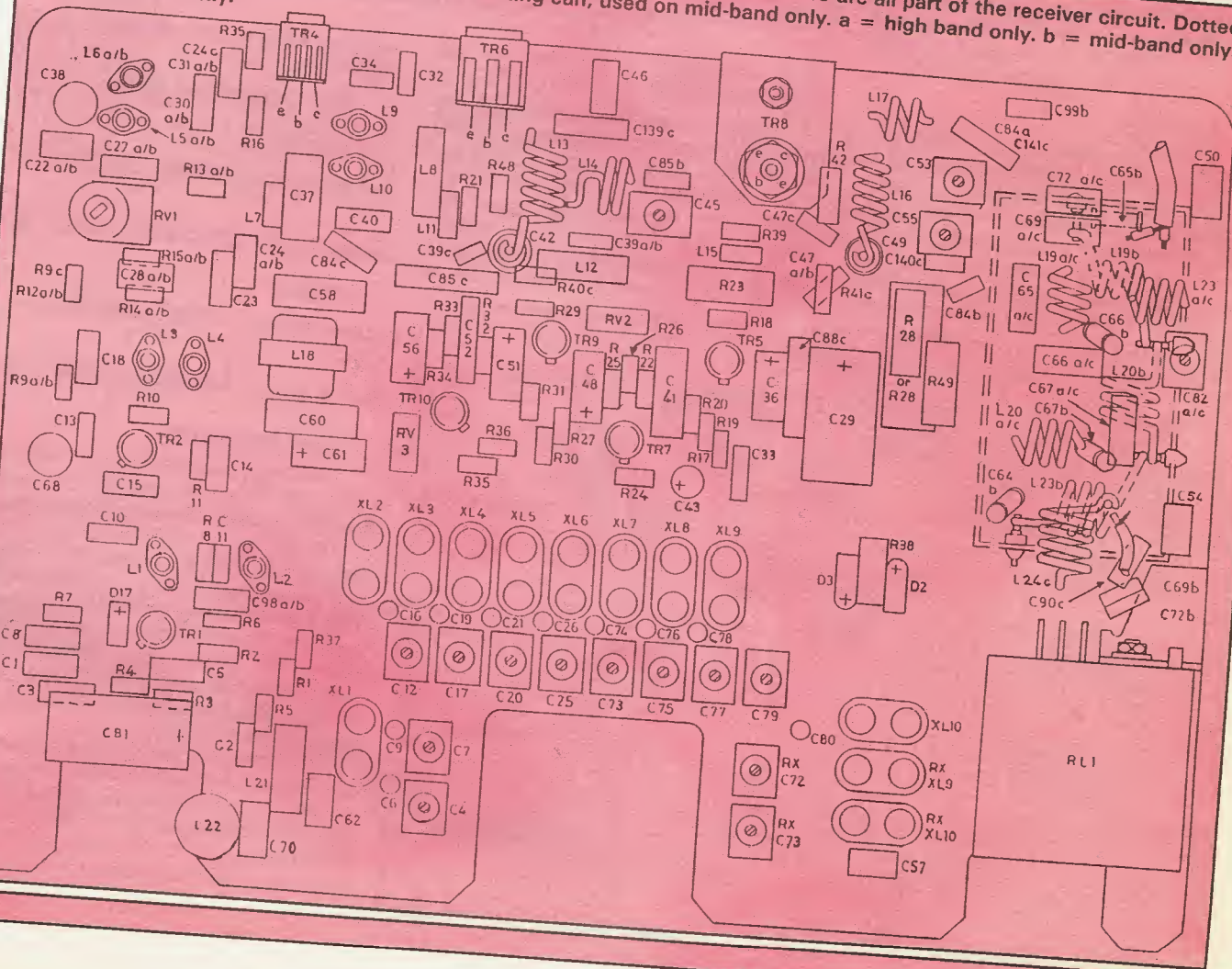


The transmitter circuit board.

trimming tools for these, and don't, under any circumstances, be tempted to use metallic jeweller's screwdrivers and Allen keys for these. Apart from upsetting the set's tuning in the first place, you'll be

likely to crack the brittle ferrite cores, and I've lost count of the number of times I've said 'I told you so' to amateurs asking me where they can obtain replacement cores, along with how they can remove the

**Fig. 4. The layout of the transmitter board. Rx C72, Rx C73, Rx XL9 and Rx XL10 are all part of the receiver circuit. Dotted items form an aerial filter contained in a screening can, used on mid-band only. a = high band only. b = mid-band only. c = low band only.**



jammed cores without destroying the coils. Don't try it, it just isn't worth it. If you haven't got access to suitable adjusting tools, a filed down matchstick or plastic knitting needle will work very well as a temporary tool for a one off job. You'll also need a multimeter to give a dc voltage reading, and some form of RF power indication to allow you to tune the transmitter for maximum power output.

### Receiver Alignment

Connect up your dc power lead and speaker, plug our receiver crystal in, and select the appropriate channel if you have a multi-channel set. Connect the negative lead of your multimeter to the dc supply negative, and with the 2.5V range selected connect the positive lead to TP1, referring to the Receiver Test Point location diagram. Switch on, and check that the front panel volume and squelch knobs operate as expected. If you get an intermittent response then a quick spray of a proprietary switch cleaner into the control's carbon track often works wonders. If you only require a unit to operate into your local, and hence strong, repeater then just perform the normal alignment. However if you need good sensitivity, follow the receiver modifications detailed. It's up to you whether you do this before or after the 'first' alignment, as it is often useful to check the radio works as you'd expect before diving in with your soldering iron, possibly causing a fault in the process which may be difficult to trace.

For the initial alignment, with your hexagonal non-metallic trimming tool, turn the core of L2 until you see the meter needle rise, then carefully tune for maximum reading, ensuring it doesn't suddenly 'drop' if you tune too far. For the next adjustment you need to connect your meter lead to TP2, and carefully tune the cores of L4 and L6 for minimum reading. In practice I have found that this is a difficult job as the voltage difference is very small, and the tuning is fairly broad. You could be better off tuning these for best reception of a received signal as detailed below.

For the remainder of the alignment, you'll need an off-air signal to tune to, reducing the level of this as your tuning progresses. As a first measure, you'll find it useful to tune the cores of L1, L3, L4, L5, L6, L7 and L8, two complete turns clockwise each, ie lowering the tuning cores into their formers. This will place the receiver very roughly in the 145MHz range, the remainder of the tuning adjustments of these cores being performed for best reception of a received signal. Remember to initially tune the appropriate crystal trimmer capacitor for best, ie least distorted, reception of a received signal on the correct frequency. You'll often find that you can perform the final 'spot' tuning by a suitable choice of a relatively

weak off-air signal, either by using different aerials or by a helpful amateur varying his transmit power for you during an on-air test. Even the local oscillator of a scanner receiver can be used as a weak signal source (key in a frequency separated from your BE448 receive frequency by the scanner's if).

You shouldn't need to touch any of the other receiver adjustments, such as those on the if and audio circuits, as these should already be at their optimum settings.

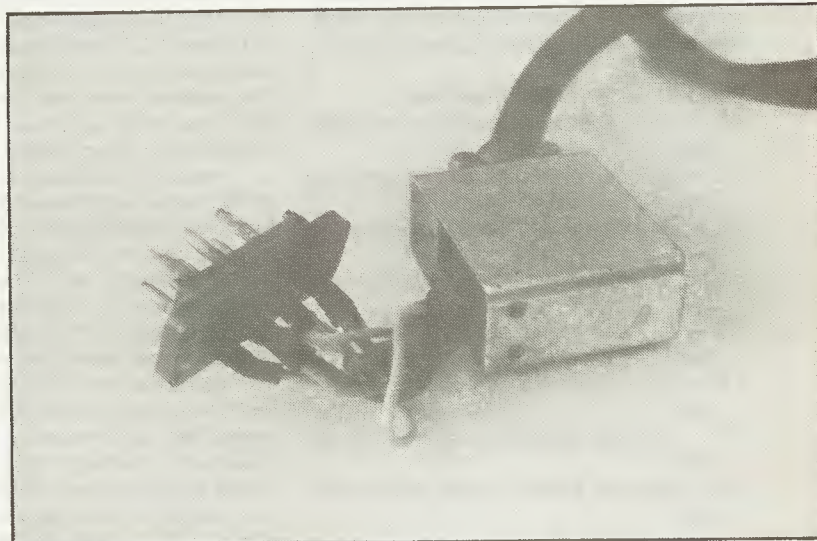
### Receiver Modifications

By now you'll typically have a working receiver, but with a sensitivity of the order of 2-3µV pd for 12dB sinad, ie around 15-20dB 'deaf'. If this is sufficient for your needs then fine, but if not you'll have to get your soldering iron out. You'll need a number of ceramic plate capacitors, the actual type is irrelevant for our purposes as long as they are physically small. Table 2 gives the capacitor values

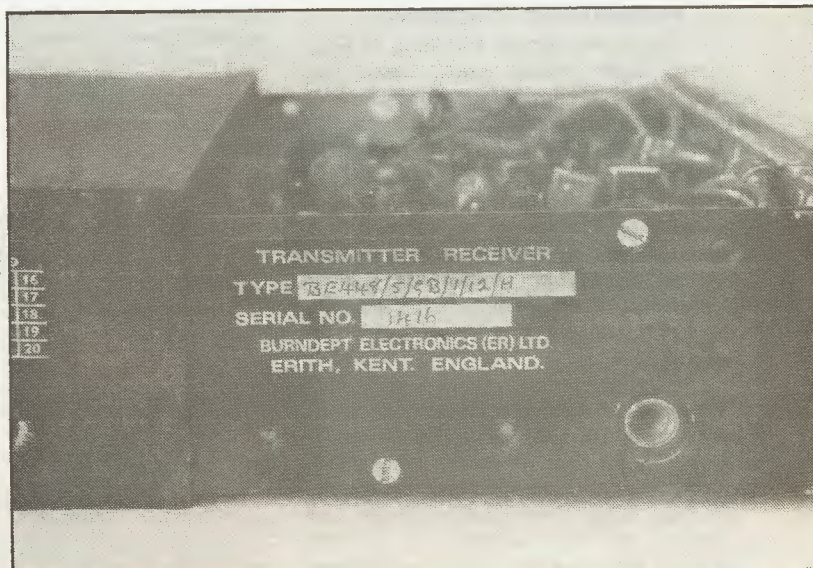
and the required modifications, derived by yours truly after initial calculations followed by many hours of testing with an RF signal generator. They are a compromise, but to get the last half dB out of the receiver you'd need to modify around three times the number of components together with a coil re-winding effort.

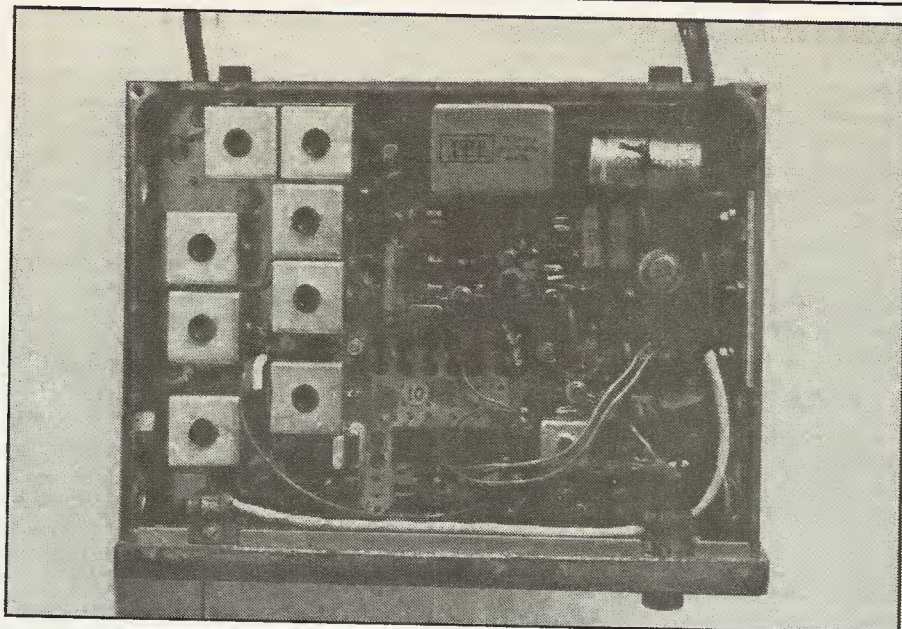
To get at the required locations, you'll first need to remove the seven outer slot-headed screws securing the receiver pcb to the chassis, together with the two central nuts. Then remove the nut/bolt arrangement securing the side heatsink panel to the chassis, and carefully hinge the pcb up as far as it will go. De-solder the folded-over tags securing the coil cans to the pcb and carefully bend these straight, so that the cans can be lifted vertically away from the pcb. Solder the required extra capacitors to the coil former pins, then replace the cans and solder their tags back in place. Finally replace the fixing screws, not forgetting the side heatsink fixings. Following a

Multi-way plug to interface speaker, microphone and power.



The Serial Number Plate — check before buying!





The receiver circuit board.

quick re-tune a detailed above you should achieve better than  $0.5\mu\text{V}$  pd for 12dB sinad from the receiver, typically  $0.35\mu\text{V}$ .

#### Table 2. Receiver Modifications

- L1 — 3p3 cap added across existing 3p cap.
- L2 — 2p2 cap added across existing 4p cap.
- L3 — 3p3 cap added across existing 3p cap.
- L4 — 3p3 cap added across existing 5p6 cap.
- L5 — 2p2 cap added across existing 3p cap.
- L6 — 1p8 cap added across existing 4p cap.
- L7 — 1p8 cap added across existing 2p cap.
- L8 — 1p8 cap added across existing 2p cap.

### Transmitter Alignment

This is the simple bit! Plug in your crystal, again taking care to select the right channel if yours is a multi-channel set. Connect a suitable 50 ohm load to the aerial termination, with some form of RF power indication to show how you're doing. This doesn't need to be an accurate power meter; a simple wavemeter or a diode probe coupled to your multimeter will do. Connect your multimeter negative lead to the dc supply negative, switch to the 10V dc range and connect the positive lead to TP2.

Key the ptt (making sure the internal Tx/Rx relay clicks over) and tune the cores of L1 and L2 with your non-metallic trimming tool for minimum (not maximum) dc reading. Remove the meter positive lead, switch to the 2.5V dc range, and connect to TP3 (145MHz Tx) or TP4 (70MHz Tx). Note that TP4 is the emitter

of the heatsinked transistor, the lead with the violet insulation. Now tune the cores of L3 and L4 for maximum reading with the ptt keyed. For 145MHz rigs, transfer the positive meter lead now to TP4 (the transistor lead) and tune L5 and L6 for maximum reading again.

Note that potentiometer RV1 acts as an RF output power control, and with this fully clockwise maximum power is given. By now you may be getting a sniff of RF power indicated with the ptt keyed, in which case tune the cores of L9 and L10 for maximum RF. If not, then connect the positive lead of your multimeter, set to the 15V dc range, to the dc supply positive, with the negative lead connected to TP6, tuning the two cores for minimum (not maximum) reading, which should coincide with maximum RF power. You can now transfer the negative lead to TP7, this is the centre connection of the chassis mounted feedthrough capacitor, and tune C45 for minimum reading again coinciding with maximum RF power. Now it's a simple case of tuning the remaining

trimmers in the power amplifier, C53 and C55 for the 5W pa, plus C127, 128, 121 and 122 for the 25W pa, for maximum RF output, together with a final adjustment of C82 in the aerial filter (at the extreme right of the pcb) for maximum.

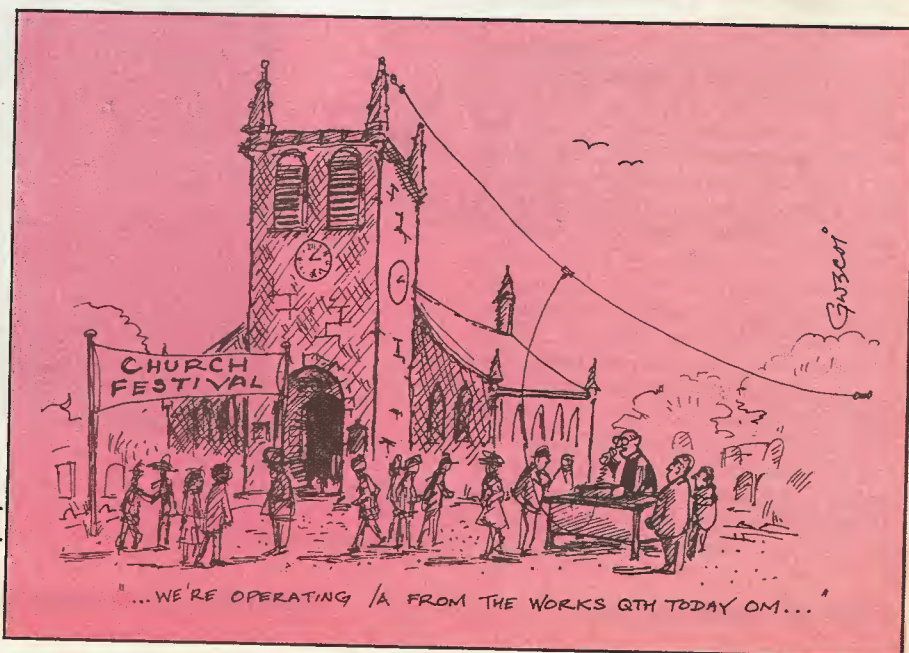
You'll now need to adjust the relevant crystal trimmer capacitor for the correct transmit frequency, either by tuning with the aid of a receiver fitted with a centre-zero meter, or by 'zero beating' your transmitter against another of a known frequency while monitoring on a receiver. Some amateurs may have access to a frequency counter which is the ideal. The transmit deviation will probably be set fairly low if the unit was originally adjusted for 12.5kHz channel spacing. RV3 is the deviation potentiometer to adjust. Watch out for the large wirewound resistor next to your fingers while you're doing this — it gets hot. If you have access to an oscilloscope, either coupled to a deviation meter or a monitor receiver, you can also adjust RV2 for equal clipping of a well-modulate signal, together with a final tweak to L1 and L2 for minimum distortion. Otherwise, leave these well alone.

### That's It

That completes the RF alignment as far as amateur service is concerned. If you're a perfectionist with access to a laboratory full of test equipment, then by all means feel free to complete the manufacturer's full 37 page alignment instructions!

I hope this article prompts a few amateurs to have a go, as it really is not all that difficult to get an ex-pmr rig going on the amateur bands, saving yourself a fair bit of cash in the process.

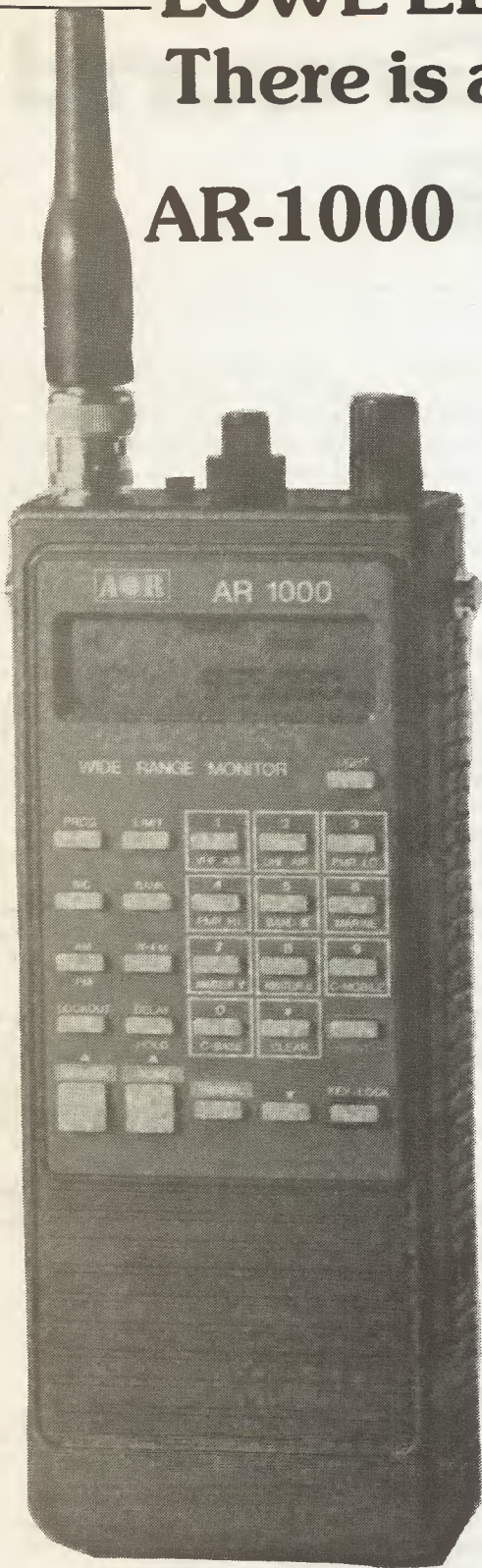
*My thanks go to Kanga Products for the loan of the transceiver used in this conversion, and Quartslab for the kind provision of the 144.650MHz crystals used.*



# LOWE ELECTRONICS LTD.

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### AR-1000 . . . £249 inc. VAT



We are delighted to give firm information about the new AR-1000 handheld scanner from AOR. Their design aim of producing a handheld version of the AR-2002 but improving on the spec, at the same time seems to have been fulfilled.

#### BASIC SPECIFICATION

**Frequency ranges** 8 to 600MHz continuous, 805 to 1300MHz continuous.

**Frequency selection** By direct keypad entry or by tuning knob on top panel.

**Memory channels** 1000 arranged conveniently in ten banks of 100, with direct keyboard access to any memory.

**Search bands** Ten bands which come pre-loaded with the ten most important UK bands of interest as follows:—

1. VHF air	118-138MHz	2. UHF air	225-400MHz
3. VHF PMR1	71-87MHz	4. VHF PMR 2	165-174MHz
5. Band 3	174.5-225MHz	6. VHF marine	156-163MHz
7. VHF amateur	144-146MHz	8. UHF amateur	433-435MHz
9. Cell mobile	890-905MHz	10. Cellbase	935-950MHz

Note that this is only the factory pre-loading, and any search band can be easily re-programmed by the user for any frequency range they wish. What is important is that the new owner can unpack the receiver and by pressing just 3 keys can begin using the unit straight away.

**Reception modes** AM, FM (narrow), and FM (wide) which gives access for the first time to FM broadcast and TV sound in a handheld scanner.

**Frequency steps** Users programmable from 5 to 995kHz, in any multiple of 5kHz to 12.5kHz.

**Scan speed** 20 channels per second.

**Search speed** 40 channels per second.

**Power source** 4.8V rechargeable NiCd.

The battery pack is four separate 600mA/H AA size cells which are provided, but the user can easily remove them and replace them by four standard AA pencils. Also, and most importantly, the AR-1000 can be powered from any external dc supply of 13.8V nominal, which not only powers the receiver but also charges the NiCd batteries — so satisfyingly simple.

**Other features include** a 10dB switched RF attenuator; concentric easy to use volume and squelch controls; a brilliantly designed keypad layout which anyone can understand and use; and a simple interactive operating system in which the display clearly indicates what the user's next move should be. All the performance and features which we wanted from AOR are here in a stylish handheld package, measuring only 70 x 35 x 170mm, and weighing a mere 300g (excluding batteries).

#### The AR-1000 comes complete with the following accessories:

Set of 600mA/H NiCd batteries

240V mains charger

DC power cord with cigar lighter plug

Soft carrying case

Belt clip

Carrying strap

Earpiece

High performance DA900 flexible gain antenna



For the past 26 years Lowe Electronics have specialised in seeking out the best in radio and bringing it to our customers. Those customers will also tell you that we have another speciality — looking after them. Whatever is best in radio, we sell. Whatever we sell, we back with really expert advice and service. WE are pleased to represent the best companies in the receiver world, and in addition to the AOR range shown here, we also distribute receivers from Signal Communications and WIN, two of the top names in Airband radio. For full information and a copy of our Airband Guide, simply send us four first class stamps and mention that you saw our ad. in Ham Radio Today. Happy listening.

Shops in **GLASGOW** Telephone 041-945 2626, **DARLINGTON** Telephone 0325 486121, **CAMBRIDGE** Telephone 0223 311230, **BARRY** Telephone 0446 721304, **LONDON** Telephone 01-429 3256, **BOURNEMOUTH** Telephone 0202 577760

All branches are closed all day Monday.

# Stand Your Ground!

## Part 2

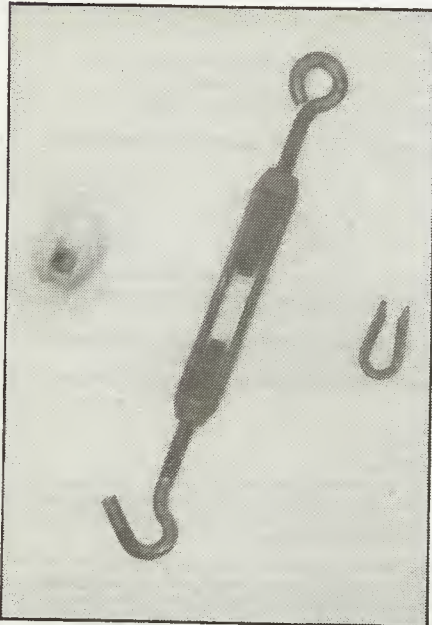


Fig. 1. Three essential items: an egg insulator, a turnbuckle (centre) and an eye.

while "splicing" is the joining of two ropes or wires. The most common use for a whipping is to secure a wire or rope to an eye or insulator. Many people consider that it is enough to simply pass the end of a wire through the eye of the insulator and wrap it two or three times around the main wire. This can prove remarkably strong, but it is doubtful whether it could be guaranteed to survive storms like the one of October 1987.

A far stronger and neater join is made by passing about twelve inches of the wire around the eye, or through the insulator and laying the free end parallel with the main length. Then unravel one strand back to the eye or insulator, and wind six or eight turns tightly around the two wires and then lay the remainder parallel with the main length. Unravel another strand and repeat the process, but this time winding in the opposite direction and securing the free end of the first winding. Continue with each strand in turn. It will not be possible to secure the last strand due to the natural stiffness of the wire, but if the end is clipped off neatly, the winding will remain securely in place.

The method of binding is to lay a two inch loop from one end of the string parallel with the rope. Using the long end of the string, wind tightly around the main and free ends of the rope, trapping the loop underneath the winding for a length of about one to one and a half inches. Pass the remaining string through the loop.

Then pull the short end of the string shortening the loop until it passes well underneath the winding. Clip off the spare string ends and the binding will remain secure.

When tension is applied to the rope, the binding may slip slightly, but it will stop as soon as it reaches the eye or insulator, and will then form a strong and effective whipping.

### Splicing

Splicing a guy wire should never really be necessary, for if two lengths of wire have to be joined it is better to either replace them with a new length or whip in an insulator.

However, human nature being what it is and the frequency at which Murphy's Law rears its ugly head, the time is sure to arise when a guy is too short, the last insulator in the box has been used and the ironmonger closed half an hour ago. Two wires will have to be spliced.

The general principle is very similar

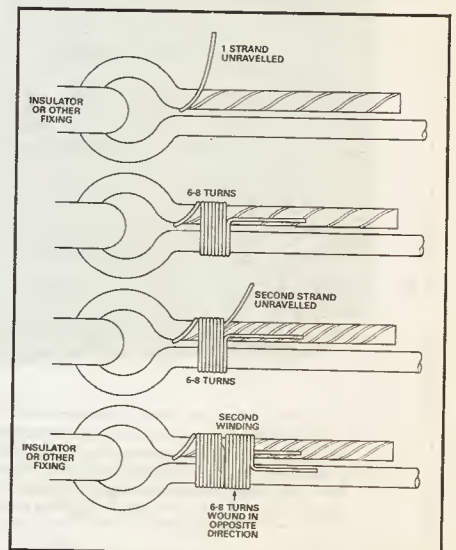


Fig. 2. Whipping an eye or insulator on to a stranded galvanised iron guy.

### *In the second part of his treatise on erecting aerial masts, Brian Kendall G3GDU splices the main brace — safely.*

Last time we looked at wind forces which masts may have to withstand, and the materials for constructing guylines, pickets, etc. In this article we will look at how to make the guylines and actually put up masts.

### Whipping

Whipping and Splicing seem to create visions of working aloft on a 19th century windjammer, rounding the Horn in a force 12 gale. However, with stranded galvanised iron wire, neither is difficult, and either results in a simple, neat, quick and extremely strong fixing.

The term "whipping" is used for a termination on the end of a rope or wire,

There are several other methods of whipping eyes and insulators to the end of a cable, but the method described is the most suitable for our purpose.

For temporary installations, such as field days, it is more convenient to use polypropylene rope. A different whipping technique has to be used. Cut the guy to length and seal the end by applying a lighted match or cigarette lighter until the rope has melted for about a quarter to three eighths of an inch.

When cool, pass about three inches of the rope around the eye or insulator and then bind the free end to the main length with a piece of strong, preferably waxed string.

to whipping: take the two wires to be joined and splay out the strands of each for six to nine inches. Push the splayed ends of the wires together and smooth the strands forward so that the strands lie along the opposite cables. Take one strand of wire and wind about six or eight turns around the other cable, laying the end parallel with the other strands. Repeat with one strand from the other cable. Return to the first cable and wind a strand six or eight turns in the opposite direction to the previous winding. Carry on until all the strands on both sides of the join have been wound in a similar manner to a whipping.

While I cannot claim that this is as strong as a wire without a join, I have never known such a joint fail.

### Putting Up The Mast

The erection of a mast requires careful planning, or a great deal of effort could be wasted with serious risk of

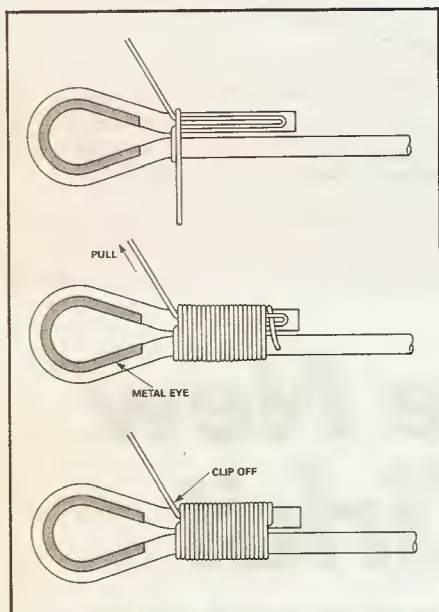


Fig. 3. Whipping a rope (not a wire).

damage to the mast and yourself or your helpers.

There are two common methods of erecting a mast, and the choice depends on the space available, the height and headload, the number of helpers, etc. They only vary in the means of support during erection.

Particular care should be taken with lightweight masts supporting beam aerials or other headloads, for unless supported along the full length, the mast will bow and may get out of control and crash to the ground.

The first task is to ensure that the pickets are secure and correctly positioned. Check the guy wires have been cut to the correct length and secured to the mast. A turnbuckle should be attached between the bottom of each

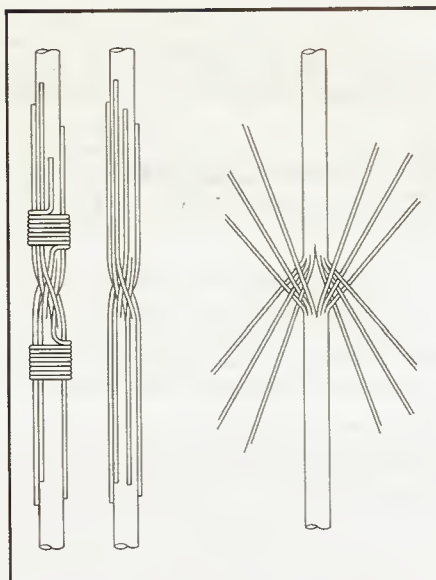


Fig. 4a. Splicing two stranded wires — stage 1. Fig. 4b. Splicing two stranded wires — stages 2 and 3.

guywire and the picket for final tensioning.

Lay the mast along the ground, aligned midway between two pickets with the base at the point where it will eventually stand. Attach the guys to these pickets.

First, drive a stake into the ground by the base of the mast and connect them with a short rope. The purpose of this is twofold: it ensures that the base of the mast does not move from its correct place, and it prevents it rising into the air if it comes off balance during erection.

Using the first method, space a number of helpers along the mast, with a further helper to control the base. Lift the top end of the mast to head height, where two or more ladders should be positioned to support and then gradually lift it towards the vertical. In the latter stages of the lift it will be possible to get further support by pulling on the third, and so far unattached, set of guys.

During this operation it is essential that the mast remains perfectly straight and, one helper should be delegated the task of "uppenfuhrer" to stand at a distance and give instructions when necessary.

When the mast is vertical, the third set of guys must be attached to the remaining picket. While the guys are loose, the mast can be lifted onto its baseplate. Finally, increase and adjust the tension in each set of guys to ensure get the mast perfectly straight and vertical.

The second technique uses a "falling derrick" or "gin pole", which uses a further length of mast tubing as long as the distance between pickets and mast base.

One end of the gin pole is attached

vertically to the base end of the mast, and the third set of guys is connected to its other end. Three further ropes are attached here as well, one in the line of the third picket and the others at a right angle on either side so that the top of the gin pole can be prevented from moving from side to side.

A steady pull is then exerted on the centre gin pole rope (professional riggers often use a winch or a Landrover for this) and the mast will gradually rise to the vertical as the gin pole moves towards the horizontal. The third set of guys can be transferred to the picket.

The mast can then be lifted on to its baseplate, the gin pole removed and the guywires tensioned.

Whichever method is used, the lift must be slow and smooth, especially if carrying a headload such as beam. At any sign of wobble, the lift must be stopped until the mast is still, for if it is not, the problem can only get worse to the point where the mast gets out of control.

### Personal Safety

Whenever a mast is erected, there is always a risk of injury, which may vary from cut hands to helpers being knocked unconscious by a mast falling on them. I have seen many accidents on field days when high masts with headloads were being erected by the inexperienced.

Fortunately, no-one has been killed,

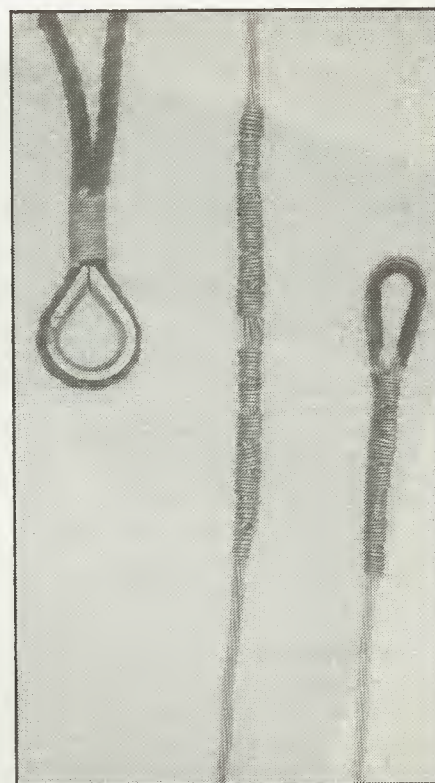


Fig. 5. Top: an eye whipped onto a rope. Centre: a splice in a guy wire. Bottom: a stranded wire whipped to an eye.

but the possibility is always there. A stacked double seventeen element beam falling from forty feet falls with considerable force and serious damage or injury is inevitable.

Risks can be minimised if precautions are taken.

The first consideration is the weather. High or gusting winds can make the erection of a high mast very difficult and extremely dangerous. In such weather it is far safer to delay for a day or two until the wind dies down. If you cannot delay, such as on a field day, consider using a shorter mast. It is better

to lose a few points than an operator.

If at all possible, equip helpers with hard helmets to guard against anything falling from the mast. Supply industrial gloves to those handling metal guy wires, as a broken strand running through the hand can cause a deep cut several inches long. And make sure that a first aid kit with suitable dressings is within easy reach.

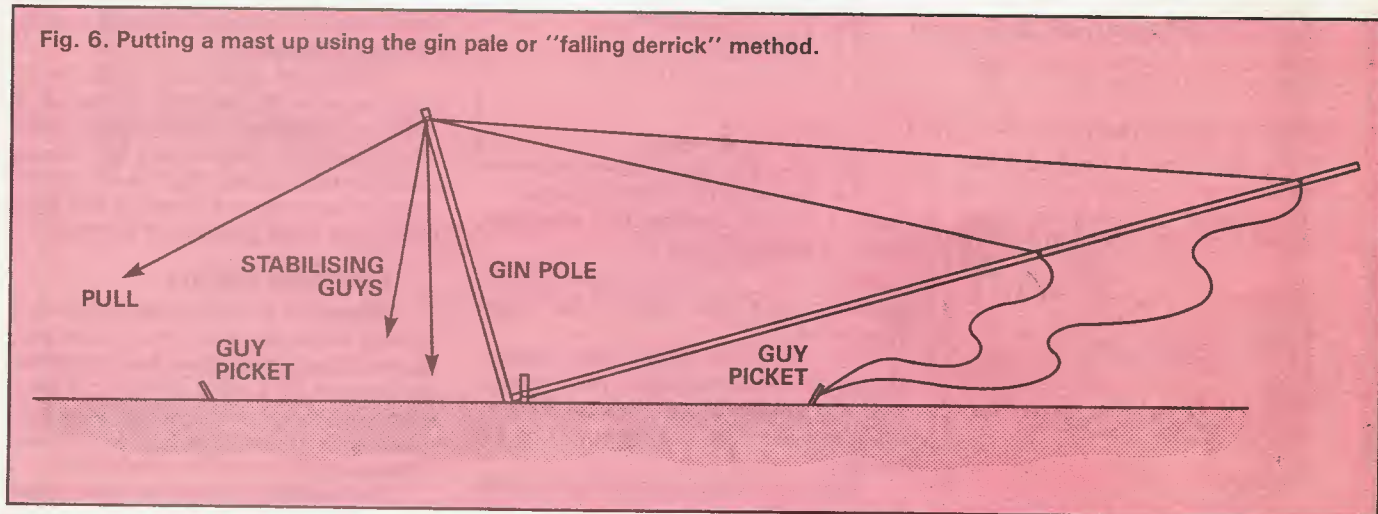
Finally, delegate one person as a foreman who, with no other tasks, will be in total command of the operation from the insertion of the pickets to the final adjustment of the guys. It will also be his

task to ensure that every helper knows precisely when and what is required.

### Conclusion

It is quite possible for amateurs to make and put up masts sixty or seventy feet high which will survive any wind which the British climate can threaten. This requires careful planning and construction, but if you fail to meet these standards, the mast will be a danger to yourself, your family and bystanders. Do it right, and it should continue to serve you, as they say, through "Hell and high water".

Fig. 6. Putting a mast up using the gin pole or "falling derrick" method.



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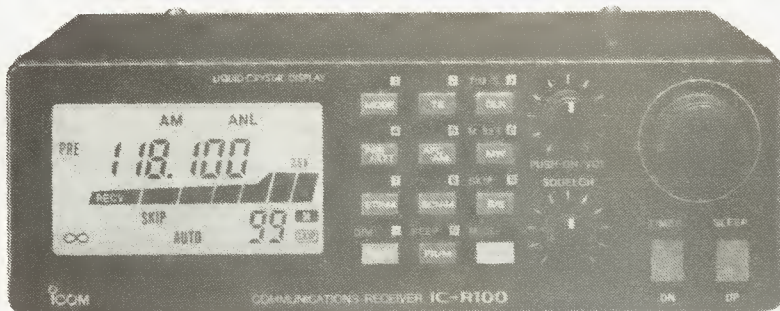
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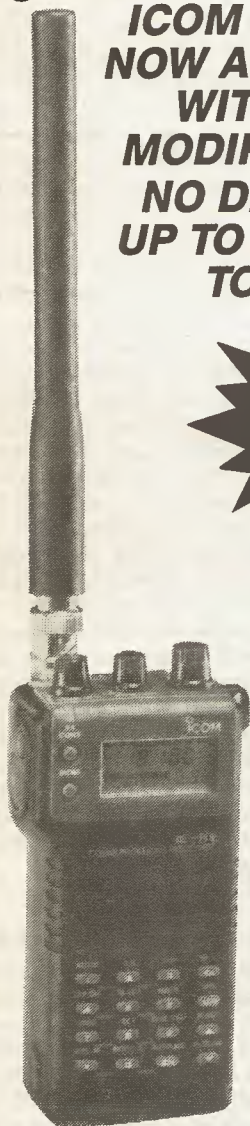
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# Review: IC3220



*G4HCL discovers that two receivers can fit into a box that looks like one and is handy in the car.*

The latest mobile rig from Icom looks just like a single bander, but appearances can be deceptive — inside the box there's a true dual band mobile, complete with twin receivers for simultaneous 2m/70cm reception. There was only one set in the country, it hadn't even been revealed to the UK public, but HRT were privileged to be offered the exclusive review. Priced at £499, it should just about be generally available when this review appears in print.

## Small Package, Big Performance

The set is around the size of a single bander, it has a similar display to a single bander, but inside the case there are two receivers and two transmitters, which allow true simultaneous operation. Some dual band rigs don't allow you to listen on both bands at the same time. Some rigs which offer 'cross band full duplex' don't always let you have a QSO on one band while you're listening out on the other, even if they have twin frequency displays. So be wary when comparing rigs.

## Mobile Safety

The set itself is a small 140mm by 40mm by 195mm deep, and can easily be

mounted above the dashboard rather than the more common under-dash position needed by larger olden-day rigs. As mobile operating safety is now becoming of greater concern to the amateur, the small size of the IC-3220E allows it to be placed in a position which gives minimum eye-travel distance between the display and controls, and the road ahead. It has been proved that this eye-travel and control operation factor is far more important than the use of 'hands free' microphones. As a further benefit, to prevent glare from the display affecting your ability to see the road ahead clearly at night, you can pre-program the set's backlighting to one of

four different levels of illumination; a nice touch.

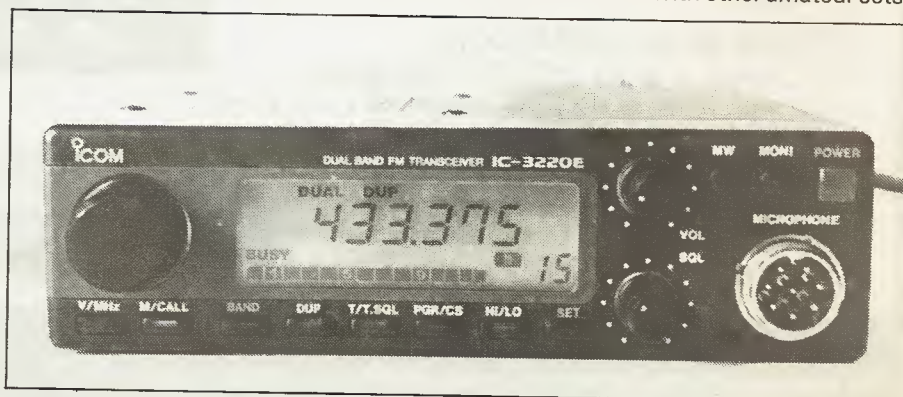
## Features

The IC-3220E gives a maximum 25W transmitter output power, together with a pre-programmable low power setting of either 1W or 10W. A further high-power version, the IC-3220H, offers 35W (70cm) and 45W (2m) maximum outputs with 5W or 10W low power in each case. A single SO-239 socket is used for the common 2m/70cm aerial output, which lets you use one of the many dual-band aerials currently on the market without a separate duplexer. Or, if you prefer to use higher-performance single band aerials, an external duplexer can be used in reverse mode for this.

The front panel Channel, Volume, and Squelch knobs control the selected 'main' band, the frequency being indicated on the display, and a 'busy' indication together with a bar-graph S-meter shows the status of received signals on this band. Almost hidden away is the 'sub' band, also controlled by the front panel volume knob but with a pre-set squelch. A 'B' indication at the right of the main display shows up when a signal appears on the sub-band. A press of the band button transfers the 'main' status between 2m and 70cm, so you can choose to control each band in turn to change frequency and so on, with the set always transmitting on the main band to make life simple.

## Frequencies and Memories

The set covers the usual 144-146MHz and 430-440MHz ranges, with selectable tuning step increments of either 5, 10, 12.5, 20 or 25kHz, a further 1MHz shift facility being available from the front panel by pressing the 'V/MHz' button followed by a twist of the main dial. In common with other amateur sets,



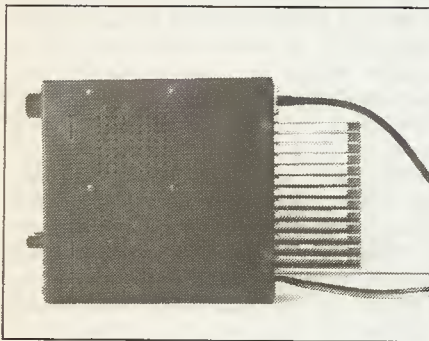
# Dual Band Mobile

the receiver tuning range may be extended somewhat, depending upon your particular government's viewpoint; the sensitivity specifications are however only guaranteed within the amateur bands.

18 memory channels on each band are provided, together with a further Call channel on each band which may be pre-programmed for quick recall using the M/Call button on the front panel. Each memory channel can hold the usual functions such as frequency, repeater shift, scan 'skip' status, optional sub-tone frequency and so on.

## Scanning

The usual scan facilities are available on the main band. As well as memory channel scan, with individual channels being locked out of the scan mode as



required, a further pair of memory frequencies on each band may be pre-programmed with frequency limits for a band scan search between these two limits in your pre-selected tuning steps. As well as this, a priority watch function is available where the set briefly samples a pre-programmed channel every few seconds, halting on it when activity appears.

As usual the scan or search halts when the receiver squelch rises and with suitable pre-programming it may be set to resume either 5, 10 or 15 seconds after the squelch first raised, or 2 seconds after the squelch closes. This allows a degree of flexibility depending on your interests, as well as allowing you to set the scan timing to suit the activity levels in your own area.

## Twin Receive

The set has separate receiver RF and IF stages for each band, using just a common audio amplifier. This means that once you have set the frequency you want

to listen to on one band, you can transfer control to the other and happily chat or scan away, and as soon as a station comes up on the frequency you've set on the other band, you'll hear that as well. However, unlike other such dual band rigs on the market, the IC-3220 doesn't have a front panel 'balance' control to let you manually vary the relative receive audio level between the two. Instead, it has a novel pre-programming arrangement, using the multi-function 'Set' facility on the rig.

The main band audio in all cases comes out at the full loudspeaker volume you've set using the volume control, and you have one of five choices for the sub-band audio. First, you can set it to come through at normal volume level, or at one of three levels of attenuated audio, so you can hear it only in the background, in other words in a fairly similar manner to a pre-set 'balance' control. Alternatively, and this may be useful depending on your operating habits, in the absence of a main band signal the sub-band audio comes through at normal volume. However, as soon as a main band signal appears the sub-band audio is again automatically attenuated to the lowest pre-programmed level. If you want to get rid of the sub-band audio completely, then a long press of the Band button turns the set into a switched band rig, disabling the second receiver.

## Options

The IC-3220E comes with a fist microphone with up/down control and toneburst buttons fitted, a mobile mounting bracket and fused power lead, and a user instruction book as standard. A wide variety of optional accessories are available, ranging from four types of external speaker, an Icom dual band

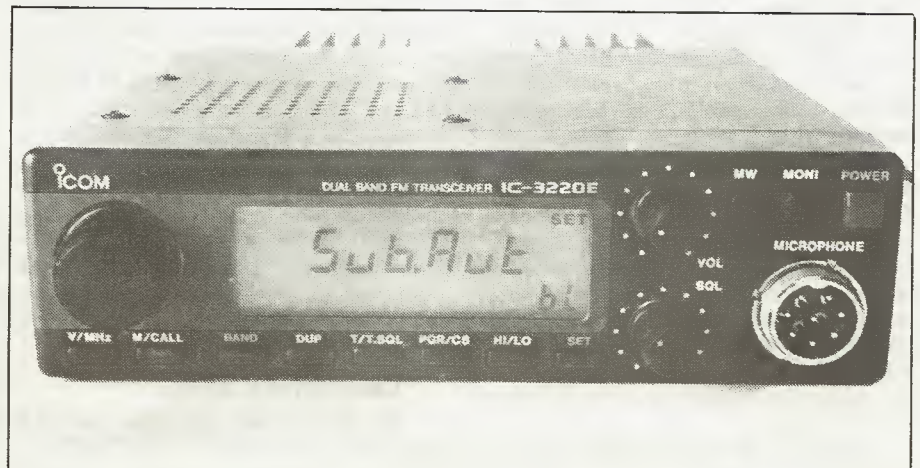
mobile aerial, various mobile and desktop microphones, spare mounting brackets and power leads, and an AC power supply for home use. Internally fitted boards are also available, such as the UT-50 Tone Squelch unit, UT-51 Sub-Tone encode only unit, and the UT-55 DTMP tone encoder/decoder for selective calling.

## On The Air

Due to the set's small size, it fitted neatly on the top of the central parcel shelf in my car, allowing me to use it either as a driver or passenger. I spent over 500 miles on the road with it to make sure it was given it a thorough test, and after I'd finished with it my wife Sheila G81YA also gave it a good going over.

I normally use separate on-glass aerials for 2m and 70cm on my car (only because I haven't yet found a decent dual band on-glass aerial that works as it should, despite testing several types), but due to the rig's common aerial connector I felt the simplest answer was to clamp on my old gutter mounted dual band aerial. This made a neat and tidy setup, and I found I could quite easily take the set out and fit it into my coat pocket when leaving the car parked, avoiding the likelihood of the rig being stolen.

The first thing I found was that after programming the set's memories up, switching between bands was a little difficult on the move due to the small band button, fitted in the middle of a number of other similar controls. Eventually I left the sub-band frequency set to a memory channel programmed with either the local 2m repeater or S20 as 'background listening', with the main band scanning around the 70cm repeater and simplex channels. Pre-programming the Set facility to attenuate the sub-band



audio automatically when a main band signal came up gave a reasonable result, and whenever I started a QSO a long press of the Band button neatly removed any last distractions from the sub band.

When operating through the many 2m and 70cm repeaters on my journeys, I found the small 'Moni' button next to the power On/Off switch very handy; as well as raising the squelch this gave a

speaker position on the top of the cabinet rather than on the bottom, the received audio was ample and I never felt the need for an external speaker, even when driving at high speed. Sheila did however comment that the audio was often tinny, no doubt due to the small size of the speaker. This may be worth noting if you like full and rounded audio. Reports of our transmitted audio were excellent with the

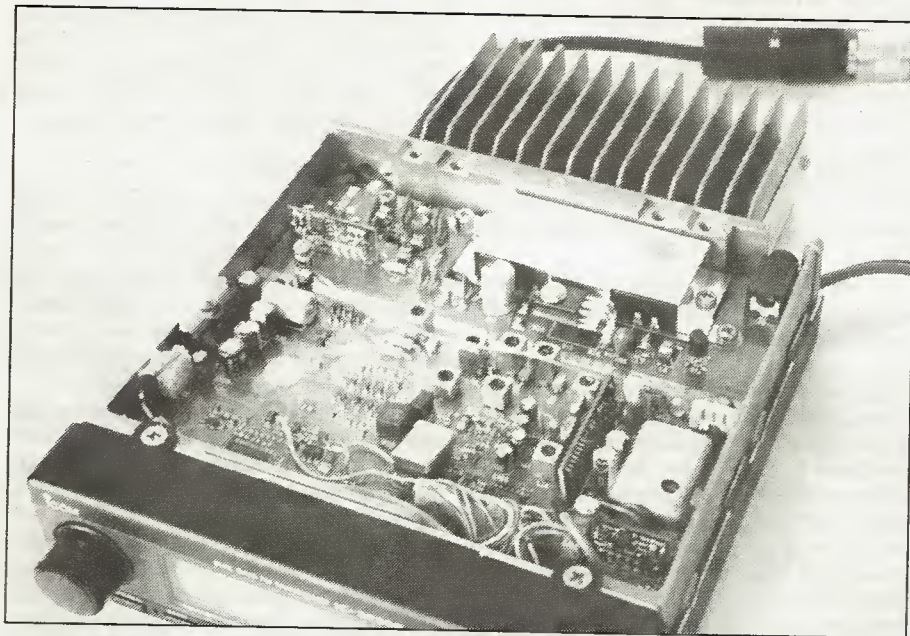
so that the set should be able to hear distant signals easily, and indeed this should prove a reasonable match for the higher power IC-3220H version when this becomes available. The adjacent channel rejection of 12.5kHz spaced signals was reasonable although not quite up to the rejection of some other sets, again as found on-air from the odd 12.5kHz off-frequency signal received on UHF.

The transmitter operated very well even under long transmit periods in the lab, the large rear heatsink certainly holding its own. The higher-order harmonics from 2m were very well suppressed, below my normal measurement limit of -90dBc. The transmit deviation on both bands was only ever-so-slightly over the top, which probably implies very accurate setting in the factory, and the frequency accuracy on both bands was excellent. In all, a very good technical performance.

### Conclusions

The IC-3220E is smaller than other dual-band rigs around, and having the facility of simultaneous reception on each band it comes very near to being two rigs in the size of one, offering a good deal of flexibility in its mounting location. The receiver offered very good sensitivity, and this could allow the use of one of the tiny dual-band mobile aerials which are currently becoming popular without too much loss in overall performance. In use, controlling both bands was a little more difficult than with other dual band mobiles, and the single frequency readout coupled with the lack of scan facilities or S-meter on the sub band may prove limiting for some amateurs. The auto-attenuator was, however, useful in many instances, and there is a limit as to what you can fit on such a small front panel.

*My thanks go to Icom (UK) for the kind loan of the review transceiver.*



'listen on input' facility so I could quickly see if a direct QSO was possible. This was useful during the bank holiday motorway traffic jams, when I was surprised at the number of amateurs all queuing up along the same stretch of road!

### Good Sensitivity

The receiver sensitivity on both 2m and 70cm was very good indeed, distant amateurs being copied with ease even when they were receiving a weak and only partially readable signal from me. On 70cm in some areas, I did have the odd problem with the scan halting on the occasional UK primary band user signal, these constant carriers from hill top locations being 12.5kHz removed from our 70cm repeater frequencies. Eventually I set the scan halt delay to the shortest programmable value of 5 seconds, minimising this occasional problem.

With the set mounted on the dash, the S-meter operation was some times a distraction as it was very lively on signals with normal mobile flutter. A low S-meter dynamic range is a common limitation on FM rigs, but the lack of damping on this set did seem rather worse than usual. On a more positive note, I found the overall lcd readability superb, and the programmable backlight level facility very useful at night.

Because of the sensible internal

supplied mobile fist microphone, with no trace of excessive sibilance or nasality, which is quite good. It's a pity some of the mobile boom mikes on sale don't do as well.

### Technicalities

The set is built into a sturdy die-cast alloy chassis, the large heat-sink on the rear panel being an integral part. To provide good isolation between bands, the 2m and 70cm circuit boards are built on either side of the chassis' central section, and a control board mounted in a metal screen fits into the front of the set, surrounded by a black plastic moulding which forms the front panel.

Inside, a dual conversion superheterodyne receiver is used for both bands. On 2m a varicap tuned front end is used together with a first if of 17.2MHz, and on 70cm a fix-tuned front end followed by a first if of 30.875MHz. In each case two monolithic dual crystal filters are used followed by small 455kHz ceramic filters in the second ifs for adjacent channel filtering. On transmit, a final frequency vco feeds the usual amplifiers, a block-type pa being used on each band for final amplification to the 25W level.

### Laboratory Tests

As found on air, the receive sensitivity on both bands was excellent,



## LABORATORY RESULTS:

### RECEIVER

Squelch Sensitivity:		
	145MHz	435MHz
Threshold:	0.09 $\mu$ V pd (7dB SINAD)	0.10 $\mu$ V pd (7dB SINAD)
Maximum:	0.20 $\mu$ V pd (25dB SINAD)	0.23 $\mu$ V pd (25dB SINAD)

Intermodulation Rejection: Increase over 12dB sinad level of two interfering signals giving identical 12dB sinad on-channel 3rd order intermodulation product:		
	145MHz	435MHz
25/50kHz spacing:	77.0dB	74.5dB
50/100kHz spacing:	77.5dB	75.0dB

Maximum Audio Output: Measured at 1kHz on the onset of clipping.		
	145MHz	435MHz
3ohm load:	2.55W RMS	2.65W RMS
8 ohm load:	1.60W RMS	1.65W RMS
15ohm load:	1.01W RMS	1.00W RMS

Image Rejection: Increase in level of signal at first IF image frequency over level of on-channel signal to give identical 12dB sinad signals:		
	145MHz	435MHz
	88.5dB (110.6MHz)	89.0dB (373.25MHz)

S-Meter Linearity:				
Indication	145MHz		435MHz	
	Sig. Level	Rel. Level	Sig. Level	Rel. Level
S1	0.76 $\mu$ V pd	-8.6dB	0.71 $\mu$ V pd	-9.8dB
S3	0.83 $\mu$ V pd	-7.9dB	0.79 $\mu$ V pd	-8.8dB
S5	1.33 $\mu$ V pd	-3.8dB	1.36 $\mu$ V pd	-4.1dB
S7	1.57 $\mu$ V pd	-2.3dB	1.68 $\mu$ V pd	-2.3dB
S9	2.05 $\mu$ V pd	0dB ref.	2.19 $\mu$ V pd	0dB ref.
S9+	2.46 $\mu$ V pd	+1.5dB	2.55 $\mu$ V pd	+1.3dB
S9++	3.96 $\mu$ V pd	+5.7dB	3.26 $\mu$ V pd	+3.5dB

Sensitivity: Input level required to give 12dB sinad:	
144MHz:	0.12 $\mu$ V pd
145MHz:	0.12 $\mu$ V pd
146MHz:	0.12 $\mu$ V pd
430MHz:	0.14 $\mu$ V pd
435MHz:	0.13 $\mu$ V pd
440MHz:	0.14 $\mu$ V pd

Adjacent Channel Selectivity: Measured as increase in level of interfering signal, modulated with 400Hz at 1.5kHz deviation, above 12dB sinad ref. level to cause 6dB degradation in 12dB on-channel signal:		
	145MHz	435MHz
+12.5kHz:	31.0dB	32.5dB
-12.5kHz:	39.0dB	30.0dB
+25kHz:	73.0dB	76.0dB
-25kHz:	79.5dB	76.0dB

Blocking: Increase over 12dB sinad level of interfering signal modulated with 400Hz at 1.5kHz deviation to cause 6dB degradation in 12dB sinad on-channel signal:		
	145MHz	435MHz
+100kHz:	90.0dB	87.0dB
+1MHz:	98.0dB	97.5dB
+10MHz:	99.0dB	100.5dB

### TRANSMITTER

TX Power and Current Consumption: Measured with 13.8V DC supply voltage.			
Freq MHz	Power/Current		
	High	Low 2	Low 1
144MHz	25.9W/5.05A	0.2W/3.21A	0.91W/1.45A
145MHz	26.6W/5.15A	8.2W/3.22A	0.92W/1.47A
146MHz	26.5W/5.10A	8.2W/3.21A	0.91W/1.45A
430MHz	25.5W/5.85A	7.9W/3.25A	1.21W/1.76A
435MHz	25.6W/5.90A	7.9W/3.28A	1.23W/1.77A
440MHz	25.6W/5.90A	7.8W/3.25A	1.22W/1.74A

Harmonics/Spurii:		
	145MHz	435MHz
2nd Harmonic:	-82dBc	-68dBc
3rd Harmonic:	-83dBc	-76dBc
4th Harmonic:	<-90dBc	-89dBc
5th Harmonic:	<-90dBc	-
6th Harmonic:	<-90dBc	-
7th Harmonic:	<-90dBc	-

Peak Deviation:	
145MHz	5.06kHz
435MHz	5.04kHz

Frequency Accuracy	
145MHz	-50Hz
435MHz	-130Hz

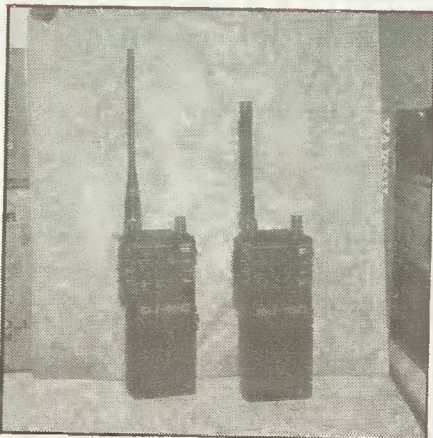
# RSGB 1990: Back at the NEC

*You heard the noise;  
here's the news.*

1989 came and went without the traditional RSGB National Convention at Birmingham's National Exhibition Centre. Here in 1990 the Convention popped up again, proclaimed by the RSGB as "The Premier Amateur Radio Event in the UK in 1990", on Saturday/Sunday 21/22 April at the new Hall 7.

The RSGB show may look like a Convention to RSGB diehards who come early, stay for the party and take down the stand on Sunday, but to the average visitor and trader it is a rally which they measure up against other rallies. Bearing that in mind, attendees expressed a fairly well-defined set of mixed feelings.

**Bargain handhelds from Waters and Stanton.**

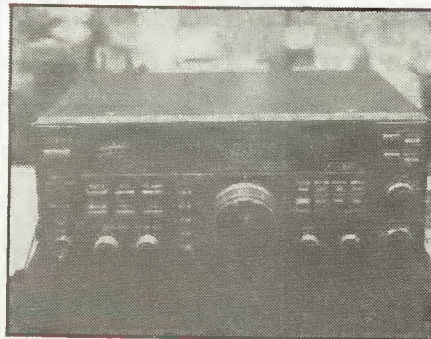


Most of the traders were rejoicing on Saturday and not exactly miserable on Sunday. "People were queueing up

**Mid-afternoon: a wide-open vista.**



**Icom IC-R72.**



**Yaesu FT-650.**

to buy," said one. Everyone reported a rush through the doors on Saturday morning, tailing off to a more leisurely pace in the afternoon. Folk like us who spent the middle of the day in the lectures found plenty of elbow room after four o'clock.

"Too much open space" said someone else. But Icom, SMC, Lowe, Waters & Stanton, Nevada, Dressler, Arrow and Garex were all there, along with a host of kit manufacturers, antennas, specialist dealers, clubs and societies; enough to keep a bod busy.

"No bring and buy", grumbled another, an old complaint. "We can't get big stuff like teleprinters in," said an RSGB long-timer. Why not keep it down to one armload each? Meanwhile, Anchor Surplus displayed boxes full of ex-PMR rigs for conversion, and people like Kanga, C M Howes, and Merlin had kits and components. Stallholders in the 'flea market' had useful stuff on offer from 4CX250 valves and sockets to surplus computers.

"They aren't talking us in, just telling us how much it costs," grumbled someone else. "They didn't want to know the way, they just kept asking how much it cost", said a bewildered talk-in man from the Solihull and Chelmsley Raynet Group, who ran the talk-in all weekend.

A number of traders were offering show bargain specials, and some of the new rigs were attracting a lot of attention. Icom (UK) and SMC revealed major new products in the UK: the Icom IC-R72, just under £500, a general coverage HF receiver giving multimode reception over 30kHz to 30MHz with all the usual microprocessor bells and whistles, plus AC/DC operation and built in nicad pack/mobile mount options let you take it out and about. The Yaesu FT650, around £1000, is a 100W pep base and mobile 6m/10m/12m multimode Tx for the worldwide DX chaser, with general coverage receive over 24,5MHz to 54MHz to check for propagation openings using foreign Band I tv transmissions. HRT is looking forward to meeting the first UK review samples.

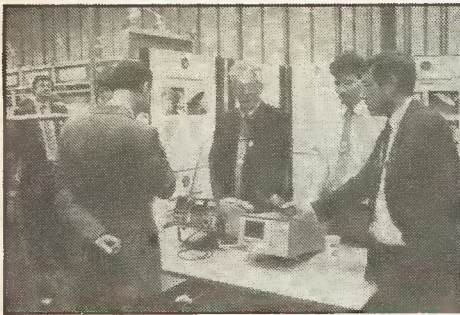
"It's expensive," said nearly everybody, though traders who had done a bit of haggling apparently found it less so. "You don't have to pay for the lectures, it's £2 just to go into the trade area," says another. That's true, but it's the same piggy bank, wherever the doors are. High stand

**The best-selling PacComm Handi-Packet on the Siskin stand.**



costs was one reason for absence given by non-exhibitors, but most did well: Siskin sold out of their popular packet tncs, and several sold their entire stocks of special-offer dual-band mobile transceivers.

For "Daily Lecture Program" read "Saturday Lecture Program". We sat through "Constructors Forum" by George Dobbs G3RJV and Ian Keyser G3ROO, which should have been titled "QRP Constructors' Forum", but was nevertheless full of inspiring



**G3TQM checks his FT-811 on the RA stand.**

and down-to-earth ideas for new constructors, and "An Introduction to Frequency Synthesis" by RSGB Tech. Chairman Peter Chadwick G3RZP, which went to the other pole entirely and had G3YZW frantically jotting down calculations and squinting at the screen.

Out on the floor, RIS staff were on the Radiocommunications Agency (see *Radio Today* this month) stand with a transceiver testing facility, to measure your handheld harmonic levels to the last dB — but to dispel rumours, they weren't also running a 'confiscate it on the spot' service if the rig didn't come up to scratch! Helpful licensing staff were on hand

to answer queries as well.

And there was the gaping expanse of the RSGB stand, looking a bit empty when the book display and the enquiries desk weren't busy. Around the back, *DIY Radio* and the new Novice Licence requirements (one copy only) were on display. Over the way, the UK Scouts were 'actually doing it' their own way, and showing off pieces of kit made with their own hands.

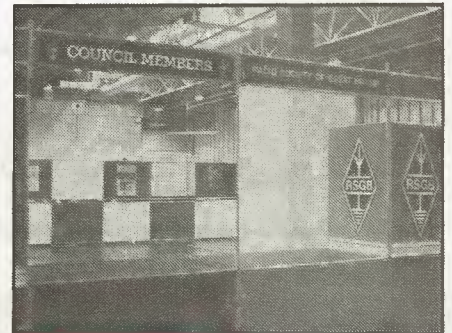
To tie up the ends, there was plenty of parking, a courtesy bus, a newspaper/sweet stand and a choice of digestible catering at reasonable prices never at hand.

Was it a success? And was it worth the visit? "We're aiming to



**Now you see them . . .**

break even; the trade stands seem happy and it's an opportunity for people in the Society to see each other", said one of the organising team. A rough count told about 4,000 visitors on Saturday and 3,000 on Sunday, and listening to the many repeater-borne discussions on the way home gave the impression that a worthwhile day was had by many, although the large empty spaces did cause some comment! Perhaps next time there will be more exhibitors or a smaller hall, to keep the gate/stand prices down. Premier Amateur Radio Event? Let's wait till we see the Leicester show in October. But whatever happens, we'll be back next year.



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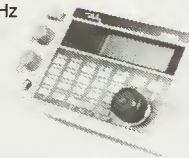


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# Radio Kits Around The World

Clear off the kitchen table, dig out the soldering iron, grab that tool kit and send the spouse and kids off to the movies... it's time to start work on that long neglected project. Instead of rummaging through the junk box in search of dusty bits and rusty pieces or driving down to the local component shop which has everything except the sole part needed to

HF kits in Japan. (The Shimizu Denshi Kenkyujo Electronic Research Company also produced kits until about four years ago but appears to have stopped.

When I contacted Mizuho about English instructions for their kits, Mr T. Takada responded to my enquiry. The following kits may still be available from Mizuho: QRP-7 7MHz transmitter, QP-21

about Yen 3800. Certain Mizuho models are available in the UK, notably from Waters and Stanton, but these are not currently in kit form.

## United States

Throughout the USA there are a number of small to medium size companies producing amateur radio and shortwave listener kits. **Q Products**, Larry Price, N7BNJ, 10412 36th Street E, Puyallup, Washington 98372, tel. (206) 841 7465 (evenings) sells a range of VHF amplifier kits. Prices and specifications are on application.

A specialised company, **Bel-Tek**, PO Box 125, Beloit, Wisconsin 53511 has developed a CMOS Keyer Kit for US\$9.95. Compatible with grid block, cathode keyed and solid state transmitters and offering a speed range from 5 to 50wpm, the kit comes complete with a PCB and all parts. Complementing this project is a memory kit for \$14.95. It can store two messages of up to 50 characters and we play them at any speed. For CW operators, Bel-Tek has a \$19.95 CW Audio Filter Kit.

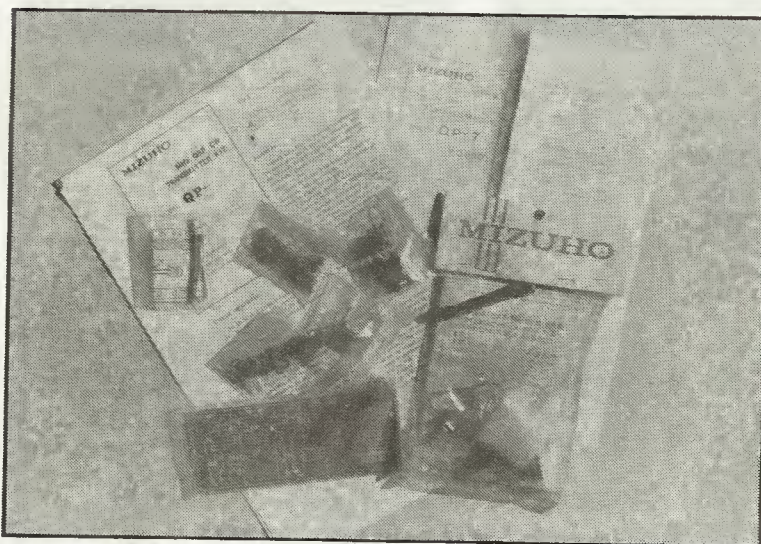
Looking for an antenna in kit form? **Antennas West**, box 50662-W, Provo, Utah 84605, tel. (801) 373-8425 manufactures QuickKit G5RV loop and dipole kits. Three models are available: full size (80-10m) \$34.95, half size (40-10m) \$24.95 and quarter size (20-10m) \$19.95. As well, there's a Marconi adaptor kit at \$4.95 and an antenna launcher kit for \$14.95.

Need a Touch Tone Decoder Controller? **NorCon Engineering**, PO Box 1607, Mooresville, NC 28115, tel. (704) 664-7817 has the \$44.95 TD-16 which decodes all 16 digits, plus one 4-digit sequence. Operating on 12V DC, it has speaker muting and is crystal-referenced. The TD-16A \$16.95 controller adds four latched outputs to the TD-16.

Use your low frequency scope as a spectrum analyser with a \$399.95 specialised kit from **A&A Engineering**, 2521 W. La Palma, Unit K, Anaheim, California 92801, tel. (714) 952 2114; also is a \$269.95 bench to direct digital frequency synthesiser kit.

Many amateurs consider a quad to be the optimum HF antenna. The **Cubex Company**, PO Box 732, Altadena, California 91001, tel. (818) 798-8106 makes a 2-element, tri-band quad kit for \$269.95. The boom and wire is not

*Writer Tom E. King VK2ATJ has made a survey of kit suppliers on his travels around the world.*



**Despite the vast number of amateurs in Japan, few electronic companies except Mizuho have been involved with kit making.**

make the whole thing work, why not consider a kit.

It's surprising what's available, and not just from specialist kit suppliers in the UK and on the continent. This survey includes a selection of amateur kits available from round the world.

## Japan

The world's most populated amateur country is a bit of a disappointment when it comes to kit manufacturers. According to the Japan Amateur Radio Industries Association, Mizuho Tsushin of 2-8-6 Morino, Machida-Shi, Tokyo 194, Japan is now the only manufacturer of amateur

21MHz transmitter, CW-100 7MHz receiver and Mod-1 2W AM modulator.

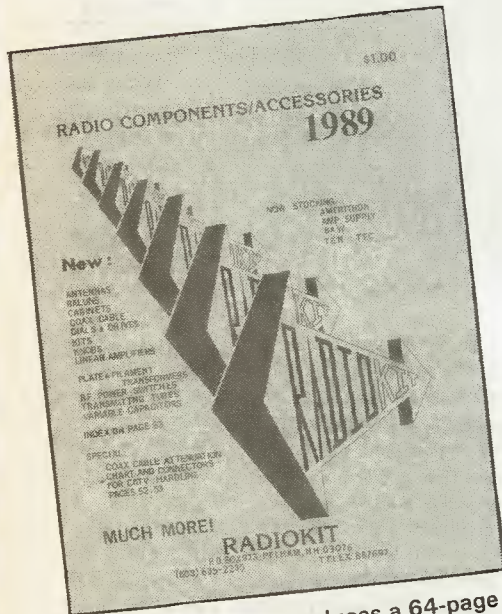
The original price of each of these kits was Yen 3000 which made them excellent value. When writing to enquire about availability of the CW units amateurs may also wish to ask about the kits status for the current range of Mizuho QRP HF SSB units. The following are now being advertised in Japan: MX-6SR 1W 50MHz, MX-28S 2W 28MHz, MX-21S 2W 21MHz, MX-14S 2W 14MHz, MX-7S 2W 7MHz, MX-3.5S 2W 3.5MHz.

All of these units are priced at Yen 24,000. A 10W HF amp is available for about Yen 10,000 and a power supply for



included.

Offering a range of QRP CW transmitter kits and components is **Oak Hill Research**, 4061 N. Douglas Rd, Luther, Michigan 49656. An sae with sufficient postage (IRCs) for overseas mailing will bring a list. An example is the GX-1A transmitter/exciter, \$29.75.



Radiokit in the US produces a 64-page catalogue of kits and components. The 1990 catalogue will be available now.

## Radiokit

Kits, kits and more amateur radio kits are sold by **Radiokit**, PO Box 973, Pelham, NH 03076, tel. (603) 657 2235, telex 887697, a specialised equipment, component and accessory mail order outlet. Three different American-designed low power transceivers are among dozens of items of amateur interest.

Featuring a superhet receiver with  $.5\mu\text{V}$  for 10dB s/n sensitivity Radiokit's \$199.95 75 meter compact SSB transceiver provides 30W out over the 3.8 to 4MHz portion of the band. All circuitry is contained on two pcbs and housed in predrilled and lettered cabinet.

For the 20m CW enthusiast there are two options: a 15W \$159.95 Travelradio and an ultra miniature 5W \$119.95 QRP-20 traceiver. The Travelradio has a crystal filter, selectable 600Hz audio filter, S mete, vox style break in with adjustable delay, 700Hz offset and sidetone.

The company has also developed a Micro 20 receiver for 14-14.4MHz. Retailing for \$69.95 it utilises a Signetics NE602 mixer ic and crystal filter. A 1500+ W transmatch kit offering coverage from 1.7 to 30MHz is available for \$169.95 (basic kit) and \$375 (deluxe kit).

Other interesting Radiokits include: K9CW Microprocessor based memory

contest keyer \$109.00, Smart Squelch (AM,FM,SSB) \$54.25, Broadband Preamp (20dB gain 270Hz to 608MHz!) \$49.95, Active Antenna \$25.00.

Radiokit is the American distributor for dozens of British amateur kits and modules, notably Minisynth and Cirkit units, including the DSB80 HF Transceiver (80m 2W CW/SSB) \$86.75, HF Amplifier (broadband 1.6-30MHz) 1W in/15W out \$75.00, 2m power amp/receiver preamp (2.5W in/22W out) \$117.00, Multi band upconverter \$93.50, Audio speech processor (all models) \$32.50.

They also have a number of other interesting items in 64-page catalogue, including printed circuit kits (etchant chemicals, protective coating and resist pens), helical filters for VHF and UHF circuits, components (even filament choke kits, B&W air wound inductors, coax relays, toroids, ferrites and beads, reduction drives, enclosures) and pcbs for a ham projects, many of which are also available in full kit form.

All Radiokit prices quoted are from their 1989 catalogue.

In late 1988 **QST Magazine** featured a three channel CW emergency transceiver. The 1W 40m CW rig was described as 'portable power for ham radio hikers, boaters, campers and pilots'. A two board set is still available for £9.95 from **Far Circuits**, 18N 640 Field Court, Dundee, Illinois 60118. The company also has boards for many other transmitters, receivers, transceivers and ham gear.

Specialising in ATV converters and 2m VHF amplifier kits, **Communications Concepts Inc.**, 121 Brown Street, Dayton, Ohio 54502, tel. (513) 220-9677 also sells HF linear amplifiers. On the ATV kit scene are three converters: ATV2 (420-450MHz) at \$44.95, ATV3 (420-450MHz GaAsFET) at \$49.95 and ATV4 (902-928MHz GaAsFET) at \$59.95. A 35W 2m amp kit is \$79.95 while the 75W version is \$119.95.

## Heath

Helping countless amateurs with instructional courses and quality amateur radio kits is the **Heath Company**, PO Box 8589, Benton Harbor, Michigan 49022; Overseas Orders (International Division) (616) 982-3512, telex: 201497, Fax 616 925 2949, is perhaps the best known kit company in the world.

For the novice, low power operator and ham on holiday Heath has the HW-9 QRP CW transceiver (see review on page 00). Designed to cover the lower 250Hz of the 80,40,20 and 15m amateur bands, the \$422.84 4W CW transceiver can also cover the 30, 17 and 12m WARC bands and the lower 250Hz of the 10m band with the optional \$59.93 HWA-9 Band Pack. A matching QRP wattmeter which reads SWR from 1.1:1 to 3:1 is \$75.69. A 100W antenna tuner with 4:1 balun is also priced at \$74.94.

On the higher power side of the Heath coin is the 100W SB-1400 HF all-mode transceiver offering 20 memory channels, a 100KHz to 30MHz general coverage receiver and dual vfos. Priced at \$109.88, the kit has narrowband (500Hz) CW and wideband (6KHz) AM IF filters, a noise blanker, a triple conversion receiver,  $1\mu\text{V}$  sensitivity above 1.5MHz and user-selectable tuning rates.

The matching SB-1000 linear amplifier, priced at \$1139.69, provides 1000W pep output on SSB, 850W out on CW and 500W out on RTTY over the 160, 80, 40, 20 and 15m amateur bands. (Also included are WARC bands at 80 per cent of rated output.)

In reflecting amateur growth in packet and AmTOR Heath has released the \$349.94 HK232, a Packkit multi mode tnc supporting all common baud rates for Baudot rtty and ASC2 and CW from 5 to 99wpm. Radio links rate are supported to 1200 baud (9600 with external modem) and computer data rates to 9600 baud.

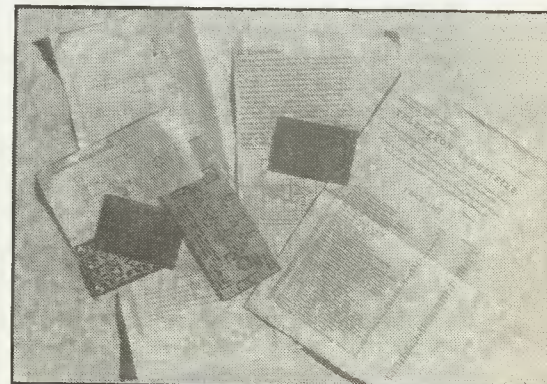
Other smaller but useful amateur kits exist for amateurs needing specialist services incling an Antenna noise bridge \$62.44 and a Remote Control Decoder at \$99.94.

Distributors of Heath amateur radio equipment have been established in several countries in Europe. Where over-the-counter purchases are not available the International Division of the Heath Company will dispatch kits by air parcel post or air freight. All orders must be accompanied by payment in US funds either via bank draft, bank cheque, bank transfer, letter of credit of VISA/Mastercard numbers. Prices quoted in this section are Heathkit export prices.

## India

India has a large and thriving amateur marketplace with a number of companies selling amateur kits. **Telectron Industries**, 22 Dayalu Nagar, 3rd Street, Near Power House, Kodambakkam, Madras 24, tel. 42 8805 is a small all-India company described as 'manufacturers and designers of high quality printed circuit

**Centred around Bombay, New Delhi and Madras, numerous electronic companies produce commercial kits for audio enthusiasts and radio amateurs.**



boards, electronic kits and dealers in all electronic components. Its city centred counter sales outlet is **Abirami Electronics**, 17 Athipattam Street (off Mount Road). Boards are supplied with the necessary schematics. Sample kits of interest to radio amateurs include the Coilless Radio Receiver 200R, Ni Cad Battery Charger 150R, Digital Frequency Meter 1200R, Bench Power Supply 24V/2A 200R. Sample prices in rupees (approx Rs26=£1).

Also in Madras is **Teltron Electronics**, 6 Trustpuram Third Cross, Kodambakkam, Madras 600024. Like Telectron, this Madras-based company has a wide range of boards and kits for applications as diverse as audio, servicing and RF. The pcb I purchased was designed for a 3 to 20A power supply. (Power handling capabilities depend upon the voltage regulator selected.) Designed around a supply circuit published in the May 1985 issue of *Elector India*, the pcb came with a photocopy of the original construction article. Teltron has a list of pcbs and kits available on request.

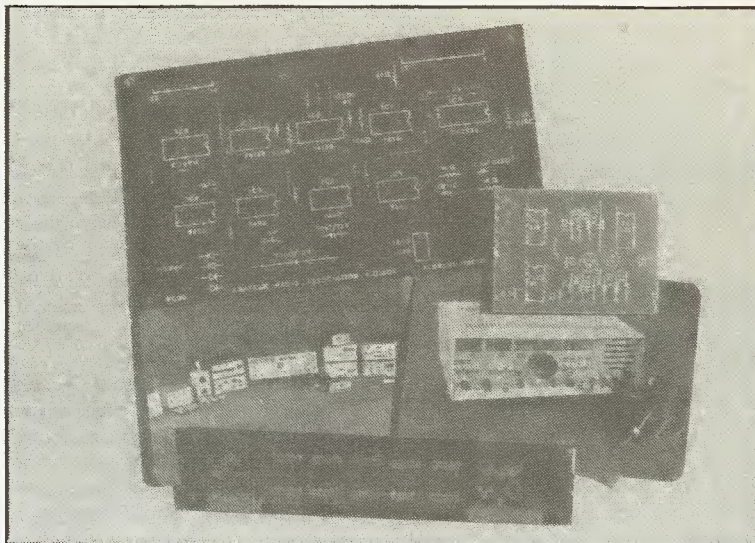
Still another pcb manufacturer located in Madras is **Sundaram Electronics**, L-5 Instonics Campus, Thiruvanmiyur, Madras 600041. This company produces a number of small power supply and power amp pcbs.

Across the country in Bombay, **Visha Electronics Corporation** manufactures and sells 201 different electronic products in kit form and pcb only. Many amateurs will find the lab instruments and power supplies of interest. Select from such kit projects as an LCD Digital Panel Meter (Rs 350), Function Generator (RS 600), and an Analogue Capacitance Meter (Rs 365). A complete list of pcbs and kits is available from Visha Electronics Corporation, 349 Lamington Road, Opposite Police Station, Bombay 400007.

Over the past seven years, the **Amateur Radio Association**, B2/101 Pachim Vihar, New Delhi 110063 has trained around 150 residents of the Indian capital. The ARA is run by Dr Ashutosh Singh VU2IF, who achieved fame in Indian radio circles when he set up communications for one of the early Indian Antarctic expeditions.

The **Delhi Radio Club** meets from 5-7pm every Friday, Saturday and Sunday. During my visit in 1987 I saw a very impressive display of totally home built equipment including a 4-band transceiver, a 2W FM transceiver and a frequency counter. Professionally produced pcbs available for these projects have been manufactured in the Delhi Radio Club workshops. Hopefully the club will answer your request for pcb costs.

One of the least expensive ways for Indian amateurs to get on the air is using an indigenously developed 40m AM/CW transmitter with BD 139 finals, a TBA 810 ic modulator and a 7MHz vfo. Designed



Designed by an Indian for Indian amateurs, these Delhi Radio Club pcbs and samples of test equipment and a multiband HF transceiver show the expertise of amateurs in a developing country little known for radio experiment.

by Vasant, VU2VWN, the little publicised project is basically known only to the ham population of Kerala.

A set of three pcbs is available for about Rs 25 with a kit costing around Rs 250. Limited stocks of kits and boards and kits are available through the **Institute of Amateur Radio** in Kerala, Vandana Sahodaran Ayyapan Road, Kadavanthara, Cochin 683 202.

The federally funded **National Institute of Amateur Radio** 6-3-1092/93, Somajiguda, Hyderabad 500 482 Hyderabad intends to mass produce the above kits and make them widely available at an anticipated lower price.

### Greece

**C&A Electronic OE**, PO Box 25070, Athens 10026, Greece, tel. 5242-867 is located within sight of the famous Parthenon in Athens. Headed by Mr Simeon Krizias, an electrical engineer, this is the largest kit company in Greece and one of the largest in Europe. The 13 year old organisation has R&D facilities and manufacturing capability.

The greatest interest for radio amateurs may well be the rapidly expanding range of HF and VHF kits. All components are supplied and instructions are in English. C&A welcomes orders from overseas amateurs and will dispatch orders by registered air post for an additional 15 per cent of the total order.

The Athens-based company sells several assembled kits: CA 6149A/3 3W mobile VHF transceivers, CA 6149A/20 20W mobile VHF transceivers and CA 6149A/B20 20W base station VHF transceivers. Price is on application. C&A can custom grind crystals 144-148MHz for all its transceivers for a modest cost.

Among a number of newly released kits are a microprocessor controlled general coverage (500KHz-30MHz) shortwave receiver; a 12V 10W 80/40/20m AM/SSB/CW transceiver, and SSTV decoder usable with any amateur receiver.

An illustrated catalogue detailing the full range of C&A kits is available by sending £1 or equivalent. A short form catalogue and price list accompanies



Head of the C&A Electronics Company of Athens, Mr. Simeon Krizias is introducing more HF, VHF and SWL kits into the list of amateur equipment.

the paper back book size illustrated catalogue.

## West Germany

Ironically, the federal amateur radio organisation, **Deutscher Amateur Radio Club (DARC)**, Postfach 1155, Lindenallee, 6, D-3507 Baunatal, in one of the western world's most technologically developed countries is having kit problems! For a number of years the DARC had helped individuals enter the world of amateur radio with its HF transceiver kits. But suppliers are no longer able to provide critical components. It appears that when the few remaining transceiver kits are sold, nothing more will be available.

## England

It appears from my research that the kit scene in the UK is QRP oriented both for VHF and HF. Consequently George Dobbs G3RJV, the editor of **Sprat**, the journal of the G-QRP Club was invaluable in providing details about low power kits available in England. (The publication available contacting George at St Aidan's Vicarage, 498 Manchester Road, Rochdale, Lancs. Tel. 0706 31812, contains adverts from companies selling QRP kits and components.)

Some 19 different kits are available from **CM Howes**, Eydon, Daventry, Northants, NN11 6PT, tel. 0327 60178.

Sample kits include: the DcRX20 20m SSB/CW receiver £15.60 (also 40m, 80m, 160m versions), CTX40 40m CW transmitter £13.80, MTX20 20m 10W transmitter £22.90, CTU30 HF band ATU for receiving on 30m £12.50. Two of the newer kits from CM Howes are the 2m and 6m converter kits each priced at £17.50. Output is on 20m. Designed as companions to the DcRx20 receiver these two converters can be used with any 20m receiver. A copy of the Howes catalogue and mail order information is available for a large SASE or envelope with IRCs.

The leading but not only kit made by **Lake Electronics**, 7 Middleton Close, Nuthall, Nottingham NG16 1BX, tel. 0602 382509 is the 1.5W DTR3 CW transceiver for 80m. Featuring direct conversion, sensitivity is better than  $1\mu\text{V}$  and selectivity is 250Hz @ 6dB. The price is £76.25 plus postage. This kit has ready printed front and back panels, a slow motion drive, audio filter and all parts. Contact.

A number of QRP projects are also available from **Harlech Electronics**, Noddfa, Lower Road, Harlech, Gwynedd LL46 2UB including a shortwave receiver, DcRx80 receiver, CW transceiver, active antenna, preselector, audible signal strength meter and a power supply. Export and domestic prices are available from the company.

**Kanga Products** of 3 Limes Road, Folkestone, Kent CT19 4AU offers a range of semi complete kits for the radio

amateur and shortwave listener. Kits are supplied complete with the hard-to-get parts leaving out components which are commonly found in any junk box. Dual Band receiver kits are £36.95, a vfo is £9.95, a digital dial frequency counter is £21.95 and a marker unit is £13.95.

A copy of the current catalogue is available for an SASE or IRCs.

## Australia

**Dick Smith Electronics** PO Box 321, North Ryde, NSW 2113, tel. (02) 888 3200, formerly stocked the country's largest range of build-it-yourself HF and VHF gear, such as a 30W transceiver (80,40,20 or 16m) and a series of 2m and 20cm GaAsFET preamps and power amps. Due to the dramatic rise in cost of components it's unlikely that the company will in future carry a diverse range, but they intend to produce kits in response to projects in Australian electronics and radio magazines. The first of these appeared in mid 1989. Designed as a spare 2m receiver for monitoring the local repeater, the A\$59.50 short form kit includes all components and pcb.

Of interest to budding SWLs or amateurs needing an inexpensive shortwave radio is the A\$69.95 Dick Smith Receiver. Using a single AM radio ic in a design that keeps components to a minimum the radio tunes from .48MHz to around 17MHz in 3 bands. The kit includes pcb, all components, box and a silk screened and punched front panel.

Easily affordable by all schools is **Dick Smith's Fun Way Into Electronics**. A Funway gift box at A\$26.95 includes a book of projects, a complete set of components and a resealable plastic breadboard. As well as safely teaching basic electronics (all projects are battery operated and use no dangerous voltages or components) there are a number of useful projects: a crystal set, morse code communicator, the 'world's smallest transmitter' and 2-6MHz receiver.

Two power supply kits offered come complete with case, front panel and transformer. The A\$119 Powermake 2 is capable of delivering 13.8V at 5A. For heavy duty applications try the VK Powermaster. The A\$169 short form kit allows the use of optional transformers to meet specific heavy current needs.

A number of procedures have been developed to speed the delivery of equipment overseas. Even though Europe is not close to Australia, they welcome mail order requests from electronic enthusiasts.

**All Electronic Components**, 118-122 Lonsdale Street, Melbourne, Victoria 3000, tel. (03) 662 3506, a 30-year-old Melbourne-based company, has a number of speciality services from the ham and SWL. Apart from custom manufacture of pcbs and extensive components sourcing, the company produces a range

of kits which were originally published in Australian electronic magazines. Nearly three dozen communication equipment kitsets (as they're known down under) are available, including a Remote Control Transmitter Switch A\$72.44, Antenna Matching Unit A\$23.86, Shortwave Radio (ETI July '89) POA, Audio Compressor A\$64.24, Aircraft Band Converter A\$46.63, Computer Driven Radio Teletype Transceiver \$204.25.

Sixteen different power supplies are featured in the catalogue. Apart from these there are some 40 test equipment kitsets.

**Ian J. Truscotts Electronic World**, 30 Lacey Street, Croydon, Victoria 3136, tel. (03) 723 3860, fax 725 9443 have sold hundreds of 80m direct conversion receivers. This popular kit comes in two versions: a barebones kit (pcbs, semiconductors and all wound components) for A\$52 and a complete kit (with all pcbs and all parts) for A\$95. A suitable case is A\$15.70. The all-mode receiver's frequency range is 3.5 to 3.7MHz.

Billing themselves as the "kit suppliers to Australia", **Auskits** of Amblecote Crescent, Mulgrave, Victoria 3170 offers a variety of amateur and SWL kits, including speech processors, fet dip oscillators and active audio filters. They also do a range of QRP transceivers. Information available on application.

**Altronics** PO Box 8350, Perth Mail Exchange, WA 6000, tel. (09) 328 1599, fax (09) 328 4459 does not yet manufacture amateur radio kits, but does carry some interesting pieces of test equipment in kit form, including a A\$299 1GHz Digital Frequency Meter, and a \$99 50MHz digital frequency meter. Featuring high input impedance overflow led indicator and kHz/MHz led indicators, everything is on one board, even the selector switch. A high current power supply kit can provide 7.5A continuous and 10A intermittent and costs around \$139.50. A number of other test equipment kitsets are also available, including a fet zener tester, \$49.95, digital capacitance meter \$79.00, and a bench amp/signal tracer \$65.00.

Amateurs wanting to go UHF can now do so easily and inexpensively thanks to the efforts of a small Melbourne company **Microwave Specialists** (address not currently available\*).

The company is one of the few UHF specialists in the world to stock 1296, 2304 and 3456MHz transverter kits. All units can be used with any 2m transceiver operating from 1 to 10W. Microwave amplifiers are available to provide power outputs of 2W, 15W and 30W.

Apart from UHF kits the company sells 10GHz Gunnplexers with 10mW to 100mW output, 10W TWT for 10GHz dishes, feeds and antennas and hard to obtain RF components and surplus bits

and pieces for the home brew enthusiast.

One of the newest starters on the amateur kit scene down under is **Stewart Electronic Components**, PO Box 281, Oakleigh, Victoria 3166.

Hot off the press is a commercial quality printed circuit board (and a full kit of components) for a 100mW 2m transverter. Based around a BF981 dual gate mosfet preamp and a BF981/BFR 96S two stage amplifier, the transverter can be built for use with a 10m or 6m IF. Price for the BX 933 pcb is \$33. Prices for all three module sections were not available at press time. Future pcbs and kits include a 100mW 6m transverter, and a 10W 2m amplifier using a Mitsubishi hybrid power amp module and a 6m power amp module. Other projects currently on the drawing board.

### Author's End Note

This survey of communications equipment and accessories looked at a representative sample of kits available on three continents: Europe, Asia and Australia. Stated prices are subject to change without notice and do not, in general, include postage. It is advisable to establish availability of any kit and current price including postage before placing any order.

*The catalogue from the famous USA kit company, Heathkit. Heathkit produces a home and an overseas price list. Many Heathkits are available from Maplin Electronic Supplies in the UK.*

### Making Contact and Checking Prices

HRT wrote to most of the suppliers listed in this article (excluding clubs, and UK suppliers listed in the Box) requesting up to date price lists. The following suppliers responded within eight weeks: Heathkit, Radiokit (just missed the new 1990 catalogue), Oak Hills Research, Communications Concepts, Far Circuits, (USA); All Electronic Components, Australia; Howes, Kanga, Lake (UK); Vishta (India) who however misunderstood our letter and did not enclose a list. \*Microwave Specialists' letter came back all the way from VK neatly marked "left address".

A few, usually larger, companies, charge for catalogues.

Prices given are the most up-to-date available to us at the time and should be treated as examples only. We have not attempted to give post, packing or local purchase tax details, as these vary widely.

We recommend always making contact with an overseas supplier to check prices, conditions and availability before sending an order unless you are already in possession of a catalogue which you are certain is current. Allowing for the vagaries of the international post, reply time may help to give you a feel for how prompt delivery will be.

### Other UK Kits

Since VK2ATH completed his research, Ham Radio Today has located the following additional radio kit producers in the UK:

**Jandek**, 6 Fellows Avenue, Kingswinford, W. Midlands DY6 9ET. tel. 0384 288900: various kits for amateurs and swls, on a modular mix-and-match design. Examples include a direct conversion cw or ssb receiver made up of a front end, product detector, low pass filter, AF output, vfo and 12V psu modules. Most modules cost under £5 or all the modules for a receiver can be supplied for a one-off price. Others available or under development. Write with sae or IRCs for a price list.

**Blue Rose Electronics**, 538 Liverpool Rd., Great Sankey, Warrington WA5 3LU, tel. 0925 72 7848. Bill Mooney at Blue Rose specialises in surface mount devices and smd kits. Sample kits include a single-transistor bfo/carrier insertion oscillator for CW (£3.61), 0.5W audio amplifier add-on giving around 52dB gain (£6.80) and high stability vfo (POA). Sells components, suitable soldering irons and jigs, etc.

**Cambridge Kits**, 45 Old School Lane, Milton, Cambridge, tel. 0223 806150. Small kits for homebuild enthusiasts. Kit News with information and useful tips circulated to regular customers. Example kits include an antenna tuner, VLF receiver, antenna noise bridge, audio oscillator, tunable notch filter, etc. Prices on application.

**Maplin Electronic Supplies**. PO Box 3, Rayleigh, Essex SS6 8LR, tel. 0702 554155 carry a variety of kits for the radio amateur, including a large selection of American Heathkits.

**Cirkit Distribution Ltd.**, Park Lane, Broxbourne, Herts. EN10 7NQ, tel. 0992 444111. Cirkit do a number of kits useful for amateur radio, including the frequency meter module featured in this issue of HRT. A bare board for this kit is available to HRT readers, see HRT June 1990.

Maplin and Cirkit's catalogues are available from newsagents or for a small charge from the companies. The price of the catalogue is often offset by redeemable coupons. For other catalogues, enquire or write with a large SAE to the companies concerned.

Small specialist kit producers can also be found among the small ads. In the radio and electronics press.



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HAM RADIO TODAY caters for both the experienced user and newcomer to amateur radio. With generally informative features, the latest news and practical projects, this magazine covers all the aspects of this growing field; an invaluable complement for any licenced radio amateur worldwide.

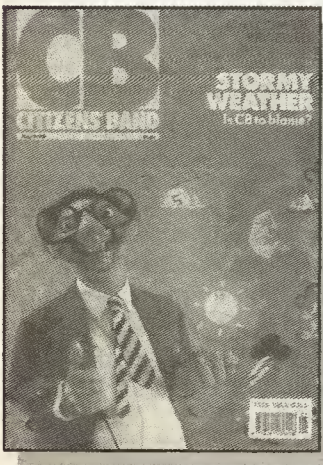
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HRT/8

# Alternative Battery

I have owned quite a few hand held radios over the past several years and have found them to be very versatile and fun to own. They normally come complete with a battery pack, but what do you do when it goes flat? This usually happens within half an hour after its first charge because you are so delighted with your purchase that you access all the local repeaters or call up a friend and then a long transmission session begins as you carry out your various tests. Next follows a 15 hour slow charge or, if

## Materials

The idea of a cheap second battery pack first occurred to me when reading through a catalogue which was advertising damaged commercial hand held battery packs. As they were very cheap (£3 for a 10 volt 600 mA/hour) I decided there was nothing to be lost by ordering one, and within two days it arrived in the mail.

It turned out to be the smaller battery pack for a Phillips PF85 and had one negative fixing lug missing

for attaching to the radio. The metal plate also acts as a negative terminal. The positive terminal is set in a small rectangular shaped island of plastic in the centre of this metal plate (see Fig. 3).

## Preparation

The first step in the conversion was to remove the plastic projection on the top of the PF85 battery. Care must be taken here as it contains both positive and negative terminals and a

**Ray Wilson GIOBRO has devised a cheap alternative bat-pack for his hand held.**

you have lots of cash, a fast charge on the fast charger/battery eliminator. Alternatively the more affluent may also buy a second battery pack which will eliminate some of the frustrating off-air time. This article is, however, aimed at those who cannot afford two or three battery packs or the fast charger.

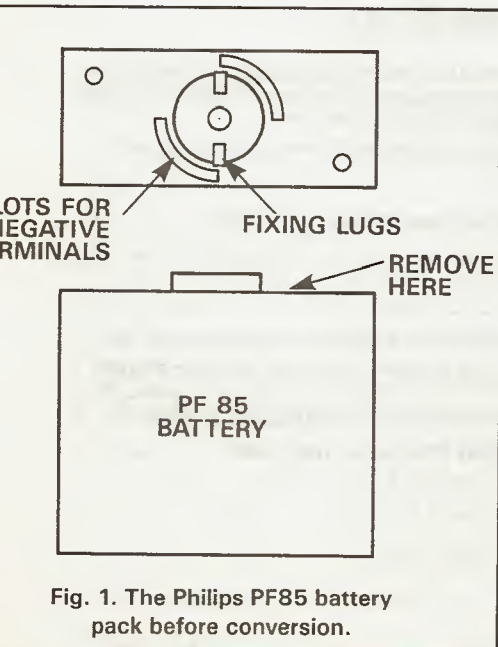


Fig. 1. The Philips PF85 battery pack before conversion.

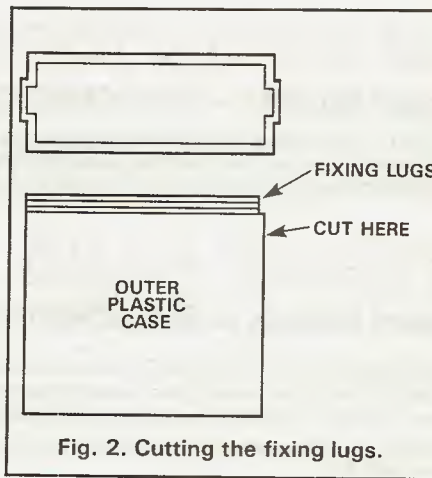


Fig. 2. Cutting the fixing lugs.

(see Fig. 1). These battery packs have approximately the same top dimensions as the IC2E Battery Packs. I had a faulty Icom ICBP4 battery case which takes six AA rechargeable batteries, and decided that I would sacrifice it for the experiment.

The battery case is of two part construction. There is an outer case which has the fixing lugs for attachment to the rig itself (see Fig. 2). The inner section holds the batteries and at the radio end there is a flat plastic top on to which is fixed a metal plate, also with locating lugs

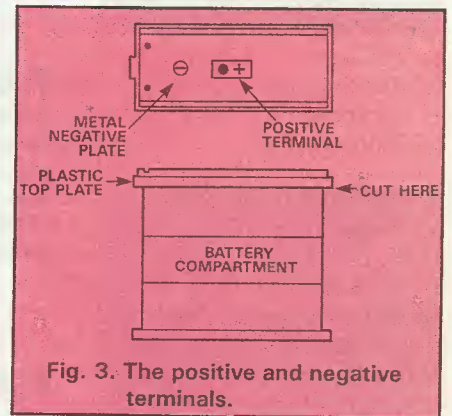


Fig. 3. The positive and negative terminals.

nasty short will occur if a file touches both terminals. I used a small grinding wheel attached to a domestic electric drill and ground the plastic away carefully. Take great care not to grind away any of the flat top of the battery or more importantly any of your flesh! You will find that the positive terminal is in fact a brass cap fitted into the plastic material and it will fall out leaving a hole about 2mm deep. At the bottom you will see another terminal also of brass. You can discard the cap as it is not used. The preparation of the PF85 battery is complete when the projection has been totally removed.

Next, take the Icom battery case and separate the two proportions. Firstly, take the inner battery compartment and remove the small screw which is the positive terminal from the centre island on the top of the case. Cut and remove any wires which are inside the case and close to the top. Remove also the small screw which is attached to the negative wire. Now with a junior

# 7 Pack for the IC-2E

hacksaw, very carefully cut the flat top away from the sides and centre web of the battery holder (see Fig. 3). Having done that, with medium grade abrasive paper, sand the rough lower surface of the top plate flat. Now drill another hole in the plastic island the same size as the original hole and 3mm away from it towards the + sign.

The final stage of preparation is probably the most difficult. Take the outer case of the battery box and cut off the top section approximately 6mm down from the top. Again use a junior hacksaw for this. The outer shell of the case is quite delicate and great care must be taken here to avoid bending the upper cut section too much or it will break (my first effort resulted in such a breakage). When you have done this, if you look at the inside of the cut section, you will see a flat ridge about 5mm from the top. Again using medium grade abrasive paper remove the excess material until a flat surface is obtained at the level of this ridge. A sheet of abrasive paper set on top of a sheet of glass ensures a flat surface. Then by moving the cut plastic rim back and forth on this surface the surplus material is evenly removed and a flat lower edge will be achieved on the rim.

## Negative Terminal

That effectively concludes most of the preparation stage. You should now have a battery with a flat top surface, a flat plastic battery case top with metal plate attached and a flat plastic battery case rim with fixing lugs. The next stage is to take the flat top and remove the metal plate from it by taking out the small retaining screw and lifting the plate off. Set the plastic section on top of the battery and check that the surfaces match up and there are no gaps between them. You will see there are two tracks cut into the surface of the PF85 battery and in the bottom of these there are copper or tinned strips. These are the negative terminals. Note their position and again set the flat plastic section on to the top of the battery.

Position it carefully so that it is central. With a marker pen make a mark as accurately as possible on the top plastic plate to correspond with the centre of the tracks underneath. Now drill a 1/8in hole through the plastic plate and again set it on to the battery. You should now be able to see the metal strip through the hole you have just drilled.

Refit the metal plate to the plastic section and fit a small compression spring from a ball pen into the hole so that it touches the metal plate. Cut the spring so that about 5mm protrudes from the hole. When the plate is set on the top of the battery the protruding section fits into the slot and touches the metal strip, making the metal plate the new negative terminal!

## Assembly

Now to assemble the three parts permanently together. For this I used a pvc adhesive normally used for assembling guttering. As this adhesive is very strong and bonds the parts together fairly quickly I recommend that you lay all your parts out in order in an uncluttered bench, well away from other items. Do not do this in a domestic situation as the adhesive has a habit of dissolving certain materials and the surface of the dining room table may not be the ideal place to spill it.

Assemble as follows: Apply a layer of adhesive to the top of the battery but do not allow it to flow into the negative terminal slots or into the centre positive hole. Apply adhesive to the bottom of the plastic top plate but do not let it into the small spring hole. Insert the spring into the hole. Taking care the spring does not drop out, position the top plate on to the top of the battery ensuring the spring seats into the slot in the battery. Centralise the top plate and press firmly down. It may be necessary to have a helper hold this plate down for a few seconds while you apply a layer of adhesive to the flat battery case rim and quickly slide it over the flat plastic plate so that it also sits flat on the battery surface and forms a sur-

round to the top plate. Now put a piece of stiff cardboard across the top of the newly assembled battery pack and gently compress it in an engineering vice for two hours to allow the adhesive to harden.

When the adhesive has set, there are only two small tasks to do before putting the battery to use. First insert a small self tapping screw into the new hole which was drilled in the plastic island on the top plate, then gently screw it down until it touches the positive terminal of the battery. Note the amount of excess screw which protrudes above the top of the battery. Remove the screw and cut off the corresponding amount from the threaded end so that when the screw is reinserted the tip will just touch the positive terminal as the head touches the top of the plastic plate. It may be necessary here to file the top of this screw flat, as it may short against the base of the radio when the battery is being inserted.

Trial and error is the only way here, but do take care not to short out the battery. The final task is to insert another small self tapping screw into the hole from which the original negative terminal screw was removed. This will help keep the metal negative plate in place.

## Testing

With a multimeter check that you have approximately 10 volts between the centre positive screw and the negative metal plate. If so slide the new battery pack on to the IC2E and switch on. I have made several of these battery packs for the IC2E each of which costs about £5 and is more robust and gives better results than the battery box from which it was made. **Please note that it is necessary to have some alternative means of charging these batteries as they are different from the dedicated Icom batteries.** I am sure that with a little thought these surplus batteries could be modified to fit other hand held radios.

At the time of writing the Philips batteries were available from Greenweld Electronics, and other suppliers.

# 50 MHz MESSAGE

In Luxembourg all LX stations have been given the use of the 6m band from the 3rd March 1990, using 100 watts erp, and horizontally polarised antennas with the same frequency spectrum as the ON stations: 50.000 to 50.450. So far, LX1SI, LX1JX and LX1DB are known to be

including contacts made recently with G stations on 6m. Andy tells me that all the logs of DL3ZM/YV5 have been sent to him, so anyone requiring a QSL card for a contact with DL3ZM/YV5 send their QSL cards to Andy K8EFS.

In Malta the 9H1SIX beacon has

N6AMG will be going to **Western Samoa** as 5W1KT from until 29 March — and then to **Lord Howe Island** as a VK9 from 5 to 15 April 1990. QSL information for both is via AE6H. VK30T will be going to Lord Howe Island as VK9LE from 25 March to 6 April. QSL information is via home callsign.

## Italy on 6m

Information was received on 10 March that approval has been given for the use of 6m in Italy. The spectrum allowed is from 50.151.5 to 50.163.5, with a power limit of 10 watts. The first QSOs on 6m took place on 19 March 1990 between several I stations and ZS during an evening TEP opening.

KH6VP is going to be active on **Christmas Island** as T32VP from 21 March 1990.

Looking at **Gibraltar**, Trevor G3ZYY confirms his ZB2 trip from 21 June to 12 July 1990. His callsign will be ZB2HN, and he will only be active on 6m and the 28885 6m co-ordinating frequency. Activity will be all weekends and most evenings and whatever time he can fit in. QSL via his home QTH.

The **Southern Sudan** DXpedition is taking place from 15 April 1990 for about three weeks, using the callsign ST0PA3DFT.

Looking at **Ascension Island**, Mike ZD8MB is now QRT, returning to UK on 1 May. I have written to ZD8VJ in the hope that I can arouse his interest in becoming active on 6m. Further information when I have it.

Julian ZD7CW has been very active from **St. Helena** recently and has worked ZC4MK, TR8CA, and many other stations but has so far not worked into Europe. QSL information for ZD7CW is via N4CID.

In **Namibia**, along with independence on 20 March 1990, the pre-

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## *Ted Collins G4UPS with the latest 6m DX information.*

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active. On the first day of their activity some of them even worked down into ZS3 as well as G, GJ, PA, etc.

In **Egypt** Laurens Rossi PA3ECR will be operating from the Gaza Strip from 10 March 1990 on 6m as PA3ECR/SU. He will be serving with the UN Peacekeeping Force, and will be on the Strip until some time in September this year. QSL information is via PA0HIP. Laurens does have an official 6m permit for his operations.

In **West Germany** the DL authorities have agreed in principal to the allocation of 6m to DL stations. The precise details have yet to be agreed but I will add information here when it arrives. The starting date is given as 1st April 1990.

## YV5ZZ Beacon

Edgar YV5ZZ is soon to activate a beacon, possibly on 50.045 MHz, as soon as he receives a crystal from the States. The callsign will be YV5ZZ/6. Edgar has got a bit behind with his QSL cards recently; K8EFS has come to his aid, and from now on will act as QSL Manager for YV5ZZ. Logs have already been sent to Andy,

been re-activated on 50.085MHz until the new crystal arrives for it to be settled on 50.505MHz.

PY2BBL reveals that there is a new beacon on the air from Brazil on 50.078MHz. PY7AAC is five watts to a quarter-wave.

## First VK Opening

February 28 was the date of the first opening from VK to Europe this year. Five VK stations were heard/worked: VK6HK; VK6RO; VK6YU; VK6ZKO and VK6ZWX. The opening lasted from 0924 — until just after 1000z. GM4GDT worked VK6 for the first GM/VK contact.

**Walvis Bay** is now accorded DXCC status, retrospective to 1 September 1977. QSL information for George ZS9H is as follows: Mr George Hart POB1018, Walvis Bay, Republic of South Africa.

5H1HK is returning for a short visit to **Zanzibar** in early March. He will be active on 6m for the benefit of those who still need 5H on that band.

CT3DJ will be active from **Madeira Island** until 1 May. Locator is IM12 and QSL information is via OH2SX.



fixes of ZS3 callsigns changed to V51, suffixes remain the same. Officially the change of calls came at 2200z on 20 March (midnight Namibia time) when the new flag was raised.

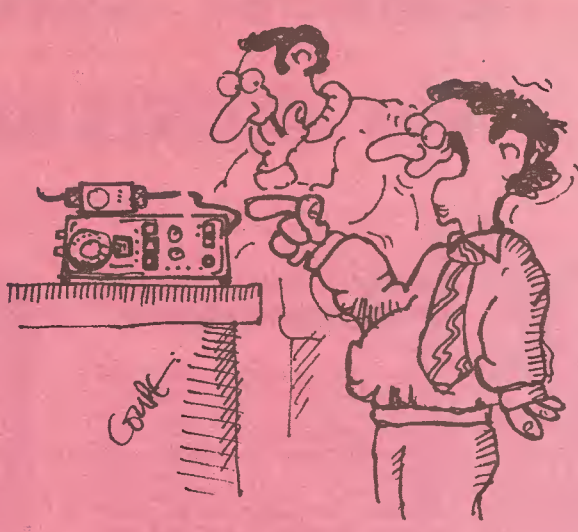
V51NAM, the anniversary call-sign, will be used by V51 stations; QSL information for this callsign will be via PO Box 1100, Windhoek 9000, Republic of Namibia. The ZS3VHF beacon will change to V51VHF.

From East Germany comes very surprising news from Matt Y33UL, saying that talks regarding 6m are going well and predicting that it will not be long before we hear our first Y3 station on 6m.

Looking at Guantanamo Bay, Steve McDaniel KG4Sm will be leaving KG@ sometime this Summer. All QSLs up to the date of his departure will be answered either direct or via the bureau, but anyone working him just before he leaves is asked to QSL via WFOFG.

**QSL CARDS RECEIVED**

During May the following QSL cards were received: F6CBC/6WI; TU4DH; TU20J; C56/SM6CKU; 9Q5EE and H18W.



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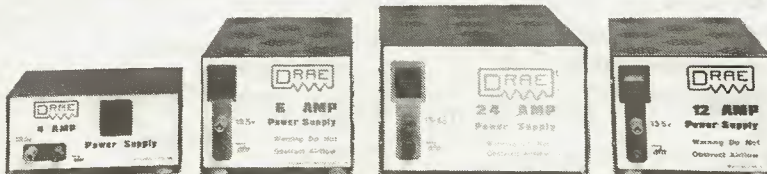
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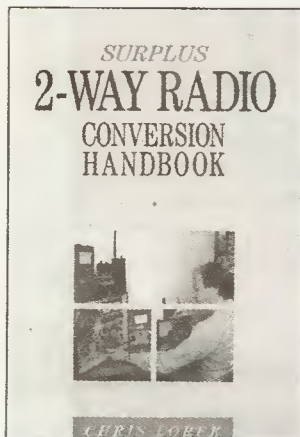
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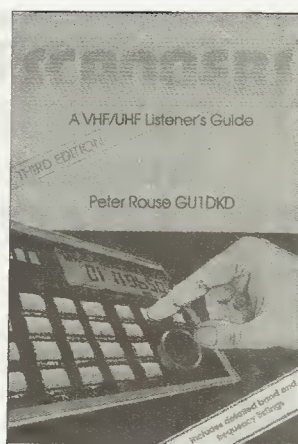


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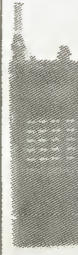
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Tonna 20809 9 ele 140MHz	£35.12
G Whip Tribander 10H/5/20m	£44.39

HF Transceivers	
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TS440S	£1138
TS140S	£862
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IC751A	£1500
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FT736R	£1199
FT4700RH	£499
IC32E	£399
IC3210E	£499

Coaxial Switches		p&p	
SA450 2way SO239	£19.49	£1.50	
SA456N 2way N	£26.99	£1.50	
Drae 3way SO239	£20.18	£1.50	
Drae 3way N	£26.11	£1.50	
CS4 4way BNC	£30.39	£1.50	
MFJ-1701 6way SO239	£38.35	£1.50	

Morse Keys		p&p	
Kent Morse key kits	£33.50	2.50	
Kent twin-paddle kits	£42.50	2.50	
Hi Mound MK704	£20.00	£2.00	
Hi Mound MH706	£22.00	£2.00	
Bencher B1 Black Base	£67.42	£2.50	
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TH25E	£258
TH205E	£199
TH215E	£228
TS71E	£358
TR751E	£599
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FT290RII	£429
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FT212RH	£349
IC2GE	£265
IC2SE	£275
IC2SET	£295
IC228H	£385
IC275E inc PSU	£1069

Scanning Receivers	
ICR7000	£989
FRG9600M	£509
ICOM ICR100	£499
AR2002	£487
R535 Airband	£249

Power Supplies		p&p	
BNOS 12/25E	£74.75	£5.00	
BNOS 12/20E	£178.28	£5.00	
DRAE 6amp	£84.99	£3.00	
DRAE 12amp	£113.10	£5.00	
DRAE 24amp	£163.42	£5.00	

Filters		p&p	
AKD HPF1	£7.65	£1.00	
AKD Braid Breaker	£7.65	£1.00	
AKD Notch Filter	£8.75	£1.00	
AKD High Pass Filter	£8.25	£1.00	
LF30A Low Pass Filter	£32.26	£2.00	

Hand Held Receivers		p&p	
H537S Airband	£69.00	£2.00	
AOR AR100	£249.00	£2.00	
Win108 Air band	£175.00	£2.00	
AOR AR900	£199.00	£2.00	
Fairmate HP100E	£299.00	£2.00	

Antenna Bits		p&p	
Bricom Balun 1:1 1kW	£15.26	£1.50	
Bricom Balun 4:1 1kW	£16.25	£1.50	
Bricom 7.1MHz Epoxy Traps (pair)	£13.65	£1.50	
Self Amalgamating Tape 10m x 25mm	£4.25	£0.75	
T-piece polyprop Dipole centre	£1.60	£0.25	
Small ceramic egg insulators	£0.65	£0.20	
Large ceramic egg insulators	£0.85	£0.20	

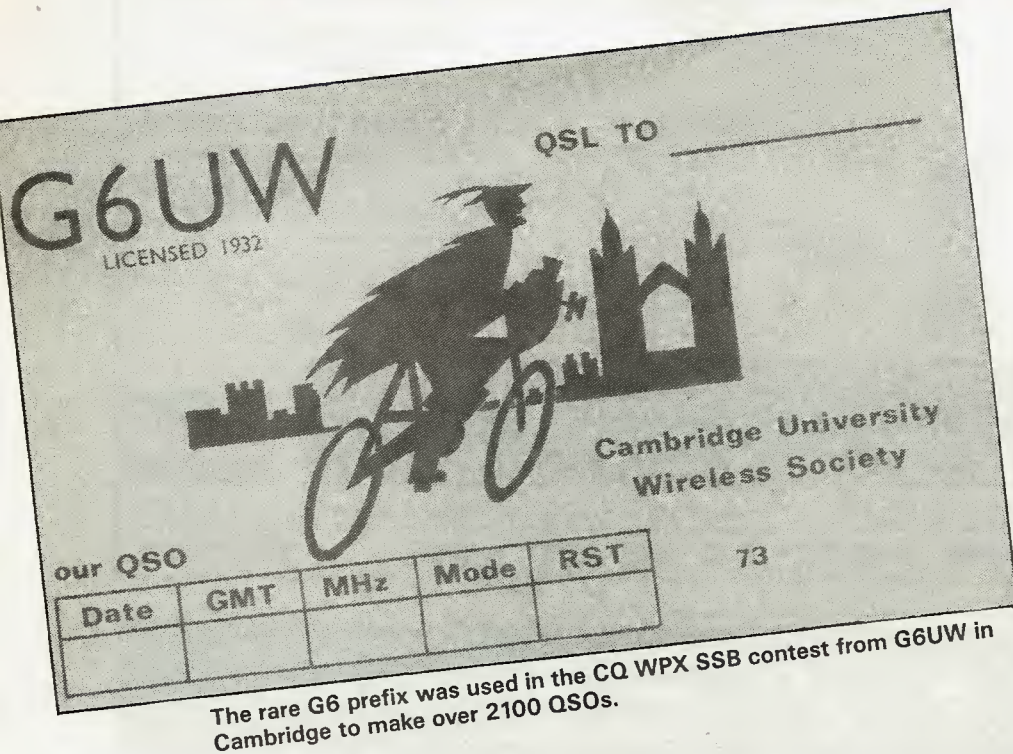
Palomar Antenna Products		p&p	
Antenna Noise Bridge — up to 100MHz	£59.95		
Tuner Tuner — Tune your ATU without transmitting	£99.95		
LED SWR Meter — Auto SWR up to 2KW PEP	£124.95		
9:1 Balun for th T2FD antenna	£23.95		

Cables Etc.		p&p	
URM67 low loss coax 50ohm per metre	£0.95	£0.25	
UR70 50ohm coax dia. 5mm per metre	£0.350	£0.10	
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UR95 50ohm coax dia. 2.3mm per metre	£0.40	£0.10	
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75ohm Twin Feeder Light Duty per metre	£0.20	£0.10	

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# QRZ



a 2-element wire beam, also on the 60 foot tower. It took several hours and a lot of pruning to get the wire beam resonant and working as a beam, but the results were worthwhile. Switching between the wire beam and the Butternut vertical gave us about two S-points gain in the relevant direction (USA and central America), while the Butternut was better in other directions.

Unfortunately conditions were pretty poor for the whole contest weekend, with no real Stateside or JA runs on 10 metres and hardly any on 20 metres either. The 15 metre band was arguably the best, although it was good to work a few West Coast USA stations (W6 and W7) on 40 metres. The final score for G6UW was 3,754,000 points, made up of 2184 QSOs and 771 multipliers (prefixes), which will probably be enough to give us the top multi operator, single transmitter position for England, although there were two or three "multi-single" groups from Scotland who were doing well, plus GJOLYP, a French DXpedition group to Jersey, who were reputed to have made some 3500 QSOs. Well done, chaps!

## Near Thing in Burma

At the time of writing, there is again a lot of DX about on the HF bands, or expected on the air very soon. The Hungarian group who have been so successful in activating Laos last year and Vietnam in 1988 (see the last *QRZ IN* May) have been trying for some months to activate Burma, XZ, which is now in second place in the "most wanted countries" survey (only Albania is regarded as being rarer). Unfortunately it seems that, although they could get permission to enter the country with their radio equipment, they could not get the all-important *written* licence to operate. Several amateurs have operated from Burma (or Myanmar as it has recently renamed itself) with verbal permission to operate, but none of these operations have been acceptable for DXCC who, quite rightly, require seeing copies of written licences when deciding whether to accept operations from rarely-activated countries.

However, rather than returning to Europe without an operation at all, the

## More signs of rare territories opening up, including Bhutan.

In the last *QRZ* I said that the Chiltern DX Club had obtained the call sign GB4CDX again and "should" be active from the QTH of Ian Shepherd G4LJF, during the CQ WPX SSB contest at the end of March. In this case "should" was the operative word, as unfortunately Ian's antennas succumbed to the great storm of January and he was unable to get them replaced in time for the contest. Instead, a group consisting of Martin G3ZAY; Dick AA6MC/GOMFO; Spyros 5B4MF/GOKUB; Andrew G0HSD; John G4DQW and myself operated from the Cambridge University Wireless Society club station, G6UW.

The advantage of using this station is that in this contest the multipliers are

prefixes, and we were almost certainly the only G6 station operating in the contest, which caused us to be sought after by other competing stations.

The G6UW "shack" is literally that — a wooden hut (named "Whoop Whoop II" for reasons that were never apparent) in a field on a farm a couple of miles outside Cambridge city centre. Outside stand a 60 foot tower with a 3-element tribander and a 40 foot tower with VHF antennas. There is also a Butternut HF2V vertical antenna for 40 and 80 metres and an 80 metre dipole on top of the higher tower.

To improve our 40 metre performance — important in this contest as QSOs on the three LF bands count double the points of the HF bands — we put up

Hungarians have turned up from Cambodia and are now active as XU8DX (on SSB) and XU8CW. They have been a good signal from about 1700 GMT on 21235kHz. Cambodia was somewhat different from the other countries in South-East as, unlike Vietnam and Laos, there had been some activity in recent years. XU1SS had been quite active for several years from a KPRLF refugee camp close to the Thai border, but more recently Son Soubert, the operator of XU1SS, was heard on the air from the Philippines, suggesting that he had left Cambodia — presumably for good. Certainly XU8DX had been working very large pile-ups, so there must have been many operators who had not worked XU1SS before he left the country.

Apart from XU8DX/CW, A51JS is also on the air at the time of writing. This is Jim Smith, better known as VK9NS and, earlier, as P29JS. Jim is the first person to activate the Himalayan mountain country of Bhutan for many years, and so it is not surprising to learn that



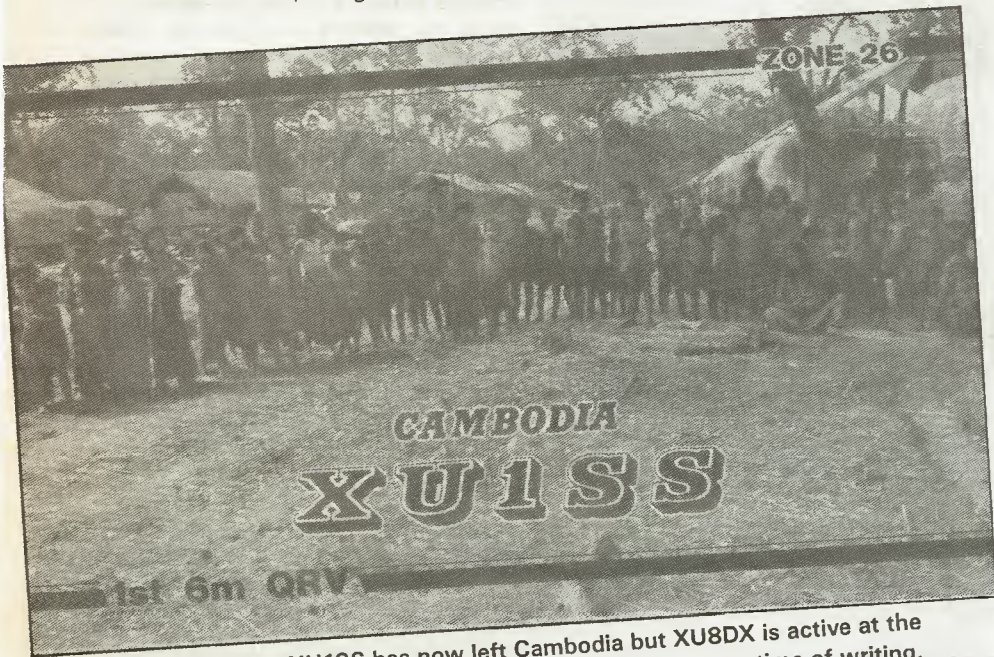
XZ5A is one of the few operations from Burma in recent years. This one does not count for DXCC as it has been operating without full authorisation.

medical doctor, is reputed to have permission for a joint medical and amateur radio expedition to Bangladesh, so things are looking up. There are now fewer and fewer countries that are not permitting amateur radio at all: Albania and North and South Yemen spring to mind as three of the unenlightened ones. I wonder which of these will on the air first?

### QSLs Arrive

It was good to receive QSLs from two of last year's major DXpeditions recently: 4J1FS from Malyj-Vysotskij Island and 3C1AG from Equatorial Guinea. The 4J1FS 1989 expedition was only the second operation from that island, which now counts as a separate DXCC country from the Soviet Union or Finland. The four-side full-colour QSL gives a thumbnail sketch of all 11 operators from Finland, the Soviet Union and the USA, such as "Larry, UA6HZ — almost like a true-blue American; a great operator and supplier of caviar. Hot Ziggity." This expedition was the first to use Yaesu's new "flagship" transceiver, the FT-1000, supplied by Chip, K7JA, of Yaesu North America and one of the expedition operators. Needless to say, Martti, OH2BH, was also one of the 4J1FS team.

The card from 3C1AG shows my old friend Erik, SMOAGD, the operator, along with his trusty Butternut HF6V vertical antenna. Erik's operation from Equatorial Guinea was just one stop on a trip which took him to Sea Tome and Principe as

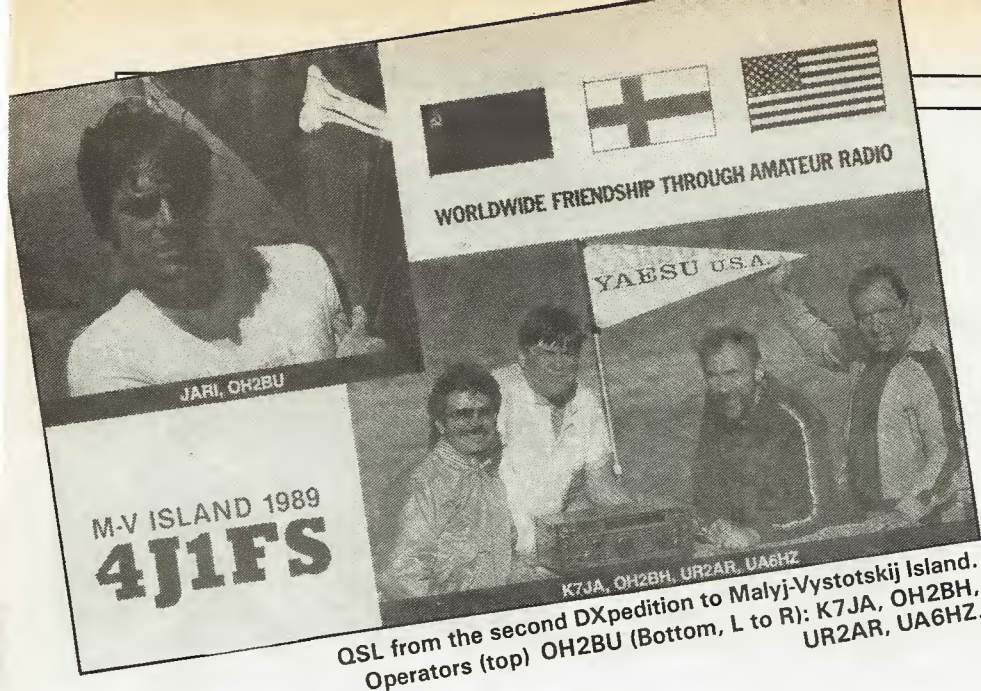


The operator of XU1SS has now left Cambodia but XU8DX is active at the time of writing.

Bhutan is also very high up the "most wanted countries" list. In fact in the 1989 survey Bhutan stood at position nine overall, although since the list was prepared Bouvet Island and Laos, which were both higher up, have had two highly successful operations and are now bound to be well below Bhutan in rarity value. Unfortunately, signals from A51JS have been very weak and there will be plenty of DXers in Britain and elsewhere who will still require Bhutan after Jim's solo expedition is over. However, it is to be hoped that Jim will have "opened up" the possibility of operating from Bhutan, and we should not have to wait too long before a Japanese group operates from

there with a larger station than Jim has been able to take (A51JS has apparently been using a 100 watt transceiver "barefoot" to a trap vertical. Judging by the signal strength, it has not been particularly well sited — possibly badly screened by the Himalayas?).

Jim Smith is also reputed to be instrumental in "opening up" Bangladesh, a country that has also not permitted amateur radio at all for several years. There was a very short operation from Bangladesh in March by some Japanese amateurs and the rumours are that this was a precursor of a much larger expedition soon. Also K5VT, Vince, who is a



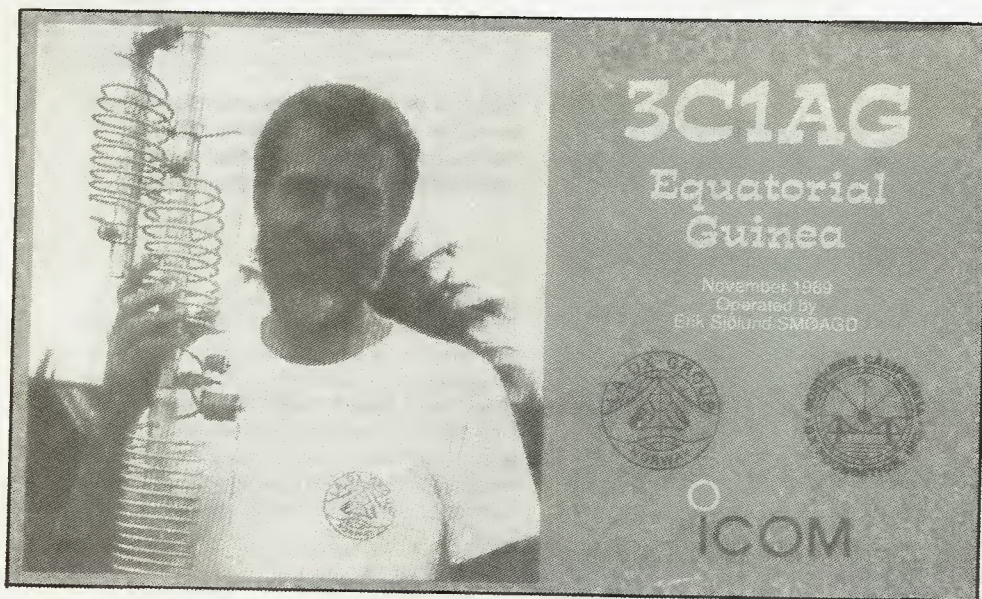
Japanese operator, is planning to activate Jarvis Island between 14th and 23rd April.

Jarmo Jaakola, OH2BN, has kindly provided QRZ with a press release on the expedition. He says: "Jarvis Island was annexed by the United States in 1853. It lies only a short distance from the equator, south of Hawaii. Jarvis is a flat coral island covering about 2 sq km. There is no population, although a small settlement existed before World War II. Today, Jarvis, along with Howland and Baker Islands, are administered directly by the US government's Fish and Wildlife Service. These three islands are not part of any state, commonwealth or US Trust Territory . . . Entry to these islands is strictly forbidden unless special permission has been obtained. The FCC has allocated the KH1 call sign prefix to Jarvis Island, as well as Baker and Howland . . . Jarvis Island is separated from other parts of the United States by intervening sovereign territory of other countries. The closest US land is Palmyra Island . . . (but) no straight line can be drawn between Jarvis and Palmyra without crossing the sovereign territory of Kiribati . . ." The press release goes on to compare other DXCC countries' locations and concludes that Jarvis should therefore count as a separate one.

### DXing Around

Some interesting DX worked recently included ZS8MI on Marion Island, who is believed to be leaving the island shortly to return to South Africa; T50DX, who was

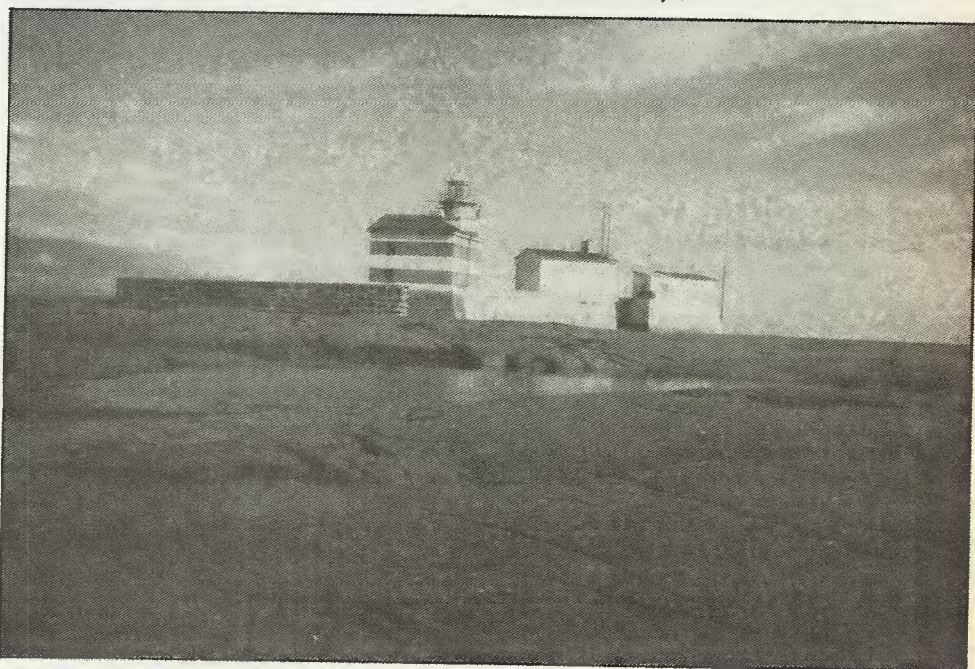
The barren rocks of the Swedish side of Market Reef is the location for the planned S18MI expedition. (The lighthouse and other buildings are in Finnish territory!).



Erik Sjolund SMOAGD operated from Annobon Island (Pagalu) and Sao Tome as well as Equatorial Guinea on his West Africa DXpedition late last year.

S9AGD and Pagalu Island as 3COGD, making a total of nearly 16000 QSOs altogether. Erik makes some interesting comments on the back of his card: "Special thanks to thousands of DXers all over the world — for showing sportsmanship and patience in the pile up. There are a few, "policemen" and others, who try to spoil our great hobby by deliberate QRMing. Don't let it happen. Please help to recreate good ham spirit on today's crowded bands. Thank you." My sentiments entirely.

By the time this is read, it could be that a new DXCC country has been added to the ranks. A claim for separate country status has been put in for Jarvis Island in the Pacific. A DXpedition, led by Martti Laine and with Finnish, American and one



I2JSB on a DXpedition to Somalia; SO1EA, who was EA2JG on a DXpedition to Western Sahara; KH6JEB/KH7 from Kure Island (this was an excellent operator who picked out my call first time although I was only running 100 watts to a vertical); BY1PK (operator Li from Beijing); 3B9FR on Rodrigues Island in the Indian Ocean; and ZZ0TA, a Brazilian DXpedition to Trindade Island (SA-10 for IOTA chasers) in the Atlantic Ocean. There have also been a couple of Japanese expeditions to the Caribbean recently, firstly J8AA from St Vincent (QSL via JJ1TZK) and later JA2EZD/J3 from Grenada (QSL via JA2MNB). It is possible that these two operations could have been from the same group of operators. Also worth mentioning was an interesting QSO I had with AH6HQ/TJ, Bob in Yaounde, Cameroon. Bob is based at the American Embassy there and his QSLing policy makes a pleasant change from those DX stations that virtually demand direct cards with saes and dollar bills or (several) IRCs before they will reply. Bob simply asks for a self-addressed envelope, without the need to send any form of return postage for a QSL. "Its all part of the hobby", he says.

The Taby Sandaramatorer (Taby amateur radio club) from near Stockholm are planning a DXpedition to the Swedish side of Market Reef in the Baltic Sea from about 28th May - 3rd June. It is notoriously difficult to land on the reef, so actual dates of operation could be somewhat different. The callsign to be used will be S18MI, S18 being a unique Swedish prefix used only for Market Reef and "MI" standing for Market Island. The Swedish part of the island only counts as Sweden for DXCC purposes, but prefix hunters will be interested to work a new prefix.

It was a pleasure to meet Phil Weaver, VS6CT, at the end of March during one of Phil's regular visits to the UK. A group of DXers gathered in a country pub in South Oxfordshire for a few drinks, a meal, and the swapping of many a good DX story. Phil, who has also operated as XX9CT from Macau, is at present off the air following a recent move of QTH within Hong Kong, but he was planning to put some antennas on the roof of his skyscraper apartment some 300 feet or more above street level. Several other VS6 operators have managed to put out very large signals, especially on the lower frequency bands, by using relatiely simple antennas extremely high up.

Talking about new antennas, Henry G3GIQ has recently put up a new German-made Fritzel FB-DO-505 5-element HF beam, to replace the KLM KT-34A which came down in the winter storms. The Fritzel beam is on an 18 foot boom and has active elements on the 18 and 24MHz bands as well as 14, 21 and 28MHz. Meanwhile, Bob G4LMW, has



**Phil, VS6CT, recently visited England. He hopes to be back on the air with new antennas soon.**

also bought a new beam — a KLMKT-34A similar to the one used by Henry until the storms. However, Bob ordered his by phoning the firm direct in California and quoting a credit card number. He reports that the overall cost — including air freight from California, import duty and VAT — is about £100 less than a British firm quoted!

I will be off on my travels again shortly and hope to be active from Anguilla between 9th-24th June. I should be using a Yaesu FT-747GX transceiver,

running 100 watts to a Butternut HF6VX vertical antenna. At present the callsign is not known, but it could be VP2E/G4JVG. I would be pleased to QSL anyone working me, either direct or via the bureau. Correct SWL reports which are sent direct to my QTH with an sae or return postage will also be QSLd. The address for QSLs, or any contributions for QRZ (photographs of your station or antennas are especially welcome) is: Steve Telenius-Lowe, G4JVG, "Penworth", Tokers Green Lane, Tokers Green, Reading, RG4 9EB.

**Henry G3GIQ, with his new Fritzel antenna for the 14-18-21-24-28 MHz bands.**



# RADIO Tomorrow

On these club contacts and forward diary pages, dates are shown approximately from the week of publication to the end of the cover month, and further into the year where dates have been supplied. We need 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 well in advance will normally be run in more than one issue. Please write and let us know if your club changes its name or contact.

## SCOTLAND

**Aberdeen ARS.** Don. 04676 251.  
**Ayr ARG.** Robert Paterson GM4CUB. 0292 262496. 2 Fris, Community Centre, Wellington Sq., Ayr.  
**Dunfermline RS.** GM0DYD. 0383 413440.  
**Galashiels DARS.** GM3DAR. 0896 56027.  
**Glenrothes DARC.** John Hardwick GM4ALA. 0592 742763 (hm) (0506 410677 (wk)).  
**Helensburgh ARC.** Barrie Spink GK0KZK 0309 64401. Thurs, The Basement, Cairndhu Nursing Home, Lower Rhu Road, Helensburgh, 7.30. Good facils, newcomers welcome.  
**Inverness ARC.** Brian. 0463 242463.  
**Lothians RS.** P J Dick GM4DTH 21, West Maitland St., Edinburgh. Prestel (NOT phone) 314471210. 2,4 Thursdays 7.30pm Orwell Lodge Hotel, Polworth Terrace, Edinburgh. May 23 DF Hunt; Jun 13 AGM; Jun 27 Social.  
**Maxwelltown ARK.** C Rogers GM4NNC 0387 721070 Rear of Lincluden Inn, Abbey Lane, Lincluden, Dumfries. 1,3 Weds etc. Morse, RAE training.  
**Mid Lanark ARS.** David Williams GM1SSA, Holytown 732403.

## NORTH EAST ENGLAND

**Barnsley ARC.** Ernie Bailey G4LUE. Barnsley 716339. Mons St. Mary's Church Hall, Laithes Lane, Barnsley.  
**Barton DRC.** John Pullen G5TGE 0652 32811. Acc Club, Barton Upon Humber, Alt. Thurs.  
**Bishop Auckland ARC.** Peter Fawcett G0FBK Bishop Auckland 606819. Most Thurs.  
**Bourne DARS.** Vince Cawthorn G4ODG. 0778 422795.  
**Denby Dale DARC.** Darran Chappell G0BWB, 221 Huddersfield Rd., Shelley, Huddersfield HD8 8LJ.  
**Derby DARC.** Contact: Kevin Jones G4FPY 0332 669157. 119 Green Lane, Derby. 7.30pm. Most Weds.  
**Doncaster ARC.** K McMahon. Doncaster 852938. Mons, Corporation Brewery Taps, Doncaster.  
**Goole RES.** Richard Sugden G0GLZ. Goole 769968. Fris, West Park Pavillion, Goole 8pm. June 8 Log evening; Jun 15 Junk sale; Jun 2 Talk; Jun 29 Social; Jul 6, 7 8 VHF NFD; Jul 13 Log; Jul 20 Talk; Jul 27 Social.  
**N. Ferriby ARS.** Frank G3YCC 0482 650410. Fris. NFU Football Club Room, Church Rd., N. Ferriby, Yorks.  
**Halifax ARS.** David Moss G0LDM 0422 202306. The Running Man, Pellon Lane, Halifax, 7.30, 3 Tue. 1 Tue "noggin and natter" informal.  
**Hornsea RC.** Jeff G4IGY. 0964 533331. The Mill, Atwick Rd., Hornsea Weds 8pm. Jun 13 Old E. Yorks contest sites survey; Jun 20 SWR Geof 63PWN; Jul 4 VHF FD prep; Jul 7/9 VHF FD; Jul 11 Post mortem; Jul 18 Cttee.  
**Hoyland ARC.** M Wardle, 11 Sokell Ave, Wombwell, Nr. Barnsley 747407. Weds, West Bank House, opp Hoyland Leisure Centre.  
**Keighly ARS.** K A Conlon G1IGH. Bradford 496222. Tues, 8pm, The Clubroom, Victoria Hall, Keighly, Yorkshire. June 26 Ambulance Service GOLL; Jul 17 Packet radio on air. Other=natter.  
**Leeds DARS.** G1EBS. 0274 665355.

**Loughborough ARC.** Philip. 0509 412043.  
**Maltby ARS.** Keith Johnson G1PQW. Rotherham 814135. Fris, Hellaby Hall, Clifford Rd., Hellaby.  
**Mansfield ARS.** J M Coates G4GYU. 0623 27257, Polish Catholic Club, Windmill Lane, Woodhouse Rd., Mansfield 1,3 Thurs 7.30.  
**Mexborough ARS.** D Thomas G6FLM. Doncaster 859654. Fris, Harrop Hall, Mexborough.  
**Northern Heights ARS.** Stan Catton G0IYR. 0274 673116. 1,3 Weds 8.15, Bradshaw Tavern, Nr. Queenbury, Bradford. Jun 20 Treasure hunt; Jul 4 FD preparation; Jul 7/8 VHF FD.  
**Pontefract DARS.** Colin Mills G0AAO. 0977 43101. Carleton Community Centre, Pontefract.  
**Rotherham ARC.** F Moody. Rotherham 552925.  
**Rugby ATS.** Kevin G8TWH. 0203 441590. Tues Rugby Radio Station Cricket Pavilion (A5, Hillmorden), 7.30.  
**Scarborough ARS.** I G Hunter G4UQP, 0723 376847. Jul 29 Rally, Spa, Scarborough, 11am. Trade, Bring and buy, Morse exams and demo. On seafront, good day out.  
**Sheffield ARC.** M Sables. Sheffield 886083. Mons Firth Park Pavillion, Sheffield.  
**Spalding ARS.** Dennis Hoult G400 075 750382 (acting). Old Fire Station, Albion St., Spalding, Linc. 7.30. Mobile Rally, Springfields Gardens, Spalding June 3. T. Kettlewell G4TWR 0775 722940.  
**Stockton DARS.** G Noble c/o Causeway Community Centre, Billingham, Stockton on Tees. Weds Causeway Community Centre 7.30. Regular RAE and morse tuition.  
**Stoke on Trent ARS.** D Wroe 0782 639476, Rose and Crown, Etruria, Stoke-on-Trent, 7.30 Fris. New venue, schedule TBA.  
**Tyneside ARS.** G Lindsay G4KOT, 12 Augusta Court, Harrian Park, Wallsend, Tyne & Wear.  
**UK FM Northern.** L. Laughton G4UNA. Wakefield 822579. East Ardsley Cricket Club, one Sun per month.  
**Wakefield: North Wakefield RC.** John Hoban 0924 825443. Thurs 8.30 White Horse Inn, Fall Lane, East Ardsley, Wakefield.  
**Wigston ARC.** G6HAJ. Leicester 403105.  
**Workshop ARS.** John Huggins G0DZX. Sheffield 0909 565856. The Clubhouse, West St., Workshop.  
**Yorks ARS.** Keith Cass G3WVO, 4 Heworth Village, York. Fris 7.30pm, United Service Clubroom, 61 Micklegate, York.

## NORTH WEST ENGLAND

**Aire Valley RS.** G6NPT. 0532 44597.  
**Bolton ARC.** Deane Sports Complex, New York, Junction Rd., Bolton. Glenn Bates G6HFF 00204 63459.  
**Bury RS.** C. D. W. Macroft G4JAG, Mosses Community Centre, Cecil St., Bury.  
**Carlisle DARS.** Roy G0HNO 0965 44766. Mons 7.30 Morton Community Centre, Wigton Rd., Carlisle. Weekly morse class.  
**Cheshire:** N. Cheshire RC. C Kirsop G6KSA, Morley Green Club, Wilmslow.  
**Fylde ARS.** Frank G4CSA. St Annes 720867. South Shore Lawn Tennis Club, Midgeland Road, Blackpool. 2,4 Thurs.



**Isle of Man ARS.** J Wrigley 0624 834257.

**Kirkby ARS.** Paul GOJIB 051 548 0452 Meets Weds, call for further information.

**Lancaster:** University of Lancaster ARS, S. Griffin G10HH 0524 64239. 2,4 Mons Assistant Staff House, U. of Lancaster.

**Liverpool DARC.** W H G Metcalfe G6VS, 38 Kempton Rd., Wavertree, Liverpool. Tues, Conservative Club, Church Rd.

**Morecambe Bay ARS.** D H Wood G4ZJL. 0524 52042. Tues 7.30 Trimpell Sports and Social Club, Out Moss Lane, Morecambe, Lancs.

**St. Helens DARC.** Carol Wainwright G0CXT 0744 813589. Thurs 7.45 Community Resource Centre, Old Central Secondary School, College St., St. Helens. Regular morse tuition.

**Staffs ARS.** Bill G4WTP. 0782 514741.

**Stockport RS.** John Verity G4ECI. 061 439 3831. Dialstone Community Centre, Lisburne Lane off Dialstone Lane, Offerton, Stockport. 8pm, 2,4 Weds.

**Trafford ARC.** Graham 061 748 9804. Thurs 7.30, Sea Cadet Unit, Bradshaw Lane, Stratford, Manchester.

**Todmorden DARC.** E. Tyler GOAEC. Halifax 882038. 1,3 Thurs Queens Hotel, Todmorden.

**Warrington ARC.** Paul G0CBN. 0925 814005.

**Wirral ARS.** A Seed G3FOO. 051 644 6094. 1,3 Weds 7.45 Ivy Farm, Arrowe Park Rd., Birkenhead.

**Wirral DARC.** Gerry Scott G8TRY 051 630 1393. 2,4 Weds Irby Cricket Club, Mill Hill Rd., Irby, Wirral 8pm. Thurs Morse class. Jun 13 SMD construction Bill Mooney G3VZU; Jun 27 Eileen Medley Challenge Cup DF Hunt; Jul 4 Mobile treasure hunt.

**Wyre ARS.** Ian Broadbent G0KMT. 03917 57636. 1,3 Weds Fleetwood Cricket Club, Broadwaters 8pm.

## WALES

**Abergavenny and NH ARC.** GW4XQH 0873 4655.

**Aberporth ARC.** GWODPR. 023987 274.

**Bridgend DARC** D E George GW10UP. 0656 723508.

**Delyn RC.** Stephen Studdart GW7AAV. 0244 819618. Daniel Owen Centre, Mold, Clwyd. Alt Tues.

**Holyhead DARS.** D Richards, 5 Queens Park Court, Holyhead, Gwynedd. Forrester's Arms, Kingsland Rd. 2,4 Suns, 7.30.

**Newport ARS.** GW7BSC. 0633 62488.

**North Wales:** Clwb Radio Amtatur Y DDraig GW4TTA. Tony Rees. 0248 600963. Four Crosses, Pentraeth Rd., Menai Bridge. 7.30pm. 1,3 Mons.

**Pembrokeshire RS.** Martin GW8ZMU, Haverfordwest 764009. Further Education Centre, Haverfordwest. Mons 7.30. RAE and Morse tuition.

**Porthmadog DARS.** Dave GW1EGQ 0766 770298. Harbour Cafe, Festiniog Railway, Porthmadog 7.30, 3 Thurs.

## THE MIDLANDS

**Atherstone ARC.** J. R. Arrowsmith G4IWA 0827 713670. 1 Weds Bull Inn, Watling St., Witherley, nr. Atherstone 8pm. Phone to confirm.

**Coventry ARS.** Johnathan Ward G4HHT. 0203 610408. Baden Powell House, 121 St. Nicholas St., Radford, Coventry. Regular On-air and morse tuition.

**Midland ARS.** Paul O'Connor G1ZCY. 021 443 5157. 3 Tues. Thurs natter. Computer night last Mon, mad morse night last Fri. Unit 16, 60 Regent Place, Hockley (Jewellery Quarter), Birmingham 7.30 Morse tuition Weds 7pm Raynet 4 Tues. Jun 19 Treasure hunt; Jul 17 Annual rig check.

**Mid Warwickshire ARS.** G4TIL Southam 4765.

**North Cheshire RC.** G6USA c/o Morley Green Club, Wilmslow, Cheshire SK9 5NT.

**Nuneaton DARC.** Paul Bicknell G4JFT. 0203 343412. 4 Tues, Etone Social Club, Meadow St., Abbey Green.

**Redditch RC.** R. J. Mutton G3EVT 0789 762041. 2 Tues WRVS Day Centre, Ludlow Rd., Redditch, Hereford.

**Rugby ATS.** Kevin Marriott G8TWH, 77 Lloyd Crescent, Stoke Hill, Coventry. Cricket Pavilion, BT1 Radio Station, B entrance, A5 Trunk Rd., Hillmorton, Rugby. Tues 7.30.

**Salop ARS.** Fred Hall G3NSY 0743 790457. 2,4 Thurs, The Olde Bucks Head, Frankwell, Shrewsbury, 8pm.

**Sandwell ARC.** Steve Jackson 021 544 4759. Mons 7.30. The Broadway, Warley, W. Midlands (doesn't actually state where). Weds evgs morse and general training.

**Stourbridge DARS.** C Williamson H4IEB 0384 396800. Robin Woods Centre, Beauty Bank, Stourbridge, Worcs. 1,3 Mons.

**Stratford Upon Avon DARS.** A Beasley G0CXJ. 060 882 495.

7.30 Baptist Church, Payton St., Stratford Upon Avon.

**Telford DARS.** Tom Crosbie. 0952 597506.

**West Bromwich Central RC.** Bill Oakes G1YQY 021 556 3183.

**Willenhall DARC.** Dave G0EGG 0902 734475 Weds 8pm Brewers Droop Inn, Wolverhampton St., Willenhall, W. Mids. CW tuition, real ale.

**Wolverhampton ARS.** Keith. 0902 24870.

**Worcester DARC.** D. Batchelor 0905 64173.

**Wythall RC.** Chris Pettitt G0EYO 021 430 7267.

## SOUTH WEST ENGLAND

**Axe Vale ARC.** Pat Cross G0GHH. Balls Farm Cottage, Musbury Rd., Axminster.

**Bath DARC.** Howard G6EYI 0225 428010.

**Blackmore Vale ARS.** Stuart Brunton G0EXI. 0747 840558. 2,4 Tues 8pm Old Coach House, Bell & Crown, A303, Wilts.

**Bristol: North Bristol ARC.** Chris Budfd G0LOT 0454 616267. Jun 15 Talk by Jandek Kits; Jun 24 Longleat Rally.

**Bristol: South Bristol ARC.** Len Baker G4RZY. 0272 832222 during meetings. Whitchurch Folk House, East Bundry Rd., Whitchurch, Bristol. Weds. 20 Longleat briefing; Jun 27 VHF NFD briefing.

**Cornish RAC** Rolf Little G7FKR 0872 72554. St. George's Hotel, St. George's Rd., Truro. Jul 14 Rally, 10am, Richard Lander School, Truro, Trade, bring and buy, computer and weather satellite demo, free parking.

**Evesham, Vale of, DARS.** John G3DEF. Evesham 6407. 1 Thurs 7.30pm, MEB Club, Community Centre, St. David's Hill, Exeter.

**Exeter ARS.** R. J. Donno QTHR. Community Centre, St. David's Hill, Exeter. 7.30pm. 2 Mon.

**Plymouth ARC.** Bob Slater 0752 361842. Tues. Frederick St Community Centre, Plymouth (off King St.) 7.30. RAE, morse classes, library, reg. RAE exam centre.

**Poole ARS.** G0EQV 0202 674802.

**Salisbury RES.** Neil 0980 22809.

**South Dorset RS.** G. Gwilliam G4FJO 0305 781164. Wessex Lounge, Weymouth FC, Radipole Lane. 7.30 1 Tues.

**Thornbury DARC.** Tom Cromack G0FGI, Rose Cottage, The Naite, Oldbury on Severn, Bristol. 1,3 Weds, 7.30 United Reform Church, Chapel St., Thornbury, Evesham.

**Torbay ARS.** G3NJA, G8HJA. Walt G3HTX. 0803 526762. ECC Club, Ringslade Rd., Nr. Highweek. Club nights Fris 7.30.

**Trowbridge DARC.** Ian Carter G0GRA. 0380 830383. 1,3 Weds, 8pm, TA HQ, Bythesea Road, Trowbridge; Jun 6 144MHz DF Foxhunt.

**Yeovil ARC.** David Bailey G1MNM, QTHR. The Recreation Centre, Chilton Grove, Yeovil. 7.30pm, Thurs. Jun 7 Product detectors; Jun 14 Antenna fundamentals; Jun 21 Propagation at night over sea; Jul 5 HF Propagation fundamentals. Talks by G3MYM; May 31 Natter.

## SOUTH EAST ENGLAND

**Aylesbury Vale RS.** Martyn Baker G0GMB. 1,3 Weds 8pm (July, Aug 1 Wed only). Hardwick Village Hall Jan 20 AGM.

**Basingstoke ARC.** Andy Wynn G1JTO 0256 64756. Forest Ring Community Centre, Sycamore Way, Winklebury, Basingstoke. 7.30pm. 1 Mons.

**Bedford DARC.** Ray G0EYM. 0234 244506.

**Braintree DARS.** M Andrews 0376 27431. Braintree Community Association Centre, Victoria St. 7.30pm. 1,3 Mons. Club net C6BRH or G4JXG, 2m 2, 4 Mons, 8pm.

**Bredhurst RTS.** G0BRC, G7BRC. Kelvin Fay 0634 376991.

**Brighton DARS.** Peter. 0273 607737. 1,3 Weds, Roast Beef Bar, Brighton Racecourse, Elm Grove, 8pm.

**Bromley DARC.** (formerly Biggin Hill ARC) Geoff Milne G3UMI 01 462 2689 The Victory Social Club, Kechill Gardens, Hayes, Middx. 7.30 3 Tues.

**Burnham Beeches RC.** G3EIL 0628 25720. Seventh McMichael Rally, July 22, Haymill Centre, Burnham, Slough. 10am, RN ARS, Datacomms Symposium, packet radio, traders, Doctor-DX computer CW test. Bob Hearn G0BTY 00494 29868. With Maidenhead DARC.

**Bury St. Edmunds ARS.** Ian Capon G0KRL 0359 70527. Upper School, Beetons Way, BSE 3 Tues. Jun 19 The Work of the RAIBC Margey Hey VCh; Jul 17 Satellites and their working Pat Gowen G3IOR.

- Cambridge DARC.** Brian Davy G4TRO, 0223 353664. Audiovisual Aids Room, Coleridge Community College, Radegund Rd., Cambridge. 7.30 Fris. Jun 29 SES at Hinchingsbrooke.
- Canterbury: East Kent ARS.** Brian Cutt, Herne Bay 366232. Canterbury High School, Knight Ave. 1,3 Thurs, 7.30pm.
- Chesham DARS.** L Cabban. 09278 3911. Stable Loft, Bury Farm, Pednor Rd., Chesham. 8pm Weds.
- Cheshunt DARC.** Roger Frisby G4OAA. 0992 464795. Thurs, 8pm, Church Room, Church Lane, Wormley, Herts.
- Chichester DARC.** H. Kaminski G1NBX Chichester 781785. St. Pancras Hall, St Pancras, Chichester. 7.30.
- Chingford:** Silverthorn ARC. Andrew Mowbray GOLWS 01-529 4489 5.30-6.30pm wkdays only. Chingford Community and Adult Education Centre, Friday Hill House, Simmons Lane, Chingford, London E4 6JH 7.30 Fris.
- Clifton ARS.** Martin Brown GODGC. 01 691 2341.
- Coulsdon ATS.** Alan. 01 684 0610.
- Dover: South East Kent YMCA ARC.** Des Edwards 0304 203073. Dover YMCA, Godwynehurst, Leyburne Rd., Dover, Kent. Weds.
- Dunstable Downs RC.** M. Spacey 0582 30664. Room 3, Chews House, 77 High St. South, Dunstable, Beds. Fris.
- Eastbourne EARC.** G1BRC 0323 29913.
- Edgware DRS.** Ian Cope G4IUZ, Hatfield 65707. Watling Community Centre, 145 Orange Hill Rd., Burnt Oak, Edgware. 2,4 Thurs.
- Farnborough DRS.** Tim Fitzgerald G4UQE 0276 292312. 4 Weds, Railway Enthusiasts Club, off Hawley Lane (M3 bridge), Farnborough, Hants. Jun 13 Silver Jubilee Construction Contest; Jun 27 VHF FD summary, VHF FD planning.
- Gosport: Submarine ARC.** Open to submariners, ex-submariners. RNARS. HMS Dolphin, Gosport, Hants. Keith Bricknell G0MII, 1 Walker Place, Gosport, Hants PO13 0LU with SAE.
- Grafton RS.** Rod Harrigan G0JUZ. 01 368 8154. Holy Trinity Church Hall, Stapleton Hall Rd., London N4. 2,4 Fris.
- Hastings ERC.** Dave Shirley. 0424 420608. 3 Weds. Westhill Community Centre, Croft Rd., Hastings. Also Fris (informal) Ashdown Farm Community Centre, Downey Close, Hastings from 7.30.
- Harrow RS.** Harrow Arts Centre, Uxbridge Rd., Hatch End 8pm, Fris.
- Horndean DARC.** F W Charrett G3COO. 0705 483676. Horndean Community School, Barton Cross, Catherington Lane, Horndean, Portsmouth, 7.30 1 Thurs. Jul 5 Junk sale; Aug 2 Chemistry in electronics.
- Horsham ARC.** P. Godbold. Steyning 814516. Guide Hall, Denne Rd., Horsham, Sussex. 8pm. 1 Thurs.
- Huntingdonshire ARC.** G8LRS. 0480 56772. Packet GB7HXA. 1,3 Thurs The Medway Centre, Coneygeare Road, Huntingdon, Cambs 7.30.
- Itchen Valley RC.** G1IPQ. Southampton 736784.
- Kettering DARC.** Barry Perrin G7CIV. Rockingham 770701. EMEB Social Club, Eskdale St., Kettering. Tues 8pm.
- Kingston DARS:** S Walters G31MK 01 397 6924.3 Weds "Alfriston", Berrylands Rd., Surbiton.
- Loughton DARS:** J D Ray G8DZH. 01 508 3434 (ev); 01-5083434 Micronet 800 mailbox, TeleGold 74:MIK1824; packet G8ZDH at GB7ESX. Room 14, Loughton Hall, Rectory Lane, Loughton 7.45pm. Fris. Jun 15 Top band DF hunt; Jun 29 RSGB video night; Jul 13 Grid dip oscillator and uses Ray Pedley GOLWF.
- Maidstone YMCA ARS.** GOBUW. 0622 20544. YMCA Sports Centre, Melrose Close, Maidstone, Kent. Fris 8pm.
- Mid Sussex ARS.** G0GMC. 07918 2937.
- Milton Keynes DARS.** Mike GOERE. 0234 750629.
- Norfolk ARC.** Steve Sewello G4VCE, 0508 78258 QTHR. Norfolk Dumping, Livestock Market, Hall Road, Harford, Norwich. Weds 7.30. Jun 13 Slow scan tv, Robert Scarfe G4TUK; Jun 27 Backyard moonbounce Doug Mallet G3HUL; Jul 4 CQ Stateside on the air; Jul 4 CQ Stateside on the air; Jul 11 Mobile DF hunt; Jul 18 Informal; Jul 25 Using satellites — demo pat Cowen G3IOR; Aug 1 meteor scatter.
- Northampton RC.** D J Linnell G7CMA 19 Beech Av., Northampton. Kingsthorpe Community Centre, Thornton Hall ("Kingsthorpe Hall"), Thornton Park, Kingsthorpe, near A508. Thurs. Jun 14 Mobile DF.
- Peterborough RES.** Peter G4PNW QTHR.
- Petersfield:** Royal Navy ARS Annual Mobile Rally HMS Mercury. Jun 10, amateur and family rally; steam engines, Swordfish fly-past.
- Reading ARC.** Mike G4THN. 7434 774042. 2,4 Thurs, Caversham Conservative Club, Caversham, Reading Berks.
- Reigate ATS (RATS).** Alan G1LNT 0883 44723, Peter G8ITY 0293 36193 after 7. Conservative Centre, Warwick Rd., Redhill, Surrey. 3 Tues, 8pm. Jun 15 Surplus sale; Jul 17 Members evening.
- St. Albans Verulam ARC.** Andy Ince G0BZS, Cottage No 1 Rounton, 28 Nascot Wood Rd., Watford WD1 3SD. RAF Association HQ, New Kent Rd., St. Albans. 7.30. 2,4 Tues.
- Sevenoaks DARS.** Barry Leggett. 0732 741222 ext. 245 office hours. Meetings, Emergency Control Centre, Sevenoaks District Council Offices, Sevenoaks, Kent. 8pm 3 Mons.
- Shefford DARS.** Nigel Leaney G1JKF 0763 71149, Brian G4ME0 0767 80043. Church Hall, Amptill Rd., Shefford, Beds. Thurs 8pm.
- Southend DRS.** S. Blinkhorn G1XGP, 102 Lord Roberts Ave., Leigh-on-Sea, Essex.
- Southgate ARC.** Brian Shelton. 01-360 2453. Holy Trinity Church Hall, Winchmore Hill, London N21. 7.45pm. 2,4 Thurs.
- South East Kent (YMCA) ARC.** Brian Joyner 0304 852533. Dover YMCA, Godwynehurst, Leyburne Rd., Dover. Weds 7.30. Jun 13 Dick's choice G0BPS; Jun 20 GB2WVW planning; Jun 23/24 Waldershare Vintage Weekend planning GB2WVW. Jun 27 Special Olympics '89 — Video G4GAN. Others = natter.
- Stevenage DARS.** Pete Daly G0GTE. 0438 724991 1,3 Tues. Ground Floor, D block, Ridgmond Training Centre, Telford Ave., Stevenage, Herts 7.30. Morse training 6.30.
- Sutton & Cheam RS.** John Puttock G0BWV 01 644 9945 3 Fris, natter 1 Mons 7.30 Downs Lawn Tennis Club, Holland Av., Cheam.
- Welwyn Hatfield ARC.** Roger Curtis G0CYC 0707 324958. Lemsford Village Hall, Brocket Rd., Welwyn Garden City, 1 Mons; Knightsfield Scout HQ, Knightsfield, WGC 3 Mons 8pm. 9th WGC Scout HQ, Knightsfield, WGC. Regular nets. Jun 18 VHF FD preparation; Jul 2 Cellular radio Graham Mullens of Marconi; Jul 16 Foxhunt; Aug 6 Video night.
- West Kent ARS.** B. Guinnessy 0892 32877.
- West Sussex ARS.** M. Mundy, 142 Junction Road, Burgess Hill.
- Whitton ARC.** A Fisher G4VBH 01 572 0465. Whitton Community Centre, Percy Rd., Whitton, Richmond. 8pm Fris. Lectures and demos.
- Wimbledon DARS.** Nick Lawlor G6AJY. 01-330 2703. 2,4 Fris, St. Andrews Church Hall, Herbert Rd., Wimbledon, London. 7.30. Jun 28 CATS vs WDARS quiz; Jul 13 Op-amps; Jul 22 DF Hunt; Jul 27 pre-camp meeting.

## IRELAND

- Armagh and Dungannon DARC.** J Murphy. 0861 522153.
- Carrickfergus ARG.** Geoff Pike G10GDP 09603 66109. Downshire Community Centre, Carrickfergus. Tues 6,7,10.
- Donegal ARC.** Patrick McHugh E15AC 075 51349 (code 010 353 75 from UK) Jacksons Hotel, Ballybofoey 8.30 last Weds. All welcome.
- Galway Radio Experimenters Club.** Ciaran McCarthy 091 53592. 1 Mons Richardsons Bar, Eyre Square, Galway, Classes Tues.
- Lough Erne ARC.** Alwun Magee G10BFD 0365 23802.
- Mid Ulster ARC.** Jim Lappin. 0762 851179. 2 Suns (not July and Aug), 3pm Guide Hall, Gilford, Co. Down.

## NATIONAL AND INTERNATIONAL

- AMRAC.** Phil G6DLJ. 0703 847754.
- British Amateur Television Club.** G8CJS or G8FOZP QTHR.
- British Amateur Radio Teledata Group.** Pat Beedie GW6MOJ, Ffynnonias, Salem, Llandeilo, Dyfed. Tel: 0558 822286. SAE for information. GB2ATG amateur radio news service transmits on 1 and 3 Sundays, on 3.590MHz, 14.090MHz and 144.600MHz. Operated by volunteers, GB2ATG welcomes amateur radio news for possible transmission, esp concerning radio data activity (RTTY, Amtor, packet, fax, etc.).
- British YL Amateur Radio Association (BYLARA) G0BIR** 0527 79636, c/o Half Way Lock Cottage, Upper Gambold Lane, Stoke Prior, Bromsgrove, Worcs B60 5HB. Occasional meetings.
- International Short Wave League.** Y Blain, 167 Wombridge Road, Trench, Salford, Shropshire TF2 6QA. Journal: Monitor.
- UK FM Group, Northern.** L Loughton, Claremont, Main St., East Ardsley.

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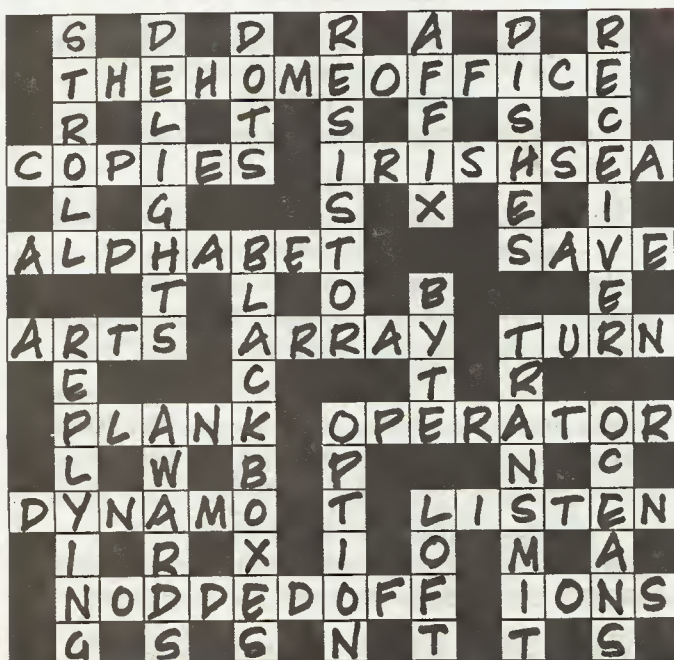
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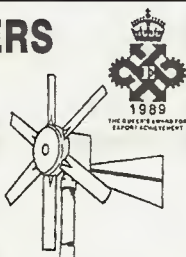
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# KENWOOD



## More of everything - except cost

The new series of FM mobiles from Kenwood really do have more of everything; more power (50W on 2 metres), with three power levels (50W, 10W, 5W); more usable sensitivity (better than 0.16 microvolts for 12dB SINAD); more channel spacings (5, 10, 12.5, 15, 20, 25 kHz); more flexibility using the RC-20 controller and IF-20 interface (up to 4 transceivers from one controller); more memories (20 multi function); and even more bands, because the full range consists of the TM-231E for 2 metres, the TM-431E for 70 centimetres, the TM-531E for 23 centimetres, and finally the TM-701E for dual band 2/70 FM.

Every function that you could ever want is included in the specification - there is even an optional digital speech store which will store received or transmitted messages of up to 32 seconds, allowing the operator to quickly check or return any call. Even the microphone has been designed to give you full control of the transceiver from one hand, with tone burst, memory recall, VFO recall, and UP/DOWN functions provided; but the UP/DOWN is not just operating frequency but memory channel number and even the frequency of the built in sub-audible tone encoder.

There is even a fourth button on the microphone which can be user programmed to select MHz steps, or repeater shift, or reverse repeater, or digital record selection, or low power; all as you wish. Extremely comprehensive and easy to use in the Kenwood manner.

This exciting new range of FM mobiles from Kenwood is now available at your approved Kenwood dealer. Try them out; you will not be disappointed, particularly with the prices. As I said "More of everything, except cost".

TM-231E	(2m)	<b>£289</b>
TM-431E	(70cm)	<b>£318</b>
TM-531E	(23cm)	<b>£385</b>
TM-701E	(2/70)	<b>£469</b>

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