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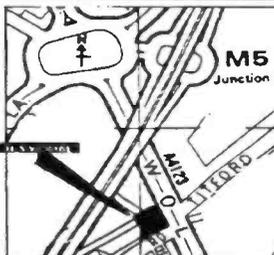
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HAM RADIO TODAY

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Published by:
Argus Specialist
Publications Ltd
Distributed by
SM Distribution Ltd
Printed & bound by:
Acorn Web Offset, Bradford
Design by
ASP Design Studio
**Editorial and Advertising
address:**
Ham Radio Today, ASP Ltd
Argus House, Boundary Way
Hemel Hempstead, Herts HP2 7ST
Tel: 0442 66551
*(please mark your letter for the
appropriate department)*

Subscriptions and back issues:
Ham Radio Today Subscription Dept,
Infonet Ltd, 5 River Park Estate,
Berkhamsted, Herts HP4 1HL
Tel: (0442) 876661/4
Subscription rates:
UK £18.00, Europe £22.50,
Middle East £22.70, USA \$40.00
Far East £24.40, Rest of World £23.00
Airmail rates on request.
USA Subscription Agent:
Wise Owl Worldwide Publications,
4314 West 238th Street,
Torrance CA90505

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

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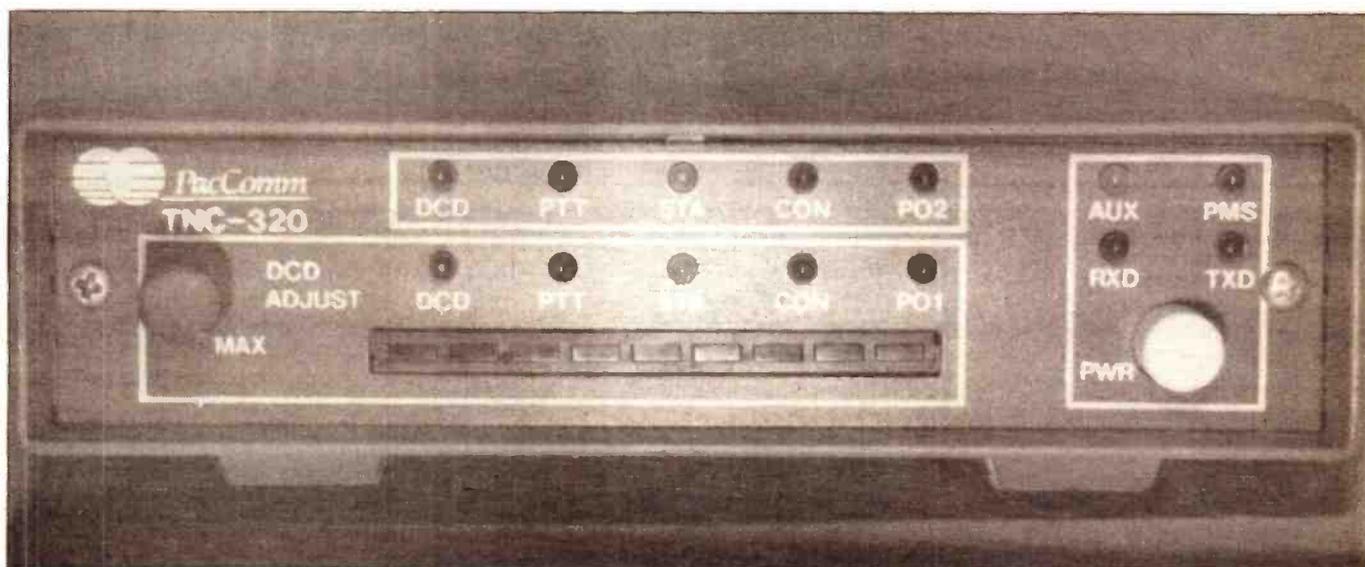
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Packet Radio

Roundup



Chris Lorek G4HCL describes some software that makes for "TNC-free" packet operation.

You don't need a TNC to get onto packet radio. Some users of packet will have come across amateurs using Digicom, which is a program that runs on Commodore computers together with a home-made pcb interface unit, to provide a 'virtual TNC'. The catch-22 situation often occurs where you need to get on packet to find this information out, so for readers with a Commodore computer sitting in the cupboard doing very little, here's your chance. All the functions of a normal TNC are provided, including a personal mailbox for message storage and a local node function to allow your station to be used as a more efficient 'stepping stone' digipeater for other stations to use.

Best of all, it won't cost you an arm or a leg, as the copying and distribution of this is performed as a non-profit making concern by amateurs around the world. In the

UK, all you need to do is send a blank formatted 5.25in disk plus a return disk mailer with the correct postage attached (30p at the time of writing), plus 30p or so to cover photocopying costs (10p per sheet) of the modem details, to Jim Mahoney G6FCL, 89 Tyefields, Pitsea, Basildon, Essex, SS13 1JA. If you're just requesting details, an sae with a contribution towards photocopying costs is all that is needed.

For the Commodore C64 the latest disk software version is V4.00, for the C128 it is V2.03 (note V4.00 is NOT suitable for the C64). If you live outside the UK, then one amateur in each country is appointed to handle distribution. These currently include:

USA Barry N Kutner W2UP,
614-B Palmer Lane, Yardley, PA
19067.

Eire John Lofthouse E13DIB,

Munroe East, Ardfinnan, County
Tipperary, Eire.

Australia Geoff Hayens VK3KGH,
5 Carbon Crt. Werribee Vic., Australia
3030.

Italy Mario D'este I3YJA,
Cannaregio 600, 30121 Venezia.

If your country isn't represented, then a couple of IRCs sent to Jim G6FCL will get you all the details.

If you have a Commodore C16 with at least 64K of memory, or the Plus/4, then Digicom on these computers is limited to a single port (no node or mailbox). The software version needed is DIGICOM>16 V1.1, and you can get this from W.M.Brennan, "La Casa". Broughtons Drive, Misterton, Crewkerne, Somerset, TA18 8LW, remembering to send the required disk, mailer, and photocopying costs; overseas readers will find 10 IRCs will cover costs, any excess IRCs being returned.

Although not required, I'd personally be tempted to add a little extra in the envelope towards a pint of refreshment to while away the half hour it takes for the above volunteers to provide your copy!

New Products

Well, the TNC-320 has finally arrived, HRT having received one of the first units to reach this country. The photograph shows the general front panel layout, which in brief offers dual radio ports for simultaneous connection of both your VHF and HF transceivers, with a front panel variable DCD (data carrier detection) control provided to allow accurate level setting for HF packet reception. Multi-coloured tuning leds on the front panel help with the fine transceiver frequency VFO adjustment necessary on HF. The other various indicators such as DCD, PTT, STA, CON and the like are duplicated to show the status of each port, and a separate 'PMS' led lets you know if you have any messages waiting for you to read in the unit's personal message store.

A Z-80B microprocessor is used together with separate internal VHF and HF modems, and a modem disconnect facility allows you fit a separate 9600 baud modem if required for high speed VHF/UHF work. Future eeprom upgrades promise the addition of Amtor and RTTY modes as well. The current price comes out at £179, and in next month's HRT we've planned an exclusive review of the unit.

For those who want to find out about the PC-320 plug-in card, which allows your computer to have its own built-in TNC, then in HRT this month you'll find that all is revealed in yet another of those exclusive reviews for which HRT is famous!

DOSGATE

Possibly the next stage from running a computer with a built-in TNC is to run DOSGATE, which is detailed in the latest issue of *Gateway*, the APRL packet newsletter. DOSGATE is a software driver package which runs on MS-DOS computers such as IBM PC clones, and quite simply allows all the functions of the MS-DOS computer to be accessed remotely over the packet network. Basically the system, acts as if received packet information has been entered in at the computer keyboard, outputting its screen data through the packet radio RS232 port also. It only takes a few seconds to think about the possibilities with, say, a computer at

the far end having a 32-bit, 25-MHz, 80386 CPU, an 80387 floating-point co-processor, 16 Mbytes of ram and 300 Mbytes of disk storage, not to mention optical disc drives installed! All from your Z88 laptop computer or even a Psion organiser coupled to your portable TNC and handheld. Non-amateur techno-yuppies, eat your hearts out!

The days of shared radio access systems are here already with BBSs and packet satellites, but don't you think this facility would whet the appetite of the computer-mad schoolkid next door you're hoping to get interested in Amateur Radio? I think so. My thanks go to Stan Horzepa, WA1LOU for the information on DOSGATE, and I'll be interested to see who will be the first amateur in the UK to run such a system, hopefully on a quiet packet frequency.

Local Group — DANPAC

This month we're giving a mention to the activities of DANPAC, the Derbyshire and Notts Packet Group. They were formed on 28th January 1989 and at the time of writing have 68 members, this number increasing all the time. GB7DAD, GB7MUM, RP2 and CD2 are the BBSs and nodes run by this active group, and they're also planning to add RP4, RP1, CD4 and CD1 to their list to spread the network traffic over several frequencies. Regular newsletters are promised (I'm looking forward to receiving their next one), and their hard working secretary/administrator

Denis GOKIU is currently planning various fund-raising ideas to supplement income from the £5.00 annual membership.

Their current idea sounds very interesting indeed: a coach trip to the Friedrichshafen Ham Radio exhibition at the end of January next year. The idea is to combine it with a holiday so as to take the partners along, and to include two nights near Ruedesheim with one evening in the Drossle Gasse, a trip through the Black Forest and a visit to Cologne on the way back, also with a trip around the top Brandy Distillery in Ruedesheim. This is all planned as a seven day trip by coach and ferry plus half board accommodation for around £150.

Needless to say, if you're an active packet user in the Derbyshire and Notts area, do consider joining the group if you make use of their facilities. You can contact them via GOKIU @ GB7MUM, he's QTHR in the callbook, or by line on 0623 659514.

End of Message — CTRL-Z

Well I'm off to have a play with this TNC-320, and I'll publish my findings next month. Please keep the information coming, as my regular correspondents know a message sent to G4HCL @ GB7XJZ will always get a reply, alternatively letters addressed to me c/o HRT at the editorial address will also find me eventually, those with an SAE also get a guaranteed reply, but please note my callbook address is not correct. 73 till next month from Chris G4HCL @ GB7XJZ.



RADIO TODAY

US Eddie

A free information pack on county hunting in the USA, produced by MARAC (The Mobile Amateur Radio Awards Club Inc.), is available in the UK from Eddie Scholes G4KHG, who holds the USA-Worked All Counties Award 536. The pack consists of eight pages of information on county hunting, the USA counties award, county hunter net operations and procedures, as well as the history of MARAC and details of its awards.

To get the information pack, send a business-size stamped self-addressed envelope to **Eddie at 19 Castle Hill, Newton-le-Willows, Merseyside WA12 0DU, UK.**

Amateurs outside the UK please send two IRCs or \$1 US for postage.

There are 3,076 counties in the 50 States of the USA, including Hawaii and Alaska. Eddie is short of just 15 on his second time around.

New SMC Contact

South Midlands Communications has appointed radio amateur Michelle King as Sales Co-ordinator for commercial radio dealers. She has been with the company five years, and will be liaising with SMC's network of commercial radio dealers in the UK.

Fax and SSTV for the BBC

Technical Software has released a fax and SSTV transceiver system for the BBC Micro. Called the GX-2, it features, in Fax mode, 320 by 256 pixel definition with seven-level greyscale, full or quarter screen transmission at all IOC's with phasing signal and stop tone, reception at any speed for meteor and press signals, picture reverse, and screen dump to printer. There is an optional direct printout of received signals with auto phasing for high quality charts and pictures.

In SSTV mode, the GX-2 features colour and mono transmission and reception, compatibility with existing Robot colour, line sequential colour and mono equipment, automatic operation in Robot mode, support for all timing standards, flywheel synchronisation to combat noise and QRM, screen dump to printer and other features.

The GX-2 uses a hardware interface and software on a 16K eeprom. The interface contains processing for Tx and Rx signals, and switches the PTT to line under program control. It also contains the fax sync signal generator. Isolation of all computer and Tx connections gives minimum computer noise.

Screens can be saved to disc for later transmission, along with screens prepared from graphics software or a digitiser.

Type-ahead facilities include 12 text sizes (four heights and three widths), in colour or grey scale. Background printing can be turned off for captioning. GX-2 has its own character set, and graphics can be generated using the typefaces and other inputs.

Live type-ahead can be to the screen or to buffers, with full flexibility in output times. SSTV screens can be loaded on the fly while the buffer is sending, for continuous transmission from disk.

The GX-2 costs £99 (£199 with the fax direction printing option), including interface, eeprom, full installation and operating instructions and all connecting leads.

Orders and enquires to Technical Software, Fron, Upper Llandwrog, Caernarfon, Gwynedd LL54 7RF, UK. Tel. 0286 881886.



Old Service Amateurs Honour King

The picture shows King Hussein of Jordan receiving a plaque in honour of his acceptance of an Honorary Life Membership of St. Dunstan's ARS, from Bill Shea G4AUJ, the Chairman.

Bill was accompanied by Ted John G3SEJ, the Society's secretary, bearing the Society's QSL cards.

St. Dunstan's is an organisation for men and women blinded on war service, and the ARS has nearly 40 members, all blind. Bill G4AUG lost his sight in the Second World War and is now a chartered physiotherapist. Ted G3SEJ was blinded while serving with the Royal Navy in the Pacific, and recently retired as a civilian administrative officer with the Merseyside Police after 33 years' service.

The meeting was arranged by Robin Bellerby G3ZYE, principal of Davies's College in Hove, where King Hussein sponsors medical and engineering students from Jordan. He is a member of the Anglo-Jordanian Council and an Honorary Life Member of St. Dunstan's ARS.

The plaque is inscribed "His Majesty King Hussein Bin Talal JY1. Made an Honorary Life Member of the St. Dunstan's Amateur Radio Society in recognition of his outstanding service in promoting international friendship through amateur radio. July 1989". JY1 is the King Hussein's international callsign in Jordan. He also has a British callsign. "I get many more contacts when I am using the JY1 sign," he jokingly told his visitors.

BT On The Ocean Wave

British Telecom has set up communications links worldwide to speed information flow and monitor the safety and progress of boats in this year's Whitbread Round the World Yacht Race, which started on 2nd September from Southampton.

BT is keen to demonstrate its capability for providing communications facilities to and from anywhere in the world for voice, fax or data and the race provides an excellent opportunity to put this to good use.

A private voice and data network will link the race ports of call to HQ in Portsmouth to aid the RN Sailing Association in running the event — a new and so far unique process. Media centres at each port will offer communications facilities to journalists.

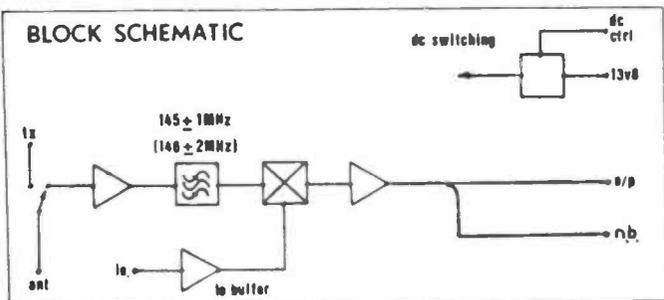
A sophisticated screen-based information system which can combine text, pictures and graphics will provide the basis of daily

news releases.

Using technology developed at Martlesham, BT will provide computer support and graphics to display the positions of the yachts throughout the nine-month event. Position information will be updated by data transmitted from each yacht via the French Argos satellite beacon system.

Further, BT has developed a facility to capture and transmit still pictures from the yachts in mid-ocean using picture-coding and compression software to store and transmit live images over telephone lines. In mid-ocean is combines established HF radio technology with advanced digital picture coding. Captured by a video camera, the picture is compressed, stored in a personal computer and sent back to the UK via HF radio.

BT are putting up an award for Best Communicator during the race and during each leg of the race. The route of the race — the fifth — will be the longest ever at around 33,000 nautical miles.



Receive Front End for IC-202s

MuTek are close to releasing a replacement receiver front end for the Icom IC-202 series portables. Designated the limited RPCB 202uB, it is designed to give low noise with superior dynamic performance.

A low-loss nitrogen-filled relay will replace the diode antenna switching system used by the original transceivers. This is followed by a low noise RF amplifier using a silicon dual gate mosfet, with a normal noise figure around 0.6dB. However, as this sensitivity is unnecessary for terrestrial communications (being as it is limited by external noise levels) some of the potential sensitivity has been traded off the extra dynamic range, to maximise the benefits of the device.

This is followed by a high performance three pole Tchebyshev bandpass filter providing image rejection and feeding the mixer via a resistive pad. Great care has been taken to ensure that the mixer terminations are adequate to avoid degradation of the mixer performance potential.

A high dynamic range mosfet amp with negative feedback follows the mixer and is matched for low noise. The output from this stage drives the original crystal filter and noise blanking circuitry.

Figures given to date are: noise 1.0dB, image rejection 70dB, intermodulation free dynamic range less than 90dB, S9 signal 0.5 volts (depending on original setting of S-meter).

The RPCB 202 will cost £60 plus £2.50 post and packing and is scheduled to be available from 30th October. Orders or enquiries to **MuTek Ltd., PO Box 24, Long Eaton, Nottingham NG10 4NQ.** They do take Access.

Low Price Draught

Number One Systems has reduced the price of its budget pcb layout and schematic draughting software Easy PC to under £100 (ex VAT).

Easy PC, which was given a favourable review in *Ham Radio Today* late last year, runs on IBM PC compatibles and now costs £98.00 plus VAT. The package now

includes output drivers for the HP-GL pen plotter and Gerber Photo-plotter. The program won a 1989 British Design Award for simplicity of operation and speed without expensive training and co-processors.

Further information from **Number One Systems Ltd., Harding Way, Somersham Road, St. Ives, Huntingdon, Cambs PE17 4WR. Tel. 0480 61778.**

Dock Your Handheld Here

Nevada have two new docking boosters on the market. Both models allow the output of a standard VHF handheld to be boosted to 25 watts output. Once latched onto the unit, the handheld is converted into a mobile or base station that can be used at high or low power.

For mobile use, the 'docking booster' comes complete with a fixing bracket for car installation. For base use, the unit can be powered from any 12V DC mains adaptor. The body of the booster contains an extension aerial socket, mic holder, transmit/receive indicators and the slipper-style docking catch which holds the handheld in place.

Model BS25 is designed to accept the Icom IC2E, CTE CT1600, Kenpro and similar models. Model BS23 is for Yaesu FT23s and similar handhelds. The frequency coverage is 140 to

174MHz, input power 3.5 watts, output power 25 watts.

Priced £59.95 for either unit, the boosters are available from **Nevada Communications, 189 London Road, North End, Portsmouth, Hants PO2 9AE. Tel. 0705 660036.**



DTI Radio Division Annual Report

The Department of Trade and Industry Radiocommunications Division has published its fourth Annual Report (financial year 1988/89).

A thick, attractive A4 magazine, the report summarises the activities of all the RD departments, including the RIS, broadcast and satellite services, and trade and hobby interests (including ours), tabulates the results of some of these activities, including licence sales and prosecutions, and looks forward to future developments.

The Amateur Radio section concentrates on the establishment of Project YEAR and the Young Amateur of the Year Award, the revisions to the Amateur Radio Licence which came into effect in January 1989, with particular emphasis on the legalisation of packet radio and other digital communications, and revisions to the RAE syllabus. The CB section records "A year of consolidation for CB radio", meaning chiefly that not a great deal has changed since the previous year, which was, however, an important year, with 40 new (CEPT) channels and a licence revision, and work going forward on a statutory instrument to allow CB users from CEPT countries to use their home licences in member countries.

The graphs, however, show the number of CB licenses declining slowly. The fall in new licenses may be bottoming out, somewhat in the way that the dramatic rise in new amateur licences after 1978 has levelled off over the last three years.

The tables show a total of 58,754 amateur licenses on issue, with a slight preponderance of As over Bs, and 93,284 CB licenses. As CB licenses are cheaper and need no qualification, this is not a bad total. But it is clear enough why the RSGB would like to convert more CBs and non-hobbyists to amateurs in the future.

The report also touches on the Single European Market (1992) and the Directive on Electromagnetic Compatibility, which may affect the supply and pricing of commercial equipment in future. A consultative document will be issued, and interested parties (it is aimed at manufacturers) can put their names down for a copy by ringing the RIS at Waterloo House on 01 215 2162.

The back of the report also lists the publications, specifications, press releases and RD staff papers published this year, and relevant publications available from HMSO and agents.



Project YEAR Goes Public

On 20th July the Radio Society of Great Britain held an Industry Conference whose purpose was to bring together all the parties who might have a forwarding interest in the RSGB's Project YEAR (Youth into Electronics through Amateur Radio). Project YEAR was launched by HRH Prince Philip Duke of Edinburgh, the RSGB's Patron, in July 1988.

The Thursday morning conference, which was sponsored jointly by the RSGB and the DTI, drew together representatives of industry (including the BBC, IBM, Plessey, GEC, British Telecom and Mercury, British Aerospace and the other major electronics, computing and communications companies), the amateur radio market, and the Scout and Guide movement, which has been involved with amateur radio for a long time.

A series of speakers was announced by Sir Richard Davies KCVO, CBE, C.Eng, FIEE, G2XM, Immediate Past-President of the RSGB.

The Rt. Hon. Robert Atkins MP, Parliamentary Under-Secretary of State for Industry, who has responsibility within the DTI for radio communications, spoke first on the burgeoning of the radio and telecomms industries in recent years and the opportunities for the UK in expanding markets such as cellular radio. Concern for the shortage of skilled manpower in engineering was uppermost (see also our comments in Radio Today in the October issue of HRT). In the early days of amateur radio amateurs were encouraged to self-train for emergency; now they are needed for industry. Robert Atkins announced that the DTI would be sponsoring the Young Amateur of the Year Award for the second year, and looked forward to hearing the RSGB's plans to date for Project YEAR and the proposed Novice Licence.

Sir Richard Davies formally presented Richard Atkins with the RSGB Novice Licence Discussion Document, which is now available to RSGB members — see end of item.

David Evans, Secretary and Chief Executive of the RSGB drew attention to the fall in engineering and technology graduates since the mid 1980s and the fall in the number of school leavers, and the part the RSGB and amateur radio has to play in bringing more young people into engineering. He recounted the part 'amateurs' in the widest sense played in developing early radio, the pool of motivation waiting to be tapped and outlined the help that amateur radio required from industry to put Project YEAR into action.

Mike Coolican, Branch Head of the Radiocommunications Division of the DTI recounted his recent experiences with a work-shadow student and the gaps in the younger man's basic knowledge of radio and electronics, and how such basic ignorance can even lead to criminal activity (and the thwarting of criminal activity). He drew attention to the stereotyped view that the public have of amateur radio (copies of an old Tony Hancock video made their appearance at various points in the conference), and how young people preferred the glamour of computers. He outlined the various schemes and information which have been compiled by the DTI to encourage young people to think again about the radio industries, and called on more encouragement to be given to women to enter the technical trades.

He spoke favourably of the RSGB's plans for a Novice Licence, and pointed out how the DTI had in the past extended the Amateur licence to allow "the maximum possible freedom". He announced support that Project YEAR had attracted in various forms from companies and organisations, and urged them to go further in everybody's interests.

Peter Blair G3LTF, Deputy MD of Rascal Research bore witness to the shortage of skilled scientists and engineers, and how an interest in radio had drawn many engineers, himself included, in the direction of electronics at an early age. "Six of them are directors within the Rascal group", he said, going on to enumerate the cutting-edge technologies which he had become involved in during his career, and calling on industry to support Project YEAR.

Victor Brand G3JNB, the RSGB's Project YEAR consultant, spoke of the RSGB's efforts to formulate Project YEAR and get the ball rolling, particularly the need for financial backing and investment, and the clear support of prominent members of the industrial

community, as well as practical help in all areas of administration. He drew attention to the importance of getting basic radio into education at primary level as an introduction to physics and electronics, and the need for help from educationalists. The RSGB, he says, needs a computer to manage the information, and for financial management. He introduced the RSGB's novice publishing plans, the need for simple, trainer-level kits to get people started, and for the amateur press to bear the need for simple projects in mind.

The conference, in pulling together the varied interests which must bear a hand if Project YEAR is to achieve its aims and presenting the whole story to industry and the media, has revealed how ambitious a plan the project is. Project YEAR has six listed objectives:

- 1) To create a framework for a Novice Licence in the UK, including an organisation to provide training and examination facilities.
- 2) The production of a recruitment video for circulation to clubs and sale to the public.
- 3) The production of new books (a series of 12 is planned) to help the non-technical person get interested in radio.
- 4) The launch of a magazine to introduce beginners to radio and electronics.
- 5) The design, approval and production of kits suitable for beginners.
- 6) Fund-raising to carry out the objectives of Project YEAR.

On the subject of the Novice Licence, the RSGB points out that it is only at the discussion stage, and 'nothing is cast in the proverbial tablets of stone'. The Discussion Document is available from the RSGB for £3 post-paid to members. Please mark orders "DS-Novice Document". It is in the interests of all amateurs that they should buy or borrow a copy of the document and read it.

Roots Amtor Terminal

ICS have announced a low-cost Amtor/RTTY terminal to bring the cost of getting active on Amtor down closer to the cost of getting started on Packet.

The usual route has been to use a multi-mode terminal. The AMT-3, made in the UK, is designed to incorporate only those modes useful to Amtor and RTTY, and a CW identification facility. The front end filter bandwidth is optimised for Amtor and RTTY, rather than for HF Packet. The front panel includes a tuning indicator and full Amtor status indicators.

The AMT-3 software was designed by G3PLX, who originated Amtor, and can reasonably be said to be the definitive implementation of the mode. The unit includes split screen host mode software for the IBM PC, with many Help screens to make it user-friendly. However, the universal RS-232 interface makes the AMT-3 suitable for use with any appropriately equipped computer or dumb terminal.

The AMT-3 is 25 by 135 by 160mm with a matching mounting stand, or can be vertically mounted using the integral screw holes.

ICS were the first company to introduce a commercial Amtor system and would like to point out

that Amtor offers both mailbox operation and old-style real-time QSOs.

The AMT-3 costs £169.95 inclusive of VAT from ICS Electronics, Unit V, Rudford Industrial Estate, Ford, Arundel, W. Sussex BN18 0BD.



Ascension Costs Descend

Ascension Island has revised the cost of its awards downwards since their announcement in June 1989. The awards are:

South Atlantic Award for working at least one station on each of Ascension, St. Helena and Falklands, any band, any mode.

Ascension Award for working at least three stations on Ascension Island, any band, any mode.

Air Bridge Award for working one station in the British Isles, one on Ascension Island and one in the Falklands, any band, any mode.

Please list log entries and certify QSOs have taken place. No date limit. Applications should be accompanied by 10 IRCs, US\$5 or £2.50 sterling and sent directly to the Awards Manager, PO Box 2, Ascension Island, South Atlantic.

New Gear From R N

R N Electronics will launch at the Leicester Radio Rally on 27 and 28 October a 2/10m transverter with 25W pep output, second harmonic less than -70dB, spurious less than -60dB, intermodulation -32dB, and less than 2.5dB noise. A new masthead preamp for 70, 144, 432 and 934 MHz will have power handling up to 200W with a noise figure of less than 1dB. The gain is set to give optimum compromise between the system noise figure and system intermodulation performance.

Enquires to R N Electronics at 37 Long Ridings Avenue, Hutton, Brentwood, Essex CM13 1EE. Tel. 0277 214406.

BARTG AGM

The British Amateur Radio Teledata Group are holding their 1989 AGM at The Churchill Room, London House, Meckleburgh Square, London WC1, close to Kings Cross and St. Pancras BR and Underground stations, at 2pm on 4th November.

This is also the event of BARTG's 39th Birthday, and cake will be served.

Apart from a number of changes on the committee, announced in last month's Radio Today, the future expansion of the successful BARTG Rally will be discussed and there will be a call for volunteers to help.

Further information from Ian Brothwell G4EAN, tel. 0602 262360.

ICOM Announce

ICOM have distributed the following specifications to HRT recently: the IC-4KL 1kW HF linear amp, IC-2400A (USA) and IC-2400E (Europe) dual band FM transceivers; IC-2SAT (USA) and IC-2SET (Europe) 144MHz hand-

held transceivers, IC-4SAT (USA) and IC-4SET (Europe) UHF FM handheld transceivers; IC-765 HF all band transceiver; IC-2SA (USA) and IC-2SE (Europe) 144MHz FM transceivers, IC-R9000 top of the line communications receiver and DM-300 digital multimeter.

Glossy brochures and price list are available from Icom UK Ltd., Sea Street, Herne Bay, Kent CT6 8LD (please specify).

Ham Radio Today will be following through with in-depth reviews of the best of these units as soon as possible.

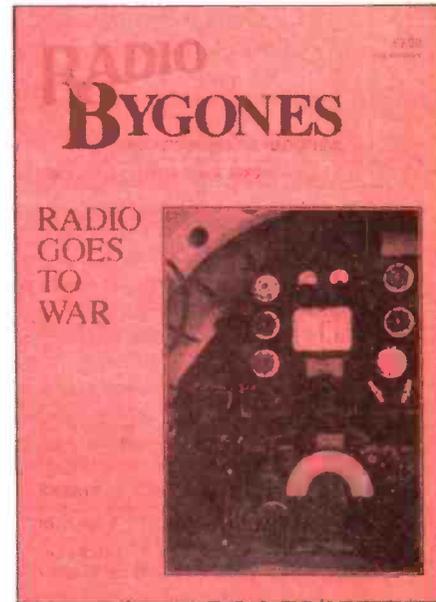
New For Old

A new magazine for vintage radio enthusiasts, *Radio Bygones*, published its first issue in August. *Radio Bygones* incorporates Chas E. Miller's *The Radiophile*, and Chas remains the principle contributor.

"Covering the era from yesterday backwards", the first issue contains features such as *Radio Goes To War*, *Wireless Takes to the Road*, *Resistance and Capacitance Bridges* and *Receiver Pro-*

file — the RI Airflo, along with many others. Edited by Geoff Arnold, the magazine has 32 glossy pages plus cover, and comes out bi-monthly at £2.20 a copy.

Issues and information from *Radio Bygones*, 8A Corfe View Road, Corfe Mullen, Wimborne, Dorset BH21 3LZ.



CLUES ACROSS

- 1 Cartoon strip or control on radio (7)
- 5 Kind of lecture — remains about (7)
- 9 Newspaper people, push (5)
- 10 Passes on, sends signals (9)
- 11 Golf implement for hams? Society (5,4)
- 12 Backs of shoes, can be high (5)
- 13 Adjust, fine tune, slim and fit (4)
- 14 Land of BV call signs and Woks (5)
- 16 Comes from a cow, partly backward zoom (3)
- 18 Approximately, a boxing match it sounds like (5)
- 19 Mountain range, slap about (4)
- 21 That which comes from the radio speaker (5)
- 23 Where the HF amateur can expect to make friends (5-4)
- 25 Vibrates, reverberates. Steer a son about (9)
- 27 Unavailable channel... Engaged? (2,3)
- 29 Beam turner (7)
- 30 Vote into office 13 down? (5)

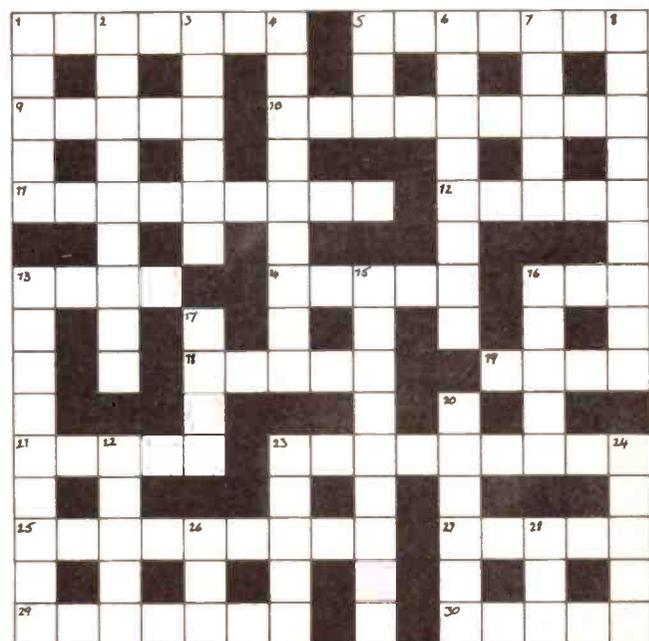
CLUES DOWN

- 1 _____het, great! (5)
- 2 In use every day. I sued lady about to get it (4,5)
- 3 No lies about a cut or wound! (6)
- 4 He, phonetically speaking (5,4)
- 5 Place to take the water, in spark transmitter (3)
- 6 One place for a pre-amplifier (4-4)
- 7 Sounds like unwanted audio on signal (5)
- 8 Electrical components that hold back (9)
- 13 Member of 11 across who looks after the money (9)
- 15 Hobbies, pastimes... (9)
- 16 Having more than one, as in mode or band (5)
- 17 Frequency allocation or pop group (4)
- 20 Helpful information, often confidential (6)
- 22 Knock over, make unhappy (5)

CROSSWORD

- 23 Could be cause of 26 down (5)
- 24 Put up, as in antenna (5)
- 26 Not dry, part of we transmitters (3)
- 28 You need this one if you QSO with French YL's (3)

October's answers appear on page 53 of this issue.



ICOM

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IC-725 £759
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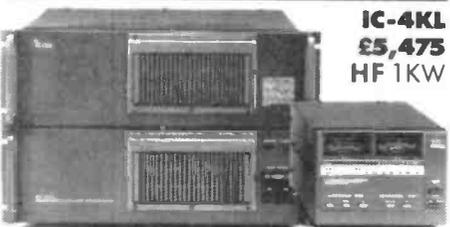


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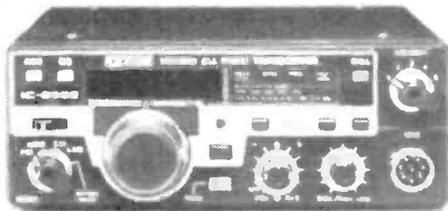
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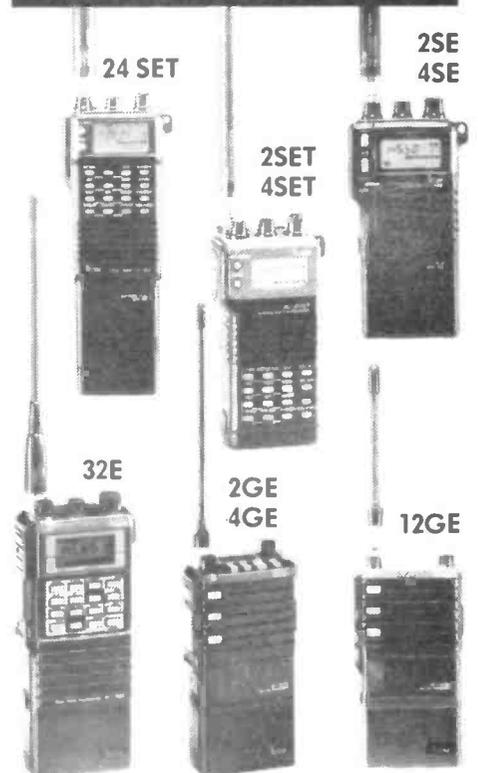


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IC-UX129	1200MHz	FM
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LETTERS

Letter of the Month

I don't know what it is that makes one SES better than another. The York Amateur Radio Society have run GB2TS for a great number of years at the Tollerton Show, which is an old-fashioned traditional show. This year we did it again, and it was MAGIC. Quite what made it so is a mystery, but magic it was.

As usual we went on the previous evening to put the aerials up and, as usual, we had some difficulty in getting the long wire over the marquee. Never seem to be able to find just the right size and weight of object to do the trick. After several tries, Tony G4XIV offered his hand-held as a weight. He said it wouldn't do any harm. So, up and over went Tony's little

hand-held. Perhaps not to be recommended, but then it is a 70cm job, and I understand there is not, as yet, a great following for 70cm in York.

The bands were quite lively, especially 40cm, and we are sorry we could not work everyone in the pile-up. It was very flattering to be on the receiving end, and we did our best. Our two newest recruits, Philip and David, both 14 years old and chasing the CW, certainly had a whale of a time.

We meet any Friday at 7.30pm. Visitors are more than welcome.
— Keith Cass, York ARS, United Services Clubroom, 61 Micklegate, York.

We hope everyone is paying close attention to the contents of this letter, and wish 70cm a happy future in York.

Raise the Age Limit

I certainly disagree with G3YZW when he states that we have a novice licence in Class B, he must have forgotten that the same RAE applies to those who have a Class A licence, with the exception of a pass in CW.

I disagree with GOIYG, GOIYH, GOIZP, GOJMR, G4CGT and G4YLB of Darwen, Lancs's article (c). In my opinion the age limit should be raised to 18 and, if a novice licence is being introduced, it should fall in the 26.965 to 28.305 MHz band. Someone will say "glorified CB", I know, but I, for one, would while awaiting my first paper results having passed the second, like to be able to use SSB and CW and would be prepared to be registered and have a legal callsign. Many CB operators say they would be prepared to pay for the privilege to do this.

Also, and I have written on this subject many times, no-one should be allowed on any of the amateur bands without sitting for the RAE or obtaining part one or two papers to qualify for a novice licence.

— Whiskey Sierra 96, Cannock.

It is nice to see people back again after the summer break. Thank you for the postcards. Class B licensees are not insulted. G3YZW took his RAE at 14, along with many, many other amateurs. He says he found the RAE much easier than the Morse test — I don't think he felt like a second class citizen, I think he felt like a radio amateur who had to struggle with the Morse test to get on the HF bands. You can guess how positively these folk will be feeling about talk of raising the age limit.

The point is that — and I suppose here I must nail my colours to the mast and say that, whatever the overtones and side-effects of their plans, the RSGB are making a sensible effort to adapt to the pressures in today's society and bring young (and not-so-young) people into amateur radio who would otherwise be discouraged by the amount of knowledge needed just to get started, by a responsible and carefully-monitored route — the point is that the RAE is far from being beyond a novice with a bit of background and determination.

Let's not underestimate young people, or novices, or CB operators.

Survey . . .

The RSGB did a survey of all its members in September 1988. The response, published in the January 1989 issue of RadCom, showed an 80.2% majority in favour of a Novice Licence.

— David A. Evans, Secretary and Chief Executive, RSGB, Potters Bar.

. . . or Ballot?

While being against a novice licence myself, I must point out that the RSGB did hold a ballot to all its members, but not a ballot to all amateurs.

It was in my opinion worded in such a way that instead of 'yes' or 'no' we had a whole list of questions to answer.

In my view the whole thing is a recipe for chaos. People who agree should bombard the RSGB with objections, and the DTI as well.
— M. Charlton G0MDF, Huthwaite, Notts.

Tucked away in the survey was a question on the novice license which could almost be answered 'yes' or 'no': it says: The Licence: A. I like the concept B. I do not like it.

Hopefully this is where the RSGB's 80.2% of repliers is drawn from but in any case the result is unequivocal. All RSGB members had their chance to reply. As the RSGB have repeatedly pointed out, this is not a closed subject: you can comment at any time, either for or agin'.

Moral: read the small print, and

medium sized print, and the large print. The Darwen Six, for instance, made some very valid points, but people have largely jumped on the "ballot" issue and ignored the rest.

A Class Issue?

I refer to the letter from six amateurs from Darwen, Lancs regarding the proposed novice licence.

The RSGB has not gone into this issue without lots of planning and forethought. All members received a very comprehensive questionnaire with Radcom several months ago (September 1988 issue — Ed.) asking for their opinions and suggestions. It seems obvious that these amateurs are not members.

How do they know that a novice licence is not met by approval by the amateur radio fraternity. Did they send out a questionnaire?

The whole idea of this licence is to give youngsters a chance to take up this great hobby at an earlier age and to encourage home brewing. All this has been said before, so I will not dwell on it now.

Join the RSGB, get Radcom and be better informed.

And how can you say "I thought that we already had a novice licence, the class B licence"? You are treading on dangerous ground there. We all know lots of G8s who have no wish to go on HF and have no need of morse code. Do we all of a sudden become second class amateurs?

— Stan Wilde, Tamworth, Staffs.



People say that operating standards have dropped in recent years, but as in so many cases the majority are paying for the sins of an uncaring minority. Species die out if they become too exclusive. If new operators won't come in because they can't face all the hurdles at once, it makes a certain amount of sense to space the hurdles out and give them a chance.

But what about the Bs and As who have worked, very hard over long periods in some cases, to get their RAEs, and then see what look like short-cuts presented to new novices?

It's up to the RSGB — and novice licence trainers, in the future — to see "on an ongoing basis" that the achievements of established amateurs aren't devalued, even by implication.

And the winds of change continue to blow. If the Novice Licence goes ahead even approximately as planned, Morse will no longer be the single hurdle to the HF bands, and the role of Morse in licensing will inevitably come up for re-assessment.

Something else to chew on. I wonder how current licensees (especially Bs) feel about the maintenance of Morse as a licensing requirement in Novice Licence? — HPA.

Mica Shortage

I have started to construct the 2m and 70cm amplifiers as described in the January 1986 and August 1987 issues of your magazine. It is proving difficult to locate a source of supply for the specified mica wrapped capacitors.

The designer of the 70cm amplifier suggests that the parts be obtained from Cirkit Ltd. However, they have only a limited range of values in stock and cannot provide me with the parts I need.

Do you know of an alternative source of supply?

Finally, have you ever published an article detailing the conversion of a high band, FM Pye Westminster to 144MHz? If so, is it possible to obtain a photocopy?

— Andy Rutter G8HCK, Manor House, London.

Working from old articles throws up certain historical problems, like: catalogues change, authors drop from sight, the world at large updates itself; extra ingenuity is needed.

According to my catalogue, the only mica capacitor needed for the 2m linear which Cirkit do not stock is the 470p. A dipped silver mica type should do for this function, or alternatively a pair of 220p wrapped mica capacitors from Cirkit should work. If you use this option, there is a remote chance that the tuning capacitors will not cover the required range, in which case a 33p dipped silver mica should be connected in parallel to bring the total capacitance to the correct value. Dipped silver mica capacitors are available from STC Electronic Services (Tel. 0279 626777).

The 70cm linear may present more of a problem. The extra stray inductance of dipped silver mica capacitors may impair the performance. It would therefore be

better to stick to the specified type of capacitor. I don't know where to obtain them, but Microwave Modules may be able to help. Their address is Brookfield Drive, Aintree, Liverpool L9 7AN and their telephone number is 051-523-4011.

"Converting Pye Westminster" (HRT March 1986) provides some useful background information but is not specifically a step-by-step guide to the conversion you have asked for. Check Chris Lorek's book when it appears in the bookshops; that will cover everything we have covered in the past, and much more. Alternatively, if you want the 1986 article, send £1.50 to the PHOTOCOPY SERVICE at Argus House, telling them the title, month and year. — G3YZW.

Brilliant

Q: How many Radio Amateurs does it take to change a light-bulb?

A: Ten. One to change the light-bulb, and nine to stand around and tell him a) how bright it is, and b) what the weather's like outside.

— C J Longhurst, Tring (unlicensed but not unaffected.)

Oh no. Not another Bright Emitter joke!

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AC128 0.22	BC108B 0.12	BC212 0.09	BD135 0.30	BD587 0.95	BF337 0.29	BR103 0.55	APSA13 0.29	RCA16181 0.85	TV106/2 1.50	25C1106 2.50
AC128K 0.32	BC109 0.10	BC213 0.09	BD136 0.30	BD588 0.95	BF338 0.32	BR303 0.95	MPA292 0.39	RCA16334 0.90	ZRF0112 16.50	25C1124 0.95
AC141 0.32	BC109B 0.12	BC214 0.09	BD137 0.32	BD698 1.50	BF355 0.37	BR303 1.15	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C1162 0.95
AC141K 0.34	BC114A 0.09	BC214C 0.09	BD138 0.30	BD701 1.25	BF363 0.35	BR303 1.15	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C1172 2.20
AC142K 0.34	BC115 0.55	BC2237B 0.15	BD139 0.32	BD702 1.25	BF371 0.25	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C1173 1.15
AC176 0.22	BC116A 0.50	BD144 1.10	BD140 0.30	BD707 0.90	BF394 0.19	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C1306 1.75
AC187 0.22	BC117 0.19	BD159 0.45	BD141 1.10	BD732 1.50	BF422 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C1364 0.50
AC187K 0.25	BC119 0.24	BD160 1.50	BD142 1.10	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C1413A 2.50
AC188 0.25	BC125 0.25	BD166 1.50	BD143 0.70	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C1449 0.50
AC188K 0.37	BC140 0.31	BD179 0.72	BD144 1.10	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C1628 1.75
AC1917 1.15	BC141 0.25	BD182 0.70	BD145 1.10	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C1678 0.50
AD142 2.50	BC142 0.21	BD182 0.70	BD146 1.10	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C1945 3.75
AD149 1.50	BC143 0.24	BD182 0.70	BD147 1.10	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C1953 0.95
AD161 0.50	BC147B 0.12	BD182 0.70	BD148 1.10	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C1957 0.80
AD162 0.50	BC148A 0.09	BD182 0.70	BD149 1.10	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C1969 2.95
AD166 0.50	BC149 0.09	BD182 0.70	BD150 1.10	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C1985 1.50
AD166 0.50	BC149 0.09	BD182 0.70	BD151 1.10	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C2028 1.15
AD166 0.50	BC149 0.09	BD182 0.70	BD152 1.10	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C2029 1.95
AD166 0.50	BC149 0.09	BD182 0.70	BD153 1.10	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C2078 1.45
AD166 0.50	BC149 0.09	BD182 0.70	BD154 1.10	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C2091 0.85
AD166 0.50	BC149 0.09	BD182 0.70	BD155 1.10	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C2098 2.95
AD166 0.50	BC149 0.09	BD182 0.70	BD156 1.10	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C2166 1.95
AD166 0.50	BC149 0.09	BD182 0.70	BD157 1.10	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C2314 0.80
AD166 0.50	BC149 0.09	BD182 0.70	BD158 1.10	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C2371 0.36
AD166 0.50	BC149 0.09	BD182 0.70	BD159 1.10	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25C2931D 0.95
AD166 0.50	BC149 0.09	BD182 0.70	BD160 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25K19 0.55
AD166 0.50	BC149 0.09	BD182 0.70	BD161 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	25K33 0.55
AD166 0.50	BC149 0.09	BD182 0.70	BD162 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	Special Offer
AD166 0.50	BC149 0.09	BD182 0.70	BD163 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	10% Discount
AD166 0.50	BC149 0.09	BD182 0.70	BD164 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	if you order 10
AD166 0.50	BC149 0.09	BD182 0.70	BD165 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	or more of any
AD166 0.50	BC149 0.09	BD182 0.70	BD166 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	one semi
AD166 0.50	BC149 0.09	BD182 0.70	BD167 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	conductors
AD166 0.50	BC149 0.09	BD182 0.70	BD168 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD169 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD170 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD171 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD172 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD173 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD174 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD175 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD176 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD177 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD178 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD179 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD180 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD181 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD182 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD183 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD184 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD185 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD186 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD187 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD188 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD189 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD190 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD191 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD192 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD193 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD194 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD195 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD196 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD197 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD198 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD199 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD200 1.50	BD732 1.50	BF423 0.32	BSW64 0.45	MRF450A 1.95	RCA16335 0.85	2N1308 1.35	
AD166 0.50	BC149 0.09	BD182 0.70	BD201 1.50	BD732 1.50	BF423 0.32</					

**A selection from our
stock of branded valves**

A1714	24.50	EABC80	1.95	EF731	4.50
A1834	7.50	EAC91	2.50	EF732	4.50
A2087	11.50	EAF42	1.20	EF800	11.00
A2134	14.95	EB34	1.50	EF805	19.50
A2293	6.50	EB41	3.95	EF805S	25.00
A2428	29.60	EB91	0.85	EF805S	25.00
A2599	37.50	EB33	2.50	EF812	0.45
A2792	27.50	EB41	3.50	EF200	1.50
A2900	11.50	EB8C1	1.50	EF260	3.50
A3283	24.00	EB8C90	1.95	EH90	0.72
A3343	35.95	EB8C91	1.95	EK90	1.50
ACSP3A	4.95	EBF83	0.95	EL32	0.95
ACS2P2N	8.50	EBF89	0.95	EL33	7.95
ACT22	59.75	EBF93	0.95	EL34 MULLARD	
AH221	39.00	EBL1	7.50	POA	
AH238	39.00	EC52	0.75	EL34	3.95
AL60	6.00	EC70	1.75	SIEMENS	3.50
AN1	14.00	EC71	1.75	EL36	2.95
ARP12	2.50	EC81	7.95	EL36	
ARP34	1.25	EC88	1.95	MULLARD	3.95
ARP35	2.00	EC98	1.95	EL38	9.00
AZ11	4.50	EC99	1.95	EL41	3.50
B5716	35.00	EC90	1.50	EL42	2.00
BT58	55.00	EC93	1.50	EL71	4.50
BT17	25.00	EC95	7.00	EL81	6.95
BT113	35.00	EC97	1.10	EL83	7.50
CIK	27.50	EC901D	12.00	EL84	0.95
C3M	17.95	ECC32	3.50	EL84	
C1149/1	195.00	ECC33	3.50	MULLARD	4.50
C1150/1	135.00	ECC35	3.50	EL84	
C1534	32.00	ECC81	1.50	SIEMENS	2.50
CCA	3.50	ECC81 SPECIAL		EL85	4.50
CD24	6.50	QUALITY	2.95	EL86	1.75
CK1006	3.50	ECC82	0.85	EL90	1.75
CK5676	6.50	ECC82		MP25	195.00
CV NOS PRICES		PHILIPS	1.95	MS48	5.50
ON REQUEST		ECC83	0.95	MU14	3.50
D3A	27.50	NEW		N37	12.50
D63	1.20	ECC83 SPECIAL		N78	9.85
DA41	22.50	Low cross		OA2	1.50
DA42	17.50	coupling		OA2WA	2.50
DA90	4.50	Low noise		OA3	2.50
DAF91	0.95	Low microphony		OB2	1.50
DAF96	0.95			OB2WA	2.50
DC70	1.75			OC3	2.50
DCX-4-5000	25.00			OD3	2.50
DET16	28.50	£3.50		OM4	2.50
DET18	28.50			OM5B	3.00
DET20	2.50			OM6	1.75
DET22	2.50			ORP43	2.50
DET29	29.50	ECC83	2.15	ORP50	3.95
DET23	35.00	BRIMAR		P61	2.50
DET24	27.50	ECC83		P41	2.50
DET25	22.00	PHILIPS	1.95	P42	2.50
DET29	32.00	ECC83		PABC80	0.95
DF91	1.50	ECC85	2.50	PC86	0.75
DF92	1.50	ECC86	2.75	PC88	0.75
DF96	1.25	ECC88	1.35	PC97	1.10
DF97	1.25	ECC89	1.50	PC900	1.25
DG10A	8.50	ECC91	2.00	PC84	0.40
DH63	1.50	ECC189	2.50	PC85	0.55
DH77	1.50	ECC801S	6.95	PC88	0.70
DK91	1.20	ECC803S	6.95	PC89	0.70
DK92	1.50	ECC804	0.60	PC189	0.70
DL35	2.50	ECC2000	7.95	PC805	0.70
DL63	1.50	EF80	1.15	PC806	0.80
DL70	2.50	EF82	1.50	PC82	0.80
DL73	2.50	EF86	1.70	PC87	0.65
DL91	3.95	ECF200	1.85	PCF86	1.20
DL92	1.50	ECF201	1.85	PCF87	1.25
DL93	1.50	ECF801	0.85	PCF87	1.25
DL93	1.50	ECF804	6.50	PCF200	1.80
DL93	1.50	ECF805	2.50	PCF201	1.80
DL93	1.50	ECF806	10.25	PCF201	1.80
DM70	5.25	ECH3	4.50	PCF801	1.35
DM160	6.50	ECH4	4.50	PCF802	0.85
DOD-006	79.50	ECH4S	3.50	PCF805	1.25
DY51	1.50	ECH42	1.50	PCF806	1.00
DY86/B7	0.85	ECB1	1.75	PCF808	1.25
DY802	0.85	ECB3	1.50	PCF808	1.25
E55L	49.50	ECB4	1.00	PCF808	1.25
EB0CC	12.50	ECB5	1.50	PCF808	1.25
EB0CF	12.50	ECB6	1.50	PCF808	1.25
EB0F	12.50	ECB7	1.50	PCF808	1.25
EB0L	29.50	ECB8	2.50	PCF808	1.25
EB1CC	5.50	ECB9	1.00	PCF808	1.25
EB1L	12.00	ECB10	1.00	PCF808	1.25
EB2CC	4.50	ECB11	1.00	PCF808	1.25
EB3CC	4.50	ECB12	1.00	PCF808	1.25
EB3F	5.50	ECB13	1.00	PCF808	1.25
EB6C	9.50	ECB14	1.00	PCF808	1.25
EB6C	9.50	ECB15	1.00	PCF808	1.25
EB6C	9.50	ECB16	1.00	PCF808	1.25
EB6C	9.50	ECB17	1.00	PCF808	1.25
EB6C	9.50	ECB18	1.00	PCF808	1.25
EB6C	9.50	ECB19	1.00	PCF808	1.25
EB6C	9.50	ECB20	1.00	PCF808	1.25
EB6C	9.50	ECB21	1.00	PCF808	1.25
EB6C	9.50	ECB22	1.00	PCF808	1.25
EB6C	9.50	ECB23	1.00	PCF808	1.25
EB6C	9.50	ECB24	1.00	PCF808	1.25
EB6C	9.50	ECB25	1.00	PCF808	1.25
EB6C	9.50	ECB26	1.00	PCF808	1.25
EB6C	9.50	ECB27	1.00	PCF808	1.25
EB6C	9.50	ECB28	1.00	PCF808	1.25
EB6C	9.50	ECB29	1.00	PCF808	1.25
EB6C	9.50	ECB30	1.00	PCF808	1.25
EB6C	9.50	ECB31	1.00	PCF808	1.25
EB6C	9.50	ECB32	1.00	PCF808	1.25
EB6C	9.50	ECB33	1.00	PCF808	1.25
EB6C	9.50	ECB34	1.00	PCF808	1.25
EB6C	9.50	ECB35	1.00	PCF808	1.25
EB6C	9.50	ECB36	1.00	PCF808	1.25
EB6C	9.50	ECB37	1.00	PCF808	1.25
EB6C	9.50	ECB38	1.00	PCF808	1.25
EB6C	9.50	ECB39	1.00	PCF808	1.25
EB6C	9.50	ECB40	1.00	PCF808	1.25
EB6C	9.50	ECB41	1.00	PCF808	1.25
EB6C	9.50	ECB42	1.00	PCF808	1.25
EB6C	9.50	ECB43	1.00	PCF808	1.25
EB6C	9.50	ECB44	1.00	PCF808	1.25
EB6C	9.50	ECB45	1.00	PCF808	1.25
EB6C	9.50	ECB46	1.00	PCF808	1.25
EB6C	9.50	ECB47	1.00	PCF808	1.25
EB6C	9.50	ECB48	1.00	PCF808	1.25
EB6C	9.50	ECB49	1.00	PCF808	1.25
EB6C	9.50	ECB50	1.00	PCF808	1.25
EB6C	9.50	ECB51	1.00	PCF808	1.25
EB6C	9.50	ECB52	1.00	PCF808	1.25
EB6C	9.50	ECB53	1.00	PCF808	1.25
EB6C	9.50	ECB54	1.00	PCF808	1.25
EB6C	9.50	ECB55	1.00	PCF808	1.25
EB6C	9.50	ECB56	1.00	PCF808	1.25
EB6C	9.50	ECB57	1.00	PCF808	1.25
EB6C	9.50	ECB58	1.00	PCF808	1.25
EB6C	9.50	ECB59	1.00	PCF808	1.25
EB6C	9.50	ECB60	1.00	PCF808	1.25
EB6C	9.50	ECB61	1.00	PCF808	1.25
EB6C	9.50	ECB62	1.00	PCF808	1.25
EB6C	9.50	ECB63	1.00	PCF808	1.25
EB6C	9.50	ECB64	1.00	PCF808	1.25
EB6C	9.50	ECB65	1.00	PCF808	1.25
EB6C	9.50	ECB66	1.00	PCF808	1.25
EB6C	9.50	ECB67	1.00	PCF808	1.25
EB6C	9.50	ECB68	1.00	PCF808	1.25
EB6C	9.50	ECB69	1.00	PCF808	1.25
EB6C	9.50	ECB70	1.00	PCF808	1.25
EB6C	9.50	ECB71	1.00	PCF808	1.25
EB6C	9.50	ECB72	1.00	PCF808	1.25
EB6C	9.50	ECB73	1.00	PCF808	1.25
EB6C	9.50	ECB74	1.00	PCF808	1.25
EB6C	9.50	ECB75	1.00	PCF808	1.25
EB6C	9.50	ECB76	1.00	PCF808	1.25
EB6C	9.50	ECB77	1.00	PCF808	1.25
EB6C	9.50	ECB78	1.00	PCF808	1.25
EB6C	9.50	ECB79	1.00	PCF808	1.25
EB6C	9.50	ECB80	1.00	PCF808	1.25
EB6C	9.50	ECB81	1.00	PCF808	1.25
EB6C	9.50	ECB82	1.00	PCF808	1.25
EB6C	9.50	ECB83	1.00	PCF808	1.25
EB6C	9.50	ECB84	1.00	PCF808	1.25
EB6C	9.50	ECB85	1.00	PCF808	1.25
EB6C	9.50	ECB86	1.00	PCF808	1.25
EB6C	9.50	ECB87	1.00	PCF808	1.25
EB6C	9.50	ECB88	1.00	PCF808	1.25
EB6C	9.50	ECB89	1.00	PCF808	1.25
EB6C	9.50	ECB90	1.00	PCF808	1.25
EB6C	9.50	ECB91	1.00	PCF808	1.25
EB6C	9.50	ECB92	1.00	PCF808	1.25
EB6C	9.50	ECB93	1.00	PCF808	1.25
EB6C	9.50	ECB94	1.00	PCF808	1.25
EB6C	9.50	ECB95	1.00	PCF808	1.25
EB6C	9.50	ECB96	1.00	PCF808	1.25
EB6C	9.50	ECB97	1.00	PCF808	1.25
EB6C	9.50	ECB98	1.00	PCF808	1.25
EB6C	9.50	ECB99	1.00	PCF808	1.25
EB6C	9.50	ECB100	1.00	PCF808	1.25
EB6C	9.50	ECB101	1.00	PCF808	1.25
EB6C	9.50	ECB102	1.00	PCF808	1.25
EB6C	9.50	ECB103	1.00	PCF808	1.25
EB6C	9.50	ECB104	1.00	PCF808	1.25
EB6C	9.50	ECB105	1.00	PCF808	1.25
EB6C	9.50	ECB106	1.00	PCF808	1.25
EB6C	9.50	ECB107	1.00	PCF808	1.25
EB6C	9.50	ECB108	1.00	PCF808	1.25
EB6C	9.50	ECB109	1.00	PCF808	1.25
EB6C	9.50	ECB110	1.00	PCF808	1.25
EB6C	9.50	ECB111	1.00	PCF808	1.25
EB6C	9.50	ECB112	1.00	PCF808	1.25
EB6C	9.50	ECB113	1.00	PCF808	1.25
EB6C	9.50	ECB114	1.00	PCF808	1.25
EB6C	9.50	ECB115	1.00	PCF808	1.25
EB6C	9.50	ECB116	1.00	PCF808	1.25
EB6C	9.50	ECB117	1.00	PCF808	1.25
EB6C	9.50	ECB118	1.00	PCF808	1.25
EB6C	9.50	ECB119	1.00	PCF808	1.25
EB6C	9.50	ECB120	1.00	PCF808	1.25
EB6C	9.50	ECB121	1.00	PCF808	1.25
EB6C	9.50	ECB122	1.00	PCF808	1.25
EB6C	9.50	ECB123	1.00	PCF808	1.25
EB6C	9.50	ECB124	1.00	PCF808	1.25
EB6C	9.50	ECB125	1.00	PCF808	1.25
EB6C	9.50	ECB126	1.00	PCF808	1.25
EB6C	9.50	ECB127	1.00	PCF808	1.25
EB6C	9.50	ECB128	1.00	PCF808	1.25
EB6C	9.50	ECB129	1.00	PCF808	1.25
EB6C	9.50	ECB130	1.00	PCF808	1.25
EB6C	9.50	ECB131	1.00	PCF808	1.25
EB6C	9.50	ECB132	1.00	PCF808	1.25
EB6C					

Around the Wc

Having QSY'd from the wide open spaces of VK-land to the limited open areas of a large Victorian house in Liverpool, my need to develop an efficient antenna to operate in a restricted space was urgent, and the *DIY Magnetic Loop* article by GM3HBT in the April 1988 issue of *Ham Radio Today* seemed an ideal starting point and from which the antenna described in these notes resulted.

The first loop constructed was similar to the one described by GM3HBT and this operated on 20-30

variable supply was constructed. Using the full 9 volts for fast tuning into near resonance then reducing the supply to 3 volts proved ideal for finding exact resonance and giving complete control over the system.

Antenna Tuned

Having overcome the initial problem of tuning the antenna at a distance, attention was turned to improving the efficiency of the Magnetic Loop itself.

Referring back to basics, there are two inseparable fields associated

proceeds outwards from the transmitting antenna. This is an expanding special wavefront consisting of alternate reversals of the electric and magnetic fields which occur simultaneously and at right angles to each other as shown in Figs 1 and 2.

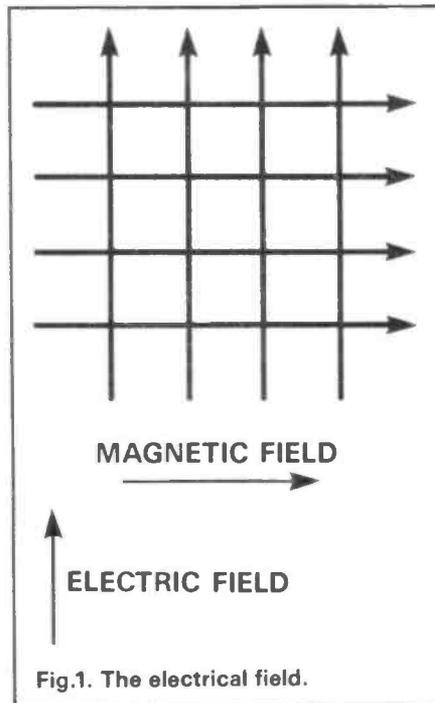
The electric field is due to voltage changes in the antenna and the magnetic field due to current changes. The combination of these two fields is an electromagnetic wave, and as it is an alternating quantity its wavelength is the distance in the direction of propagation between two points where the intensity of the field is similar in sign and magnitude; or in simple terms, one complete cycle.

George Metcalfe G6VS goes further on less by making a loop.

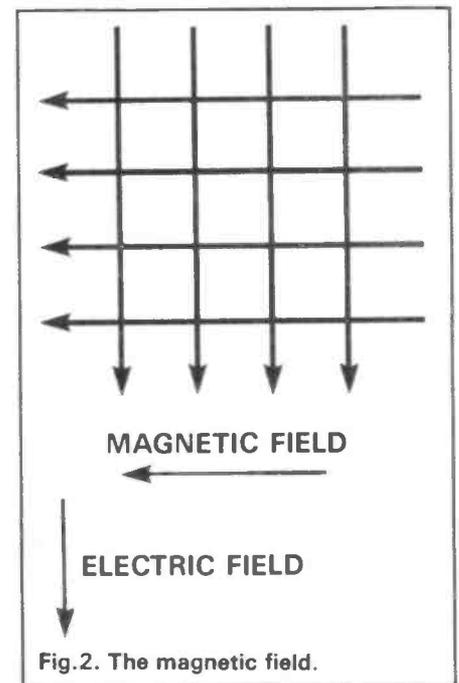
and 40 metres. Using this magnetic loop indoors quickly showed the potential of such an antenna, but it had several drawbacks, the most important being the disturbing effect of hand and body capacitance when tuning the loop to resonance.

It was obvious that a system of remote control was required so that the antenna could be tuned from the operation position in the shack; eventually a 9 volt DC motor with a 32:1 reduction gearing was found in a computer junk shop. This worked but the tuning speed was far too fast for efficient operation and a further 6:1 reduction was made with a couple of plastic cogs from a model shop — this was still too fast and the problem was eventually solved with an Eddystone 15:1 slow motion drive located at a Rally.

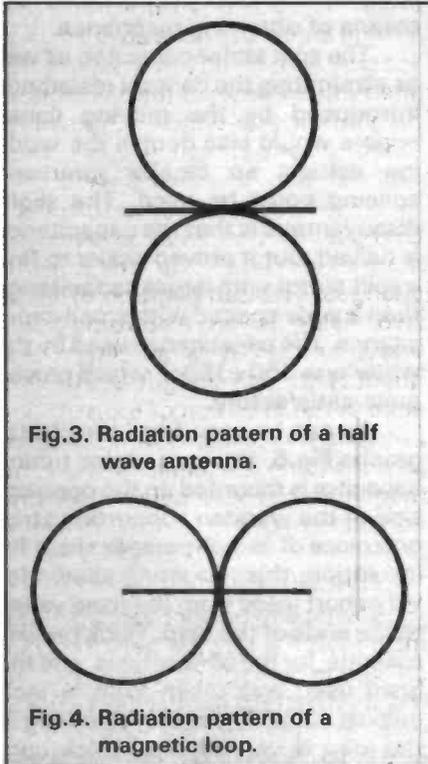
The combination of 32 × 6 × 15:1 reduction from the 9 volt DC motor was good, but still a little too fast for fine tuning once the resonant position had been reached, so tests were made with a reduced DC voltage and it was found that the motor still produced a reasonable torque with only 3 volts, so a small 9 – 3V



with a transmitted signal: the electric field due to voltage changes and the magnetic field due to current changes; these always remain at right angles to each other and to the direction of propagation as the wave



World in 99 inches



magnetic field due to current changes in the antenna, and as these are at right angles to the electric field the radiation pattern is in the plane of the loop as shown in Fig. 4.

As an earth or ground plane is unnecessary with a magnetic loop it does not require to be mounted high above ground; indeed the best results seem to be obtained when the magnetic loop is fitted about three metres above ground. The actual radiation pattern contains very high, medium and low vertical radiation.

Resistance Low

As the loop is current activated it is obvious that both the DC and the radiation resistance should be as low as possible; a low resistance also increases the Q factor of the loop and this in turn determines the bandwidth and the terminal voltages at the ends of the loop. It is important therefore to keep and make all connections in the loop circuit as perfect as possible. The AC resistance of a conductor due to skin effect is a major consideration

with a magnetic loop, and that in a copper conductor can be calculated from:

$$R = \frac{0.996 \times 10^{-6} \sqrt{f}}{d}$$

Where R = Resistance in ohms/ft
f = Frequency in Hz
d = Diameter of conductor in inches

In practice it has been found that copper pipe between 1 and 1½ inches diameter produces excellent results.

Construction

The original loop was constructed using 10ft ¾ inch soft drawn copper tube but due to the self capacitance of the loop it was not possible to tune it to the 28MHz band, no matter how small a tuning capacitor was used. It was therefore decided to make a smaller loop; the original 10 ft length made a loop of one metre diameter. A smaller loop of 80 cm would require a length of 8 ft 3 inches to form a 99 inch circumference. To improve efficiency it was decided to use 1 inch diameter tubing, but this introduced a problem about how to bend it into a circle. Enquiries were made to have this work done commercially — one quote of £41 + VAT and another of £86 just for bending the tube into a circle were quickly rejected as it destroyed the idea of a DIY high efficiency magnetic loop at a reasonable cost.

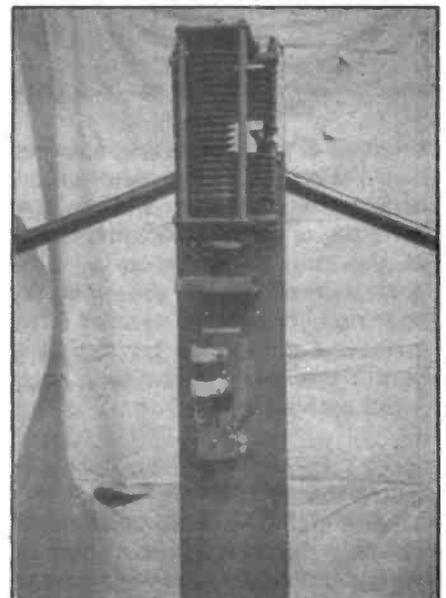
Although a circular loop is the ideal configuration as the area enclosed is directly related to the efficiency, only a small loss would occur if the loop was formed by an octagon shape. An octagon could easily be formed with eight one foot lengths of one inch diameter copper tubing coupled together with seven 45° Yorkshire fittings and using a blow lamp to ensure that the soldered joints were properly formed.

These Yorkshire fittings are already tinned and there is enough

solder in the ridge to form a good joint provided the copper pipe is first cleaned with steel wool. The Yorkshire fittings added three inches to the eight one foot lengths of pipe and this was the actual length required. The ideal loop should be jointless, but it was not possible to bend a one inch copper pipe with the equipment available at home, so the octagon construction was a good second best.

Having finished the actual loop, the next problem was to fit it to the 3 foot by 4 inch piece of timber which was to form the main vertical support. As the centre of the loop is at zero (earth) potential this point could be used to fit a solid metal support; a hole was drilled right through the centre of the Yorkshire fitting which was exactly 180° from the gap at the top in the loop. A length of 2BA screwed rod was then fitted through this hole and clamped in place by nuts and washers, and the rod similarly fixed through the wood, spaced from the wood by the height of the stand-off insulators used to support the ends of the loop.

With the high voltages at the ends of the loop good quality insulators are required for supports, ceramic stand-off insulators were used and a small hole was drilled at



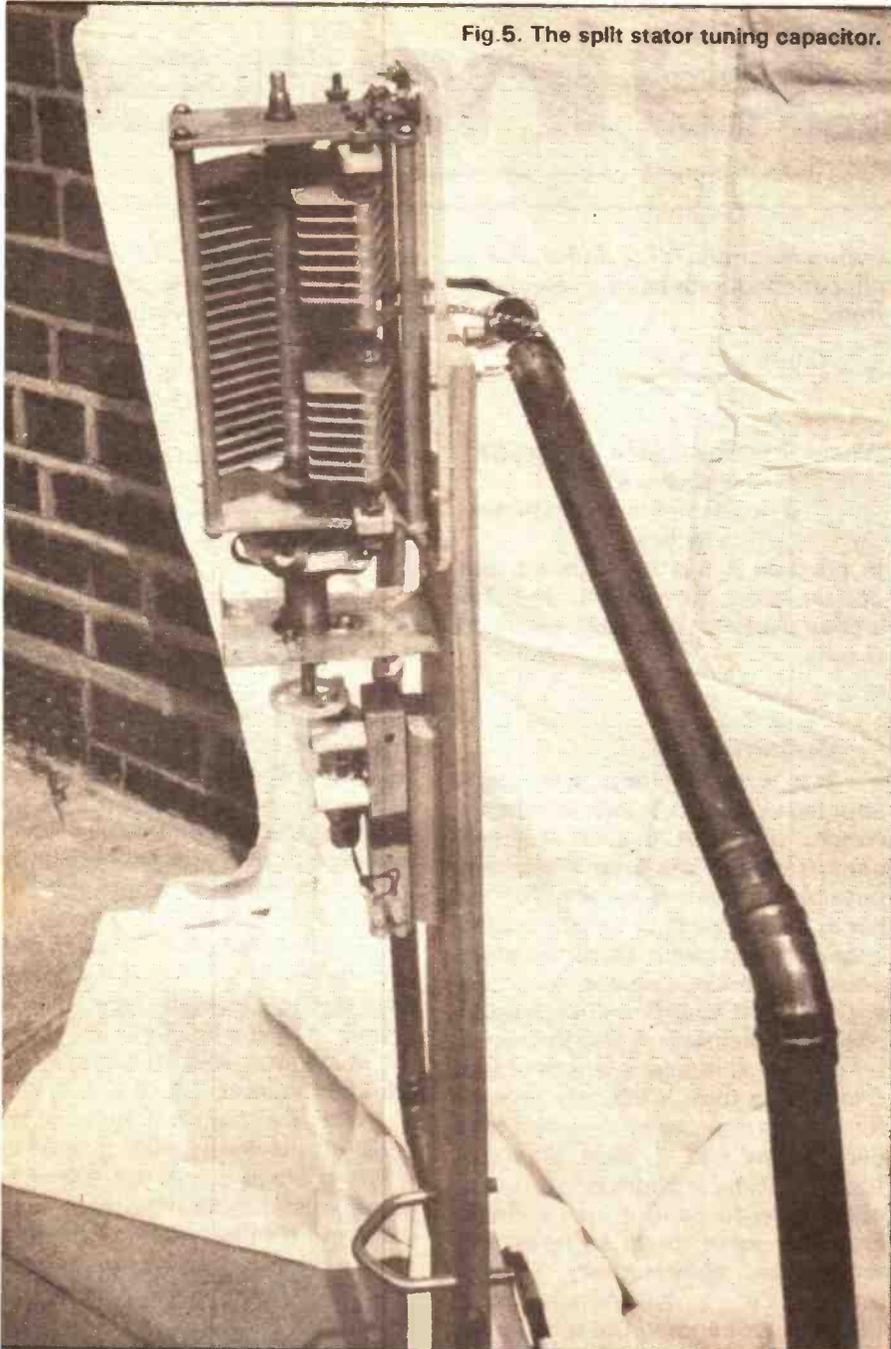


Fig.5. The split stator tuning capacitor.

variable capacitor were tried with a fair degree of success, but it was realised that the wiper contact for the moving vanes must add some resistance which would reduce the Q, and a split stator with the moving vanes unconnected would still provide a variation in capacitance between the ends of the loop and become the means of obtaining resonance.

The split stator capacitor, as well as eliminating the contact resistance introduced by the moving vanes wipers would also double the working voltage so smaller intervane spacing could be used. The slight disadvantage is that the capacitance is halved, but it proved easier to find a split stator with larger capacitance than a wide spaced with small capacitance. The capacitance used by the writer was 150+150pF which proved quite satisfactory.

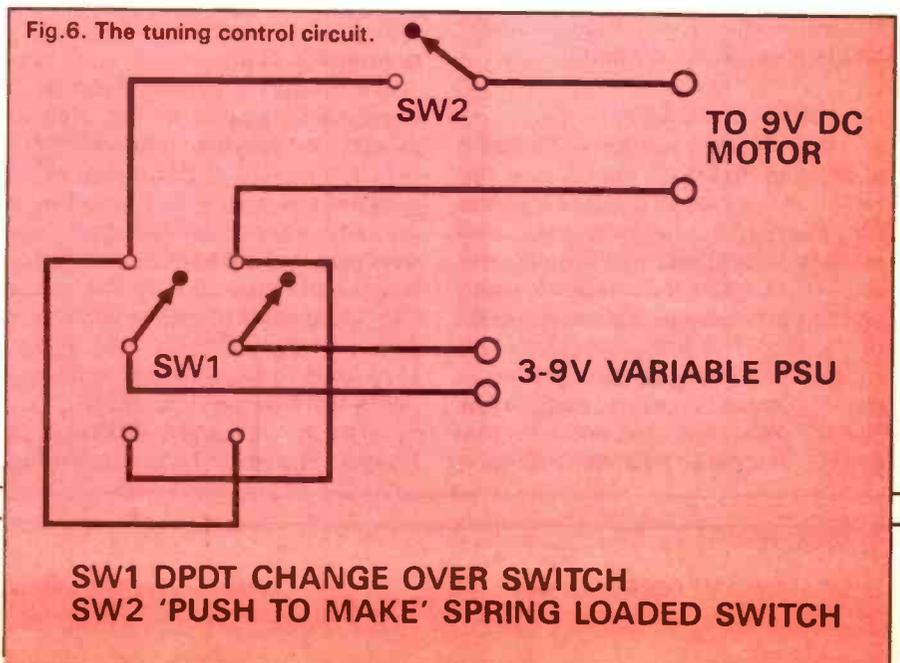
As can be seen from the photographs Fig.5, the split stator tuning capacitor is mounted on the opposite side of the wooden supporting strip, on a piece of 3/8 inch perspex sheet for insulation; this mounting allows for very short leads from the fixed vanes to the ends of the loop. Thick braid is essential for the connections, and the braid used was taken from 1/2 inch coaxial cable. The current flowing in the loop is very high so thick connections are essential.

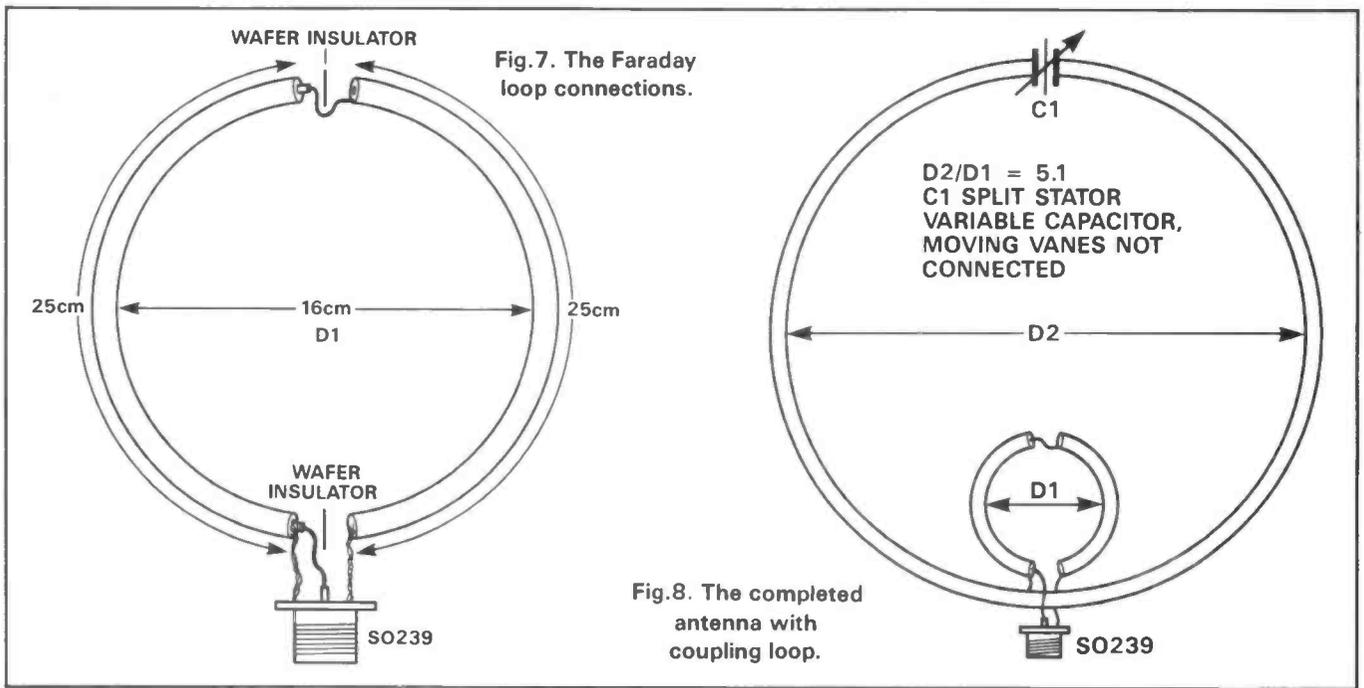
The small DC motor and reduction gearing was next fitted, and as no two loops are likely to be similar in respect to this part of the construction, it must be left to the individual constructor as to how best utilise the available material from the 'junk box'. Suffice it to say, it is best to use a choc-bloc connector for the motor and connecting cables, and a ferrite ring should be fitted each end of the

the ends of the tube which was fitted over the screw of the insulator and secured with a washer and nut. High voltages, up to 6-7000 volts, appear at the ends of the loop, so good quality insulators are essential. The spacing between the centres of the insulators should be 1 1/2 inches to permit the ends of the loop to be fitted without strain.

The Capacitor

A suitable variable capacitor is probably the most difficult component to obtain; several wide spaced





control cable to prevent RF entering equipment in the shack.

Control Unit

The method of tuning control is very simple and consists of a dpdt toggle switch controlling the motor direction and a spring loaded 'push to make' switch to apply power to the motor; the circuit showing connections is shown in Fig.6.

Use the full 9 volts for fast tuning and reduce to 3 volt for fine tuning using the reversing dpdt switch if necessary to obtain minimum vswr.

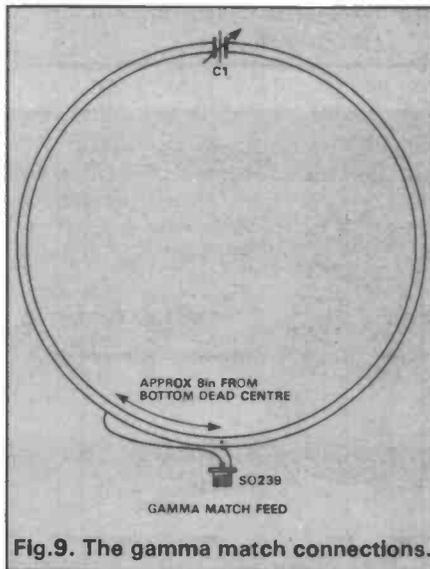
There are three possible methods of matching the coaxial feeder to the antenna — gamma match, Faraday loop and half Faraday loop. All three have been tried and all work with varying degrees of efficiency; the gamma match is simple and certainly works, but proved difficult to obtain a low VSWR on all bands covered by the antenna and the VSWR is certainly affected by objects being moved near to the antenna.

The full Faraday loop is also simple to make and the VSWR adjustment is made by the tightness of the coupling to the antenna, but the distance was very critical and it was almost impossible to obtain a low vswr on all five bands covered by the antenna.

The half Faraday loop was the most difficult to make but proved far superior to the other two methods and was also easy to adjust with a 1:1 VSWR being obtained on all bands

except 21MHz which produced a very acceptable 1.2:1. Various sizes of half Faraday loop were tried and the best had a diameter ratio of 5:1 with the antenna loop.

The half Faraday loop was made from 19.8 inches (50 cm) 1/2 inch diameter coaxial cable cut exactly in half and connected as shown in the diagram Fig.7. It is essential that the braid is NOT connected at the top of the loop, also that the inner conductor of the right hand side of the loop is free at both ends. A small wafer insulator cut from the inner insulation of the coaxial cable is



placed between the joint of each half before clamping together with heat shrink sleeving.

The 50 cm circumference of the half Faraday loop gives a diameter of 16 cm which is a 1:5 ratio of the antenna loop.

Fig.8 shows the theoretical diagram of the complete antenna with the coupling loop.

Gamma Match

Fig.9 shows the gamma match connections; the coaxial braid is soldered to the exact middle of the loop at the bottom (zero potential) and a flexible lead taken from the centre and a crocodile clip fitted to the end of this lead. With the transmitter on low power adjust the tapping point until the lowest vswr is obtained on all bands and then solder the connection to the antenna. The best point will generally be found between 8 and 12 inches from the braid connection. Another method is to use a semi-stiff connector from the coaxial inner conductor, solder it to the antenna about 10 inches from the braid connection, and adjust the VSWR by moving the semi-stiff connector to and away from, the antenna.

With the components I used the loop covered 10,12,15,17 and 20 metre bands when coupled to the transceiver via a length of 50 ohm coaxial cable and a suitable vswr meter. With the transceiver on receive in the 21MHz band, tune the loop by rotating the split stator capacitor via the remote control unit, until a very sharp rise in band noise is

heard, indicating resonance. Switch to transmit and on low power rotate the tuning capacitor either side of resonance until minimum VSWR position is located. It is advisable to use the low voltage (3 volt) to the DC motor for this fine tuning operation. With a little practice it is easy to reverse motor direction and touch the 'push to make' switch to find the position of lowest vswr.

At this point it is necessary to adjust the coupling between the half Faraday loop and the antenna and making small adjustments to the tuning of the loop, until the best minimum vswr is obtained. Check on the other bands covered by the loop and if necessary readjust the tightness of coupling. It is well worth while spending some time on these adjustments to ensure that the antenna works as efficiently as possible.

The Q factor of a correctly coupled and tuned Magnetic Loop is very high and this results in a narrow bandwidth — something in the order of 12-20Hz, consequently the antenna requires retuning each time the transceiver is tuned outside the bandwidth. The higher Q factor the narrower the bandwidth; so do not worry if you have a narrow bandwidth, it indicates a very high Q.

With my magnetic loop a vswr of 1:1 was obtained on all bands except 21MHz which produced an acceptable 1.2:1.

Results

Using the antenna indoors on a rotator fixed to the stair rail on the upstairs landing, it was found that better all round results were obtained with the plane of the antenna in an east-west direction, so it was removed from the rotator and fixed onto a piece of kitchen worktop (a cut-out from fitting a hob) with an aluminium right angle bracket screwed to the magnetic loop wood support. The loft space would be ideal to locate this antenna, but unfortunately my QTH the trap door is too small to allow the magnetic loop to pass, so it finally ended up standing on a bed in an unused bedroom.

In this position, lined up east-west, all continents have been worked, VK,ZL,JA,LU,ZS with mini-

The author with his octagonal loop and bed sheet, giving an idea of the size.

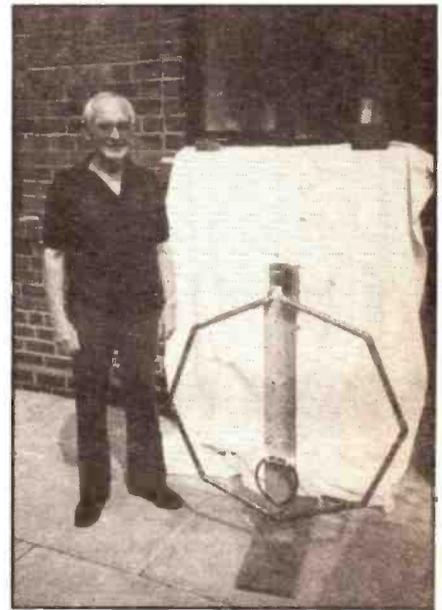
mum reports of RST 549, W and VE with minimum reports of RST 569 and most European countries, together with east Russia, the general RST is 599 when using a Kenwood TS830s.

An additional bonus is the low background noise which enables weak signals to be read more easily.

Several excellent ssb contacts have been made with stations in W4-9, VE2-5 and several Russians. SSB tests were made to ensure that the narrow bandwidth did not affect the quality of a phone signal.

Features of the Magnetic Loop

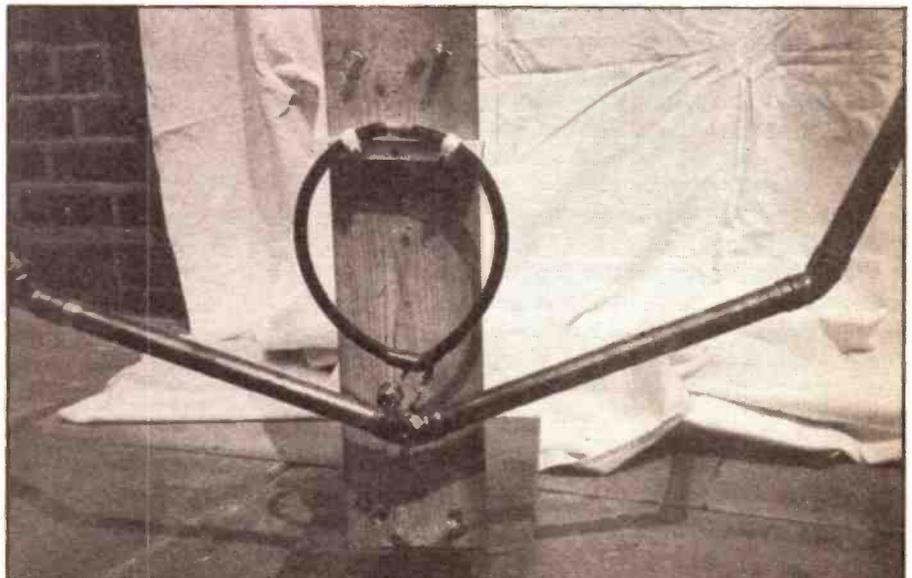
1. Physically very small and ideal for flats or houses without gardens or garden space.
2. Performance equal to a dipole.
3. Very high Q.
4. Very low radiation resistance.
5. Narrow bandwidth
6. Low background noise.
7. Operates at ground level.
8. Does not require a rotator.
9. Does not need an ATU.
10. No static charge build up and protected (apart from a direct strike) from lightning as loop is always electrically grounded.



Tight Space

The magnetic loop is an excellent antenna and ideal for all who lack space for a conventional antenna or beam. Using the magnetic loop indoors show that excellent results world wide can be obtained. No tv problems have arisen, maybe because neighbours cannot see any evidence of a transmitting antenna!, and it certainly does not introduce any tv into a television working in a room immediately below the location of the loop.

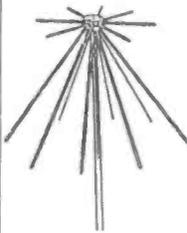
The total cost of my loop was less than £30 plus many hours of enjoyable experimental work, but the net result is an antenna ideally suited for my QTH and all others with restricted space.



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The UK's favourite disccone composed of traditional British quality engineering.

The REVCONE works well without exaggerated advertising claims. It is designed to cover 50 to 500MHz, and thousands of satisfied users will testify to its efficiency. Unlike some manufacturers we do not claim a wider frequency coverage, and we do not quote inflated figures for gain. A gain figure is meaningless unless the reference point is stated.

Optional vertical whip feature: It is possible to fit a vertical whip section to a disccone. We do not want to give you the "hard sell" where this vertical element is concerned, but there is some evidence that it may improve the performance of the antenna around the resonant frequency of the whip. That's why we make it an optional feature.

Another option is the N-type connector instead of the popular SO239. N-types give a better UHF performance, but they cost a bit more. The choice is yours.

Because the REVCONE is British-made by a Company which has been in business for 30 years, you buy with confidence, knowing that there is back-up should anything go wrong.

RADAC



This Wide-band antenna offers an interesting alternative to the disccone. It is simply an array of dipoles, but the clever bit involves arranging the dipoles to maximise bandwidth and minimise interaction. The RADAC can be set up for a range of frequencies from 27MHz to 500 MHz, and because very good impedance matches can be obtained the user can specify any six frequency bands in this range for optimised performance, either for receiving, or more usefully, for transmitting. For example, all the Amateur Bands from 10M to 70CM can be covered in one antenna. If you are in the PMR business, the RADAC can be customised for your needs. Aircraft listening enthusiasts can specify VHF & UHF Airband coverage.

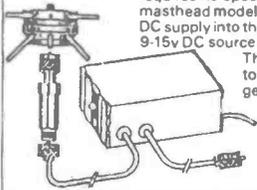
What a versatile antenna! Design and engineering excellence from REVCO!

WIDE-BAND PRE-AMPLIFIERS

The problem with omni-directional wide-band antennas is their lack of gain.

The REVCO PA3 range of wide-band pre-amplifiers complement the antennas and compensate for their shortcomings.

The basic specification of the products is similar: coverage 20MHz-1GHz, at 1GHz: minimum gain 13dB, noise factor 5.5dB. Choose from a mast-head version (PA3) or a standard die-cast box style (PA3I). Best results are normally obtained from the masthead model which gives a boost to weak signals which would otherwise have been lost in the feeder cable. Also feeder cable noise is not amplified which is the case if the amplifier is mounted at the base of the feeder. On the other hand, the die-cast box version requires no special installation and is readily taken out of circuit. The masthead model is supplied with a special power unit which feeds the DC supply into the antenna feeder. No PSU is provided for the PA3I as any 9-15V DC source is suitable (current requirement about 25mA).



The PA3I finds application in instrument work, e.g. input to spectrum analysers, boosting the output from signal generators to give a low-power Tx.

The standard version of the PA3I has BNC sockets and is designated "PA3I/B"; available to special order N-type sockets ("PA3I/N") or SO239 ("PA3I/S").

A special feature of the PA3 series is a high-pass filter to attenuate frequencies below 20MHz; high-power HF & MF broadcast stations can be very troublesome!

ON-GLASS ANTENNAS

This type of antenna mount has been around for a long time, but they are very difficult to produce successfully at VHF. The Cellular Radio Industry has popularised the glass-mount, but there are fewer design problems at 900MHz, because the coupling assemblies are small. REVCO's extensive experience in making the UK's best Cellular On-glass has led to the production of superior quality VHF and UHF models. Here are a few facts which you should know:

Coupling efficiency: apart from the question of effective power transfer to the outside world, you don't want too much RF floating around inside the car, do you? Not health for vehicle electronic systems, and possibly not good for humans either. REVCO glass mounts feature very efficient power transfer.

Sticking power: no good if they fall off half way home. A properly installed REVCO stays on. Should you change your car, a refit kit is available.

Simplicity: Some of the competition has a multitude of loose components: the REVCO has 2 pre-assembled parts: inside and outside. What could be simpler?

Weather-resistance: REVCO antennas are made from corrosion resistant materials so you can leave them out in the rain with confidence. It is not necessary to plaster the product with silicone rubber to keep the water out.

The REVCO glass mounts do cost a bit more, which reflects these superior features.

REVCO also make a full range of mobile antennas for frequencies from 27MHz to 950MHz, and new products are constantly under development. Contact your local Dealer or in case of difficulty write, phone or fax. Trade enquiries welcome.

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VISA — VISA AND ACCESS WELCOME —



The TS-950 has Landed!



On September 10th, Kenwood dealers throughout the UK centred on a hotel in Derbyshire for a 'secret unveiling' by Lowe Electronics, the

from Japan especially for the occasion. After a well produced video presentation, the velvet cover was lifted from the transceiver, and there was almost a rush to be the first to try it out!

The set is a top-of-the-range HF band multimode transceiver, giving coverage of all amateur bands together with general receive coverage over 100kHz-30MHz, with the major feature of twin frequency reception. By the use of twin IF stages, it can simultaneously monitor two frequencies anywhere within 500kHz of each other, great for split frequency DX working or keeping an ear open



Mr. Naguro (left) and Mr. Fujii (right) with the new transceiver.

The HRT review team gets an exclusive preview of the new Kenwood flagship.



Mr. Fujii goes for the screwdriver.

appointed sole UK Kenwood distributors. The transceiver featured was the new Kenwood HF flagship, the TS-950, and HRT were honoured to be the sole representatives of the UK amateur press. Mr Naguro (Kenwood European Sales) and Mr Fujii (the TS-950 design team leader) flew over

for a station while listening to another QSO. This is quite different to the usual 'twin VFO' system, where you can switch between the frequencies anywhere in the tuning range but you can't listen to both simultaneously.

The other major new feature is the digital signal processor, which digitally tailors the bandwidth of received and transmitted signals to provide improvements to the general readability as well as carrier and unwanted sideband suppression on SSB, together with the digital shaping of CW signals to avoid key clicks. As well as this, a wide range of IF filters are available for bandwidth selection as well as SSB IF slope and CW variable bandpass tuning facilities. The receiver performance is claimed to have an interference free dynamic range of 105dB with an intercept point of greater than +20dBm.

The front panel of the transceiver gives an idea of the numerous functions provided, too many to mention here, but as a guide even the front panel multi-segment meter can give you simultaneous indications of power, SWR, and ALC while you talk into the microphone (I haven't got three eyes!).

However, not content with seeing an impressive front panel, after a suitable pause in true HRT fashion we asked 'who's got a screwdriver?' Mr Fujii immediately bowed to our wishes, disassembling the transceiver himself to let us see what really was under the covers. It was certainly impressive, and must have been Kenwood's best kept secret for quite a long time!

Coming Soon

We left with the promise of an exclusive sample for review, another UK first for HRT, which you'll see in these pages soon as well as on display at the Leicester Amateur Radio Rally. If you're itching to part with your money already, then £3,199 will get you one of the first models when supplies become available around December this year.



The heavy duty PA heatsink is fitted internally.

REVIEW: Alinco D

We tested Alinco's first ever dual band mobile, the ALD-24E, in HRT some time ago, but the time has come now for its successor, the DR-510E. Alinco have also chosen to introduce their first dual band portable the DJ-500E, and in keeping with our reputation HRT were granted the opportunity to be the first ever UK magazine to run them through their paces.

The DR-510E Mobile.

For £549, the rig provides a more cost effective purchase than separate transceivers for 2m and 70cm, as well as a compact mobile installation without the



simultaneously receiving on the other. But it is not, however, two rigs in one, unlike the current (and more expensive) dual-band rigs from the 'big three' Japanese

its predecessor which had a back-lit led, the DR-510E uses a multi-colour transmissive led which gives a very clear and readable display, very important in a mobile (looking down at a mobile rig display for several seconds, rather than at the road, is considerably more dangerous than using a mobile fist mic, for those who think hands-free mics are the answer to everything).

The led and function key buttons are lit for night use, each button also having a small illuminated segment for easy location.

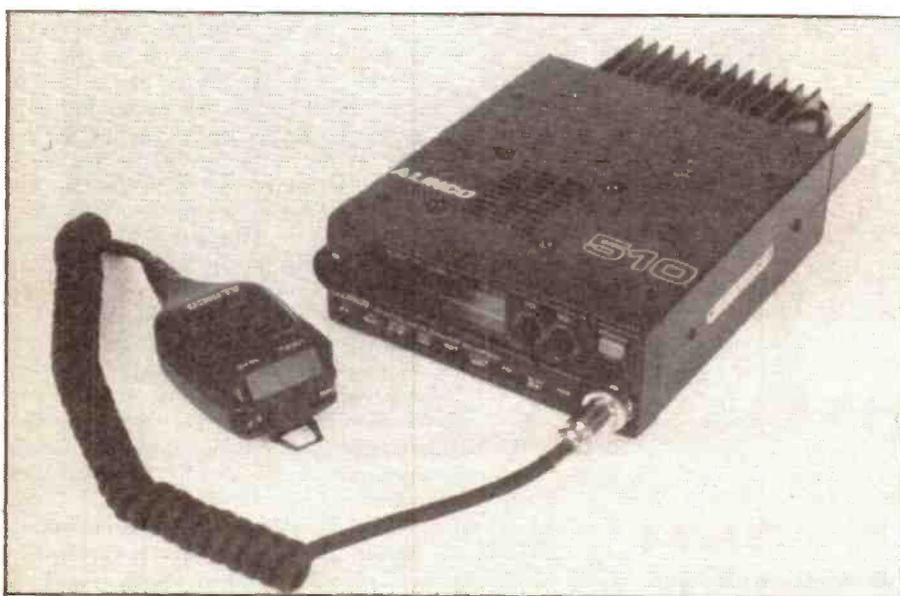
Mobile or portable, the HRT Review Team find that the new dual banders from Alinco give a good account for a modest bank account.

Memories

14 memory channels are available, 1-9 and A-E, each able to store the frequency, any transmit repeater offset programmed, and the receive frequency for dual band Tx/Rx operation. Memory channels A and B are used to store the frequency limits for a programmed VFO scan, and memory channel D stores the transmit frequency used for any programmed 'odd' offset. An internal lithium battery with a 5-year lifetime retains memory information while the radio is switched off.

Scanning

In Memory mode, pressing the Scan button starts the set searching through each memory channel in turn, looking for signals and halting on any which raise the receiver squelch. If you want to lock out busy channels, this may be done by a two-button press. In this mode you can still manually select the channel by using the rotary tuning knob or the microphone Up/Down buttons but enjoy quiet bliss while searching for other activity. In tunable VFO mode, a press of the Scan key will initiate a search of the pre-programmed frequency range in memory channels A and B in the selected tuning steps. If you program the same frequency into these channels, then the VFO scan facility acts instead as a complete band



need for an external duplexer for dual-band mobile whip use. The set gives a specified 45W output on 2m and 35W on 70cm to reach those distant repeaters, with a low power setting of 5W on each band if required for local use. Measuring a reasonably compact 14 by 50 by 205mm it should fit into many of today's cars with their ever-decreasing dashboard space.

It allows you to operate cross-band duplex by transmitting on one band while

manufacturers, and it can't receive on one band while you're having a QSO on the other, but some amateurs could find the latter a bit much while mobiling anyway.

Frequencies

The normal frequency coverage is 144-146MHz and 430-440MHz in selectable 5, 10, 12.5, 15, 20 or 25kHz steps, and the suppliers also offer extra receive coverage on both bands if required. Unlike

DR500 and DR510

scan on either VHF or UHF to let you know what's happening everywhere for those who like to know.

If you like to keep an eye on just one frequency for a pre-arranged call while listening elsewhere, then a 'priority' scan mode on the set checks a selected VFO frequency or Memory channel for one second out of every six, allowing you to lock onto it when activity appears.

In Use

Not surprisingly, the set was very similar in operation to the 2m Alinco DR-110E recently tested, hence the usual study of the operating manual wasn't needed apart from the odd check on band changing operations. I found the set extremely easy to use while mobile, the display easily read with a quick glance,



and the often-used 1750Hz repeater Tone and channel Scan buttons were sensibly located for quick operation by feel alone. The receiver volume, squelch and main tuning knobs were sensibly positioned, although I found the microphone Up/Down buttons easier when attempting a QSY.

Unfortunately I found the limit of 14 memory channels nowhere near enough to store all the 2m and 70cm frequencies I would have liked. Instead I resigned myself to switching between the VFO and memory channels when driving away from the local areas which used different repeater channels to those I had stored in the memories. The audio from the internal speaker was always sufficient without an

external speaker even though the audio was a bit 'topy' I still found it readable even when travelling at speed. Reports on my transmitted audio were quite good, but surprisingly I found that talking too close to the microphone did bring in the odd report of distortion on my signal.

Home Use

Used in the shack, the receiver held its own with few problems from other nearby strong signals, the rejection of 12.5kHz spaced signals on both 2m and 70cm (from the primary band users on the latter) being very good indeed. Using the set on packet radio showed good performance, but I did have to set the TX audio output level from my TNC carefully to prevent too much deviation (which brought about a high level of retries).

Once set, the transceiver functioned very well with a fast squelch rise time giving good reception of even weak packets. I had to take the receiver audio output from the rear panel earphone jack as the set did not have the usual facility of low-level receive audio from the microphone connector, but this presented little problem in practice (users who like to monitor received packets would need to connect an external speaker or dive inside the set).

DJ-500E Portable

Does the long awaited dual-band portable from Alinco live up to Alinco's reputation of sensible, cost-effective transceivers, we wondered? The tall slim

box revealed a tall slim rig and the nicad charger supplied was quickly plugged into a shaver socket adaptor to give the set its very first charge.

At £375 it is certainly cheaper than some dual band portables (although as with the DR-510E it does not have the simultaneous 2m/70cm receive capability of its more expensive competitors), and from listening around the set has certainly stirred interest amongst amateurs looking for an inside pocket companion — partners take note as Christmas is coming!

While the nicad was charging, inspection of the supplied operating manual revealed a 2.5W transmit output on 2m and 2.0W on 70cm using the supplied 700mAh 7.2V nicad. An optional larger 12V battery allows the set's transmitter to give 6W on 2m, 5W on 70cm to reach that bit further. A DC/DC converter is also built in to the battery packs allowing an external 12V supply to be plugged in to conserve battery life.

Knobs and Buttons

Top panel mounted volume and squelch controls are fitted alongside push buttons for the lcd backlight, 1750Hz tone transmit, high/low transmit power selection (with 450mW low power on each band), squelch defeat, and a 10dB receiver attenuator. A single jack socket lets you plug in an optional speaker/microphone, and the supplied dual band portable whip fits to a BNC aerial connector which also lets you connect an external aerial for home or mobile use. The front panel of the set sports a large lcd panel which shows you what's happening on the set as well as providing a sectioned S-meter and transmit output bar-graph indicator. This display can be backlit for night time use. Below the display are five rubberised rocker switches which control most of the functions, together with a Function bar above the side mounted PTT bar. Below these is the numeric keypad to enter frequencies directly as well as change between memory and VFO modes; this can act as a dtmf sequence memory keypad in transmit mode.

Frequencies

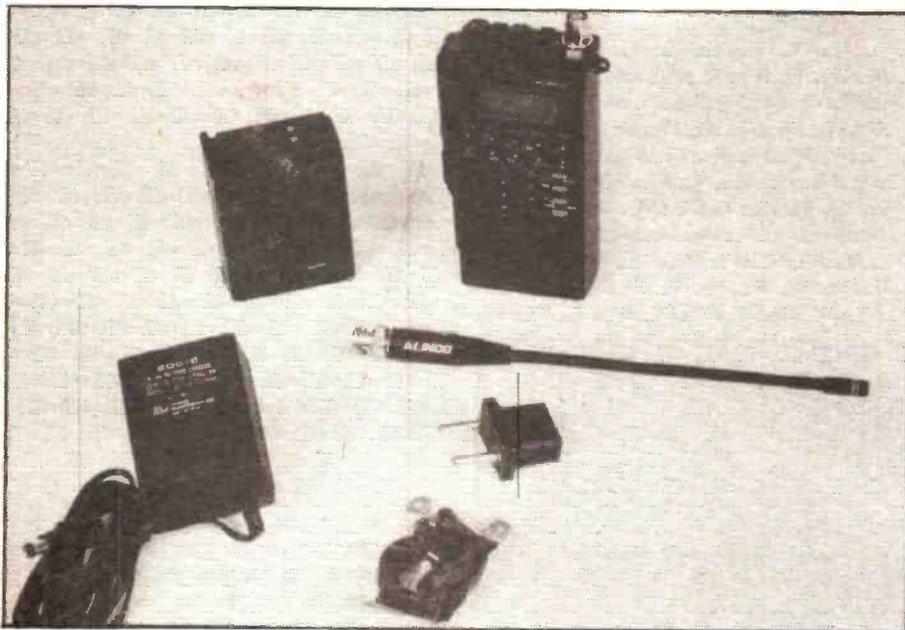
As with the DR-510E mobile, the set transceives over the standard 2m and 70cm bands, with extended coverage on receive added by the suppliers if required for scanner enthusiasts. This allows the set to cover 130-170MHz, 420-470MHz,

340-380MHz and 870-900MHz on receive, quite an extensive range. The front panel buttons may be used to step the indicated frequency up or down in 1MHz, 100kHz, and finally selected 5/10/12.5/20/25kHz step increments. Adjacent buttons toggle between VHF and UHF frequencies, and step the 10 memory channels provided on each band up and down for manual selection. 'Second Function' modes are also available from these buttons together with the Function key, in which the set may be commanded to operate split band transceiver in full duplex, check the selected repeater input frequency ('Reverse repeater'), set the

two-pin adaptor), and an instruction manual. Other accessories mentioned are a soft protective carrying case, a plug-in speaker microphone, car cigar lighter power cord, and various nicad battery packs. With the supplied battery the set is 200 by 63 by 30mm.

In Use

Switching the set on showed it to be reasonably sensitive on both 2m and 70cm, and plugging in an external aerial gave several QSOs through my semi-local 2m and 70cm repeaters. After a nicad charge the set was taken out and about,



transmit repeater shift for each band, lock memory channels, switch the keypad bleep on or off, and switch in a VHF/UHF alternate memory channel check facility.

Tunable Memories

The apparent limitation of 10 memory channels on each band is offset to a certain degree as every memory acts as a separate VFO. For instance, you may use Channel 1 for 70cm repeaters, Channel 2 for 2m repeaters, Channel 3 for 2m simplex and so on (no doubt users of the extended receive coverage versions will think of other uses). Any number of these channels may be 'locked' to prevent an accidental QSY, likewise the keypad itself may be locked by the use of side mounted slide switch.

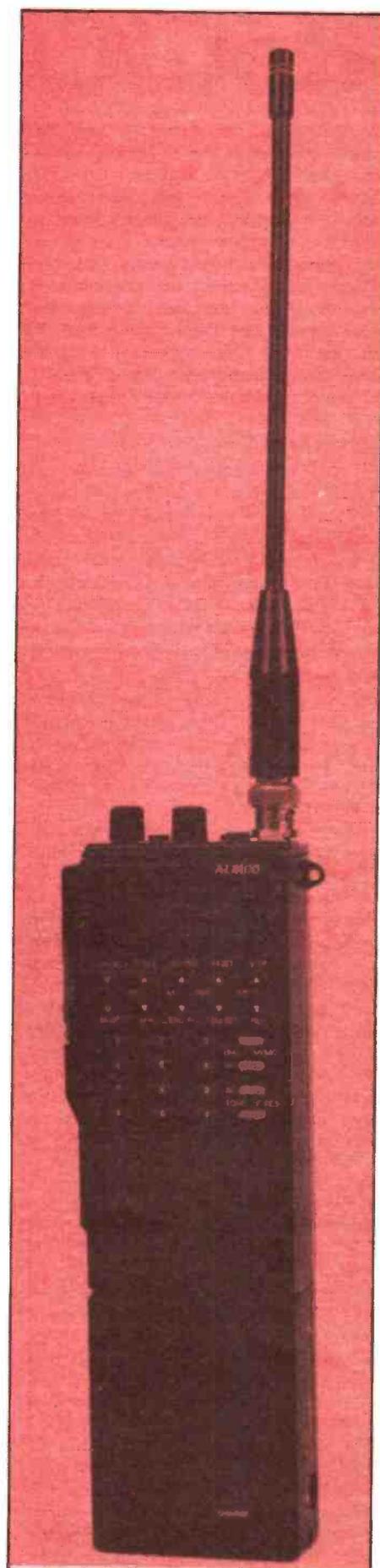
A receive economiser (automatic battery save, or ABS) is provided which alternately switches the receiver circuitry on and off in the absence of signals to reduce the battery drain. This can be defeated if required by a further 'second function' operation.

Together with the 7.2V nicad and set top aerial, the set comes with a belt clip, a small plug-in mains charger (American flat pin type with a supplied European thin

fitting in my hand very comfortably, and I could easily hold and operate it in the same hand by just using my thumb to operate the various up/down buttons. However, it wasn't very long until I found a problem — the set has no automatic scan facility apart from an alternate 2m channel/70cm channel check every six seconds, ie 3 seconds on each. Ah well, never mind, not all users would want channel scan facilities but I did find it a disappointment especially given the wide frequency range available.

Having said that, for normal portable use I usually left the set monitoring the local 2m chat channel with the local 70cm repeater on 'dual channel scan', switching manually to my semi-local 2m repeater when required, and didn't find it too hard to live with! The slim set slipped nicely into my inside jacket pocket without a bulge, and as with other small portables I found it a very handy companion when out and about.

Reports on my transmitted audio were fairly good, but I found the receive audio from the front panel speaker to be rather 'nasal' although quite readable. Going portable at night, I found the lcd illumination excellent, but unfortunately



the operating controls weren't lit. However using the up/down keys by touch alone was reasonably easy, after a little practice.

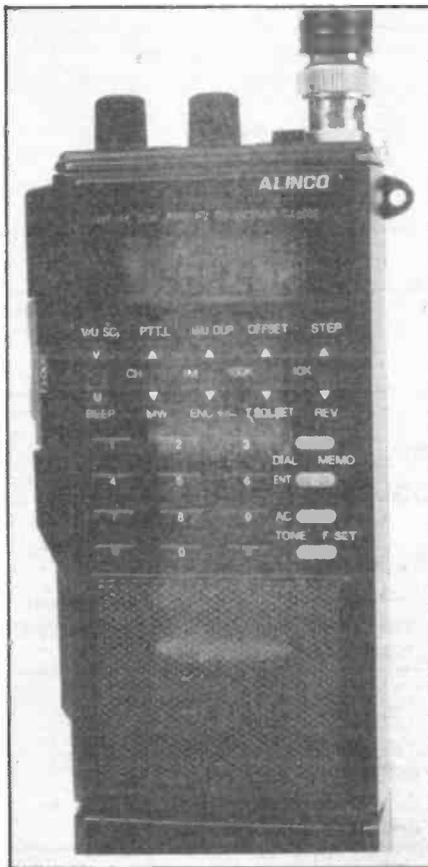
At home I found the set did occasionally suffer desensitisation from another local 2m signal source, however, switching in the 10dB attenuator helped prevent this when receiving moderately strong signals. I must say this attenuator facility is a nice touch on a portable set when occasional use at home, or in other strong signal areas such as mobile rallies, is required. I found little problem operating at home on 25kHz spacings, but the rejection of a 12.5kHz separated signal on 70cm (from the primary band users) in the middle of a repeater section was rather poor, and I found the selectivity here asymmetrical, quite good 12.5kHz HF of the signal but poor 12.5kHz LF of it, suggesting something was a little off frequency in the set.

Laboratory Tests

First, the DR-510E mobile. Overall, the receiver performance was quite good; the 2m intermodulation rejection wasn't too fantastic but the excellent 12.5kHz off-channel rejection on 2m certainly made up for this. The latter should allow the set's receiver to cope admirably in areas where this spacing is generally used. The S-meter was little more than useless, having a dynamic range of less than 10dB. This unfortunately is a very common failing in many FM-only transceivers where the S-meter can be considered little more than a 'busy' led.

On transmit, the harmonic levels were very well suppressed showing good filtering; no doubt the built-in duplex filter helps here. Even with the SO-239 aerial socket as fitted for both 2m and 70cm, a good level of output power was measured; the 70cm power surprisingly increased somewhat as the frequency went up. The low power level was correctly set at near to the 5W level in each case, and the frequency accuracy on both 2m and 70cm was quite good. The transmit deviation on both 2m and 70cm however was too high, and would need adjusting for instance in busy 2m areas to prevent interference to other stations operating 12.5kHz away.

As for the DR-500E portable, the receiver performance on 2m was very good for a portable, on 70cm less good but still reasonable. Most portables would not be expected to have the same strong signal handling performance as that of a larger dedicated mobile or base set, but the 10dB attenuator fitted to the DR-500E could prove useful if problems do arise when already receiving a moderately strong wanted signal. As found on air, the 12.5kHz rejection on 70cm was asymmetric, but this was probably due to the receiver being around three-quarters of a



kHz off frequency as was the transmitter. As with the mobile, the dynamic range of the S-meter was very limited, little use for radio foxhunts and the like. The transmit power on both bands was measured around the 2.25W level across the band, and the deviation was accurately set at just below the absolute maximum 5kHz mark.

Overall Conclusions

Alinco are keeping up their reputation of offering good performance at a cost-effective price, although the facilities in terms of the number of memory channels, and the absence of dual-frequency receive and optional sub-tone fitment reflect the lower price. Many potential users don't want all these, and here the Alinco pair could be just the thing for their next rig, or as an upgrade from a 2m only transceiver to allow the new pastures of 70cm to be reached at an affordable price. Both transceivers were very easy to use on the move by just switching between memory channels, with comprehensive display of the mobile being particularly good.

The facility of optional extended receiver frequency coverage could be of interest to the scanner enthusiasts, but the absence of a scan facility on the portable could limit this a little. Beware you don't fall foul of the law in what you listen to though, some authorities quite

rightly take a very dim view to people openly monitoring certain UHF frequencies, with at least one rig confiscation to my knowledge as a result!

Our thanks to go Waters and Stanton Electronics for the loan of the transceivers for review.

Laboratory Results

DR-500E Portable

Receiver:

Sensitivity: Input level required to give 12dB SINAD:

144MHz:	0.16µV pd
145MHz:	0.16µV pd
146MHz:	0.16µV pd
430MHz:	0.18µV pd
435MHz:	0.19µV pd
440MHz:	0.19µV 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	17.6dB	48.6dB
- 12.5kHz	38.6dB	7.2dB
+ 25kHz	67.2dB	56.5dB
- 25kHz	68.2dB	55.5dB

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

	145MHz	435MHz
+ 100kHz:	80.6dB	73.2dB
+ 1MHz:	90.0dB	82.1dB
+ 10MHz:	92.4dB	86.3dB

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

145MHz	435MHz
67.6dB	57.1dB

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
78.0dB	64.0dB

S-Meter Linearity:

Indication	145MHz	435MHz
S1	0.71 μ V pd (-7.9dB)	0.98 μ V pd (-7.3dB)
S3	0.93 μ V pd (-5.5dB)	1.32 μ V pd (-4.8dB)
S5	1.32 μ V pd (-2.5dB)	1.65 μ V pd (-3.8dB)
S7	1.51 μ V pd (-1.3dB)	1.97 μ V pd (-1.3dB)
S9	1.75 μ V pd (0dB ref)	2.27 μ V pd (0dB ref)
S9+	2.09 μ V pd (+1.5dB)	2.86 μ V pd (+2.0dB)

Squelch Sensitivity:

	145MHz	436MHz
Threshold:	0.12 μ V pd (8dB SINAD)	0.15 μ V pd (8dB SINAD)
Maximum:	0.23 μ V pd (20dB SINAD)	0.26 μ V pd (20dB SINAD)

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:	76.1dB	80.8dB
+ 1MHz:	94.5dB	85.4dB
+ 10MHz:	97.7dB	98.7dB

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

	145MHz	435MHz
	65.0dB	66.0dB

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
	78.0dB	87.0dB

Transmitter

TX Power Output measured using fully charged standard 7.2V nicad pack:

Freq MHz	Setting	Power
144MHz	High	2.26W
	Low	440mW
145MHz	High	2.27W
	Low	460mW
146MHz	High	2.27W
	Low	470mW
430MHz	High	2.30W
	Low	250mW
435MHz	High	2.26W
	Low	300mW
440MHz	High	2.14W
	Low	300mW

Frequency Accuracy:

145MHz	- 230Hz
435MHz	- 740Hz

Peak Deviation:

145MHz	4.80kHz
435MHz	4.92kHz

Toneburst Deviation:

145MHz	3.86kHz
436MHz	3.50kHz

Harmonics/Spurii:

	145MHz	435MHz
2nd Harmonic:	78dBc	- 73dBc
3rd Harmonic:	-69dBc	-64dBc
4th Harmonic:	-86dBc	-65dBc
5th Harmonic:	-88dBc	-
6th Harmonic:	<-90dBc	-

DR-510E Mobile**Receiver:**

Sensitivity: Input level required to give 12dB SINAD:

144MHz:	0.15 μ V pd
145MHz:	0.15 μ V pd
146MHz:	0.15 μ V pd
430MHz:	0.16 μ V pd
435MHz:	0.17 μ V pd
440MHz:	0.19 μ V pd

Squelch Sensitivity:

	145MHz	436MHz
Threshold:	<0.06 μ V pd (<2dB SINAD)	<0.06 μ V pd (<2dB SINAD)
Maximum:	0.25 μ V pd (18dB SINAD)	0.32 μ V pd (18dB SINAD)

S-Meter Linearity:

Indication	145MHz	435MHz
S1	0.66 μ V pd (-7.8dB)	0.75 μ V pd (-7.3dB)
S3	0.83 μ V pd (-5.7dB)	1.04 μ V pd (-4.9dB)
S5	1.05 μ V pd (-3.6dB)	1.21 μ V pd (-3.7dB)
S7	1.28 μ V pd (-2.0dB)	1.42 μ V pd (-2.3dB)
S9	1.60 μ V pd (0dB ref)	1.83 μ V pd (0dB ref)
S9+	1.83 μ V pd (+1.2dB)	2.14 μ V pd (+1.4dB)
S9++	2.05 μ V pd (+0.9dB)	2.68 μ V pd (+1.9dB)

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:

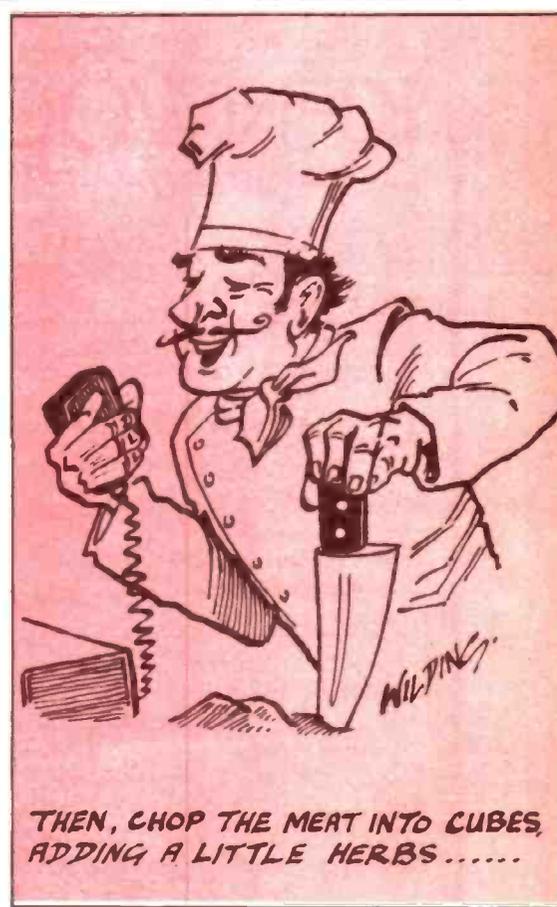
	145MHz	435MHz
+ 12.5kHz	60.7dB	47.1dB
- 12.5kHz	56.7dB	32.2dB
+ 25kHz	74.1dB	59.0dB
- 25kHz	74.1dB	59.6dB

Harmonics/Spurii:

	145Mhz	435MHz
2nd Harmonic:	-80dBc	-69dBc
3rd Harmonic:	<-90dBc	-84dBc
4th Harmonic:	<-90dBc	-82dBc
5th Harmonic:	-86dBc	-
6th Harmonic:	<-90dBc	-

Transmitter

TX Power Output measured using 13.8V DC supply:			Peak Deviation:	
Freq MHz	Setting	Power	145MHz	5.84kHz
144MHz	High	44.0W	435MHz	5.54kHz
	Low	4.70W		
145MHz	High	45.1W	Toneburst Deviation:	
	Low	4.81W	145MHz	3.56kHz
146MHz	High	46.2W	436MHz	3.68kHz
	Low	5.04W		
430MHz	High	30.2W	Frequency Accuracy:	
	Low	5.15W	145MHz	-100Hz
435MHz	High	38.1W	435MHz	-350Hz
	Low	5.19W		
440MHz	High	39.1W		
	Low	4.65W		



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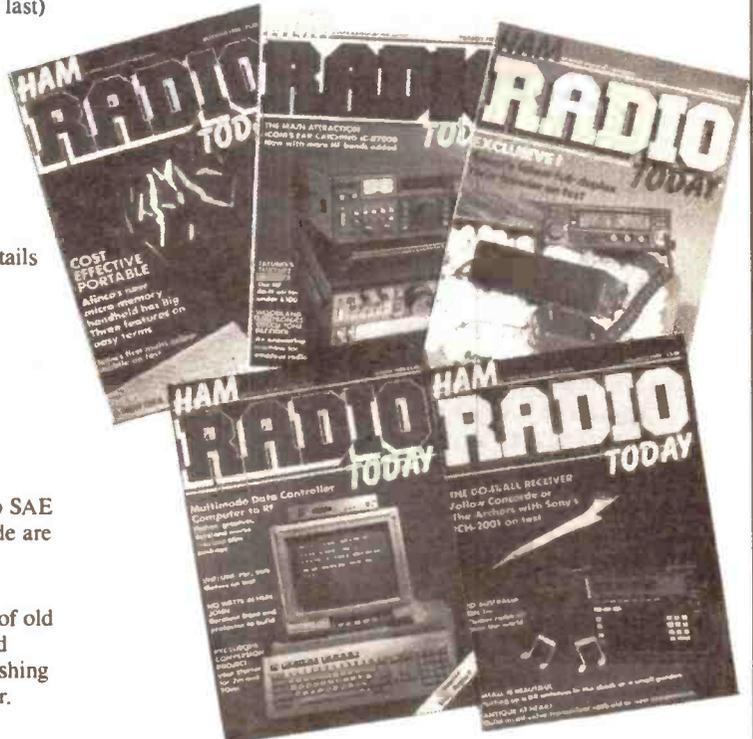
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The Wierdes

I'd recently converted a cheap and nasty bit of PMR to seventy cms to replace a decent rig that had been stolen from my van. Although the rig was insured, I was determined that there was going to be nothing of value in there to be stolen again. The problem was, no tone burst. I was absently flicking through the big box of totally useless crystals that every amateur collects, hoping to find something divisible by a reasonable number to give 1750Hz, when I noticed the growing piles of crystals

The Idea

We all know how a superhet works: you beat a local oscillator with the incoming signal to get your IF, it's called heterodyning. My idea was to build two identical RF oscillators using two identical crystals, one padded down the required 1750Hz below the other, and mix them together to produce the wanted audio tone. The big advantage is that it is the difference that is important to us, so that the end product (our tone) is extremely stable. Think about it:

main the same, so no drift even if it drifts! In practice, the results were startling. No detectable drift was measurable between -20 and $+60^{\circ}\text{C}$.

The Practice

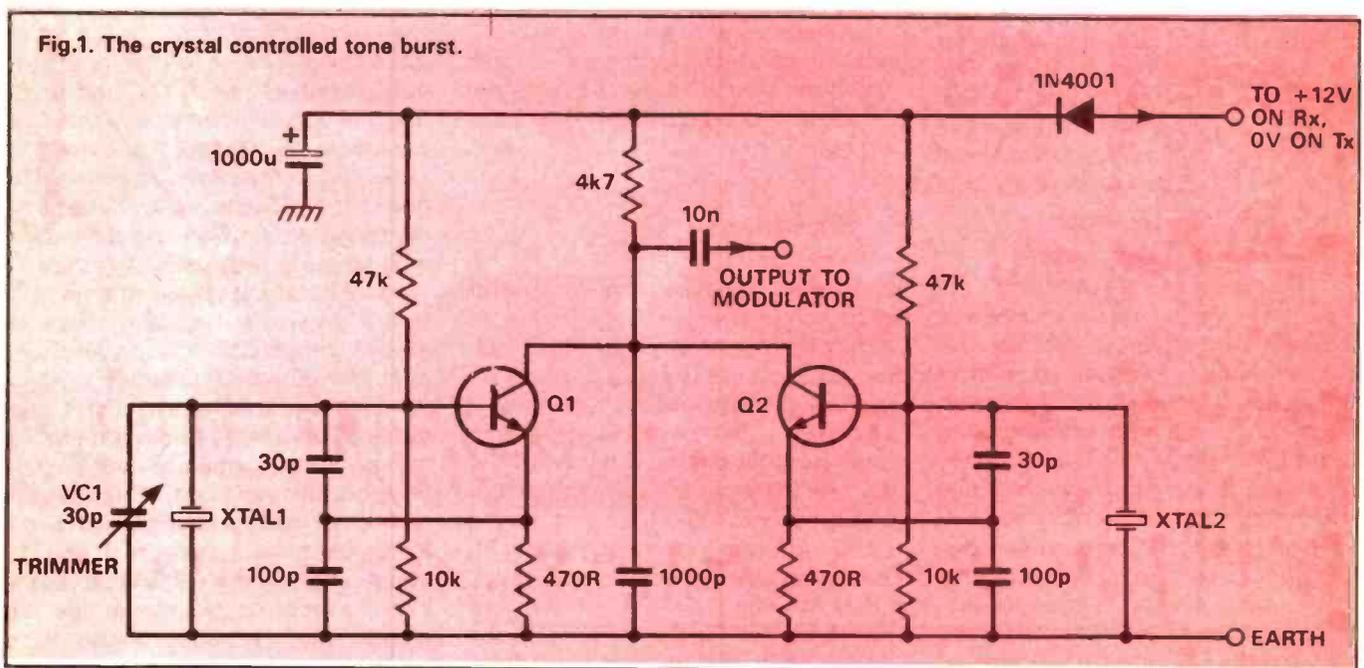
There's an old saying that when you are up to your ears in alligators its difficult to remember that the object of the exercise is to drain the swamp. Well, after several attempts to build a toneburst with the above idea involving boards full of transistors, mixers, audio filters and the like, I'd more or less forgotten that the original idea was to build a cheap and simple tone burst out of scrap. The trouble was, as other amateurs were quick to point out, one crystal oscillator is only too keen to lock up onto the other given half a chance. In practice, with most oscillators I tried, get closer than 3kHz and wonk! the b*ggers locked up on one another. I remember when I was trying to lock up a 10GHz gunn oscillator with a crystal: the oscillator studiously ignored the crystal. That's Murphy's law for you!

In the end I came up with collector mixing, and they worked back

Hugh Allison G2XSE beats two old rocks together and invents heterodyning.

that were all the same. You know the sort of thing, ex colour TV ones, second IF conversions, etc. When BAM! An idea struck. Why not beat two similar crystals together to give a tone out?

although crystal oscillators are inherently good at staying on frequency, if you have two identical crystals in two (almost) identical oscillators then they will both drift together and the difference will re-



st Toneburst

to give the minimal design of Fig.1. This will reliably not lock up down to about 400Hz.

The Circuit

Q1 and Q2 form identical oscillators with the only difference being the trimmer, VC1, which is used to pull down one crystal 1750Hz against the other. Q1 should be the same as Q2 and can be anything that will wizz away at the frequency of your rocks. In the prototype I used IF transistors out of a scrap FM broadcast radio, but others have been built by other nutters using BC107s, 8s or 9s, 2N2369s and allsorts. Note that, for absolute stability the 30 and 100pf capacitors should also be identical to each other.

The transistors share a common collector resistor, the 4.7k to rail. The RF from the oscillators is prevented from getting into the modulator by the 100pf capacitor to deck, and the 0.0 μ F merely serves to prevent DC upsetting the modulator. Obviously the 1000pf is a compromise, you might need more if using low frequency crystals. The tone burst switching uses a rail from the receiver of the transceiver. As you are listening the tone burst is running; as you go to transmit the rail, obviously, disappears. The 1000 μ F capacitor continues to run the tone burst. The IN4001 merely stops the 1000 μ F trying to run the receiver. You are welcome to use more conventional burst circuits if you wish. Output is about 500mV pk to pk.

Choice of Crystals

Basically, any two that are the same. The oscillator circuit will normally shake most sorts of crystals above about 100kHz though overtone crystals will normally sing away on their fundamental. This is purely academic to us, since we are only interested in the difference between the two: it doesn't matter where they are going off! There is no reasonable upper limit to crystal frequency. Incidentally, if you are using big old slabs of quartz they are often unimpressed

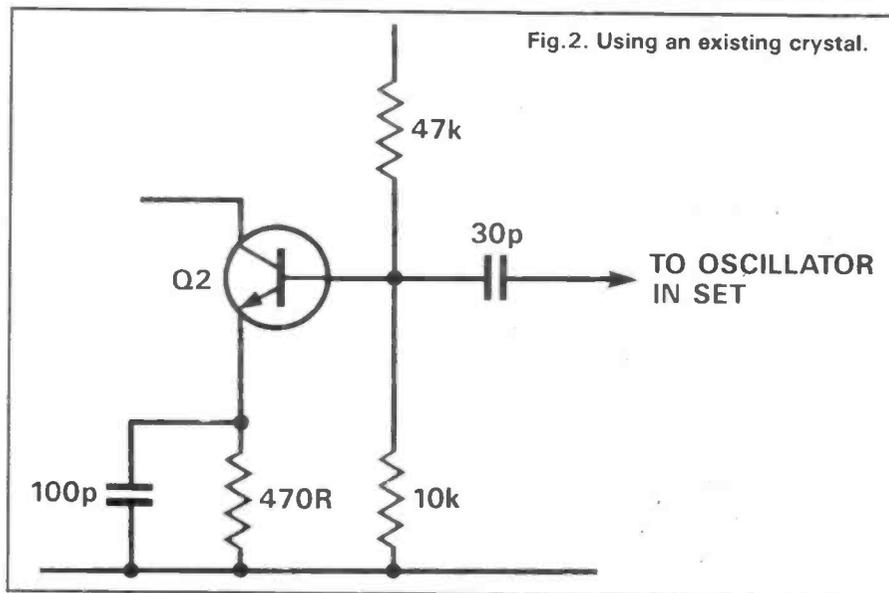


Fig.2. Using an existing crystal.

with 30pf across them and will not budge, but put the capacitor in series with them and you might get some luck.

Once you've built up the circuit, disconnect the collector of Q1, connect up a counter to the emitter of Q2, and note the frequency. Now connect up the collector of Q2 and disconnect that of Q1. Transfer the counter to the emitter of Q2 and set the frequency to that noted above minus 1750Hz using VC1. Reconnect the collectors and run it all up with the counter connected to the output, just to check that it really is giving out 1750Hz. Go down the pub to celebrate.

Variations

One amateur was using a HF multi-mode on two via a transverter with no toneburst. He built one as above, then quickly built another with the crystals set up 10kHz apart, no 1000pf and stuffed it up the aerial socket as a 10kHz calibrator! Another amateur built one but instead of the 4.7k he fitted an output transformer and speaker to make a morse practice oscillator (obviously no 1000 μ F). Then, as word spread, more crazy ideas surfaced. One was to re-configure as per Fig.2, the rest of the circuit as is, and use the input from

some crystal running all the time in the rig, say the 10.240MHz in a CB set converted to 10 metres, and make the other crystal in the tone burst unit the same.

One amateur was using a three channel rig on seventy, one channel was the local repeater, one for Raynet and the third for simplex. He had no room on the front panel for a tone on/off switch and thus required an automatic tone to run only on the repeater channel. He came up with the loony idea of injecting the transmit oscillator into this toneburst unit, configured as per Fig.2, and using another exactly the same transmit crystal in the toneburst. When he switched to the repeater channel he got his 1750Hz, and when he switched to simplex the difference was so great that, although the mix was still taking place the output frequency was so high that it was cut off by his modulator's audio low pass circuit and he had no tone!

In short this weird circuit provides a very stable audio tone maintaining a good stability over a wide temperature variation. It also seems tolerant of voltage change, with a one Hertz variation between 3 and 15 volts when using 12MHz crystals. Putting that into plain language, it's never failed to access the local repeater!

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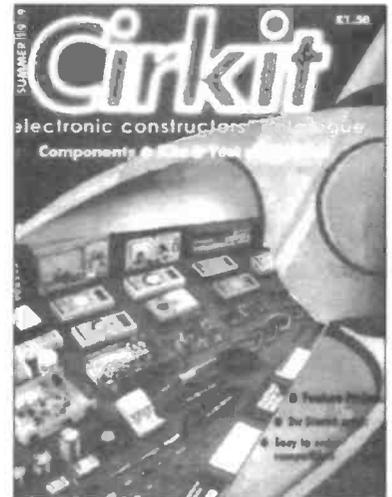
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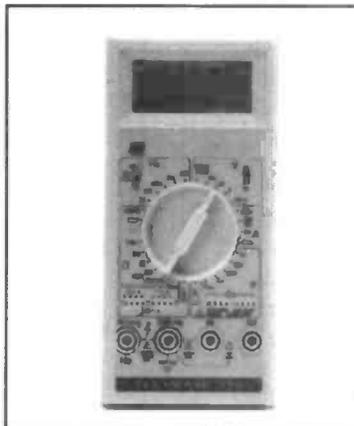


Over 3,000 product lines feature in the Summer 1989 edition of the Cirkit Constructors' Catalogue.

available from most larger newsagents or direct from the company priced at £1.50. The latest books, an RF frequency meter, two new PSU designs and a 3.5MHz converter are among the innovative new kits this issue, while our construction project - a 2 Watt stereo amplifier - is bound to prove an absorbing activity for dedicated constructors. In the test equipment section there's a whole new range of multimeters, a bench DVM and a triple output PSU.

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LISTENING ON



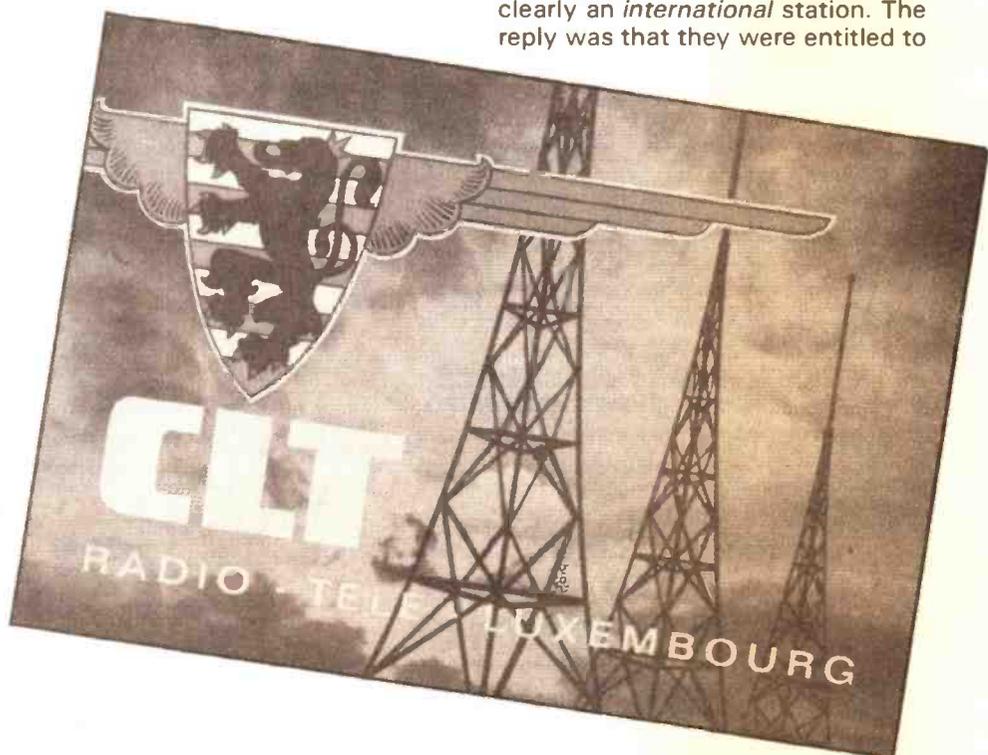
"Atlantic 252" station logo. Write to the station at PO Box 252, London, W1E 2RA. Atlantic 252 is a joint venture of the Irish RTE and ...

A voice like Luxembourg, but from the Atlantic ...

It is not often that we are able to report the birth of a brand-new radio station in "Listening On ...", and it happens even less often in the British Isles. So it was with considerable anticipation that I awaited the official opening of "Atlantic 252" on 1st December.

The "Atlantic 252" station started life as the Radio Tara project: a joint venture between CLT (the Compagnie Luxembourgeoise de Tele-diffusion) which runs Radio Luxembourg, and RTE, the Irish state national radio and television organisation. Radio Luxembourg have long wanted to be able to broadcast all day long to the UK, but have been using the 2000kW longwave transmitter on 236kHz for French-language programmes. The Radio Luxembourg transmitter which broadcasts in English during the evening, on 1440kHz ("the great 208", as it is known), although it uses a power of 1200kW, is not audible in Britain during the day (except perhaps in the extreme southeast or in mid-winter).

... the Luxembourg-based CLT.



This transmitter also carries Radio Luxembourg's German-language service during the day. The Irish government has long had a longwave frequency allocation, 254kHz, but has had no need to use it, coverage of RTE1, RTE2 and Radio Na Gaeltachta (the Irish-language network) being perfectly acceptable on mediumwave and VHF. The answer was to combine efforts and use Ireland's longwave allocation for a day-time English-language commercial radio station, broadcasting primarily to the UK.

And here is where the controversy starts. Neither the BBC or the IBA are terribly happy about a new radio station which can cover virtually the whole country competing with Radio 1 and the ILR commercial stations, and operating without the restrictions of either the BBC or IBA. Reports had it that complaints had been made to the Irish government along the lines that the longwave allocation was intended for national broadcasting, and Atlantic 252 is clearly an *international* station. The reply was that they were entitled to



Radio Netherlands' Bonaire QSLs, twenty years apart. From 1969 . . .

use up to 600kW of power on that frequency, that they were bound to be heard beyond the borders of Ireland (in the same way that Radios 1, 2, 3 and 4 are all audible in Ireland) and that as a commercial organisation, they were merely "marketing their overspill".

Atlantic 252's problems did not end there. They had a lot of trouble persuading the residents of County Meath, where the transmitter is located, that they should be allowed to put up an 800 foot high tower in their rural surroundings. Once the mast was eventually erected, and test transmissions started, initially at only 50kW, in August half the telephones in the village picked up the pop music and test tones. The Atlantic 252 engineers must have wondered why they had ever started. If they had this sort of problem with 50kW, what would it be like when they tried the full 600kW? (Radio amateurs who get insoluble TVI and BCI problems when they increase their power from 100 watts to 400 watts will no doubt sympathise!). There were stories that the Irish PTT were not going to allow the station to run more than 50kW (after they had spent an awful lot of money in buying two 300kW Continental transmitters).

However, Atlantic 252 received plenty of reception reports from all over the UK, and from as far away as the Faroe Islands and Germany, and

they found that they were putting a good signal into London and the south-east of England, even at the low power level, which had not been expected. In Scotland and north-west England their signal was even stronger than Radio 4, the strongest thing on the longwave band. On 1st September, despite all earlier misgivings, the station came on the air at 8am as planned, with 500kW, although whether they have sorted out their BCI problems, I do not know. The signal in the south-east of England is

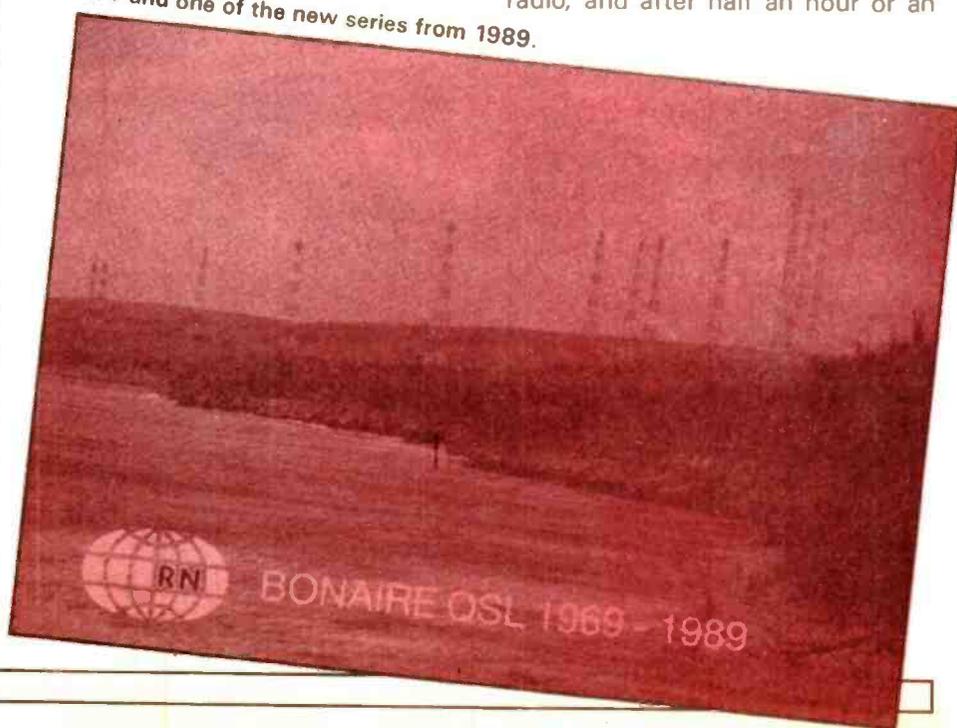
excellent, not only very strong, but with full and crisp modulation — they are apparently using an "Optimod" system.

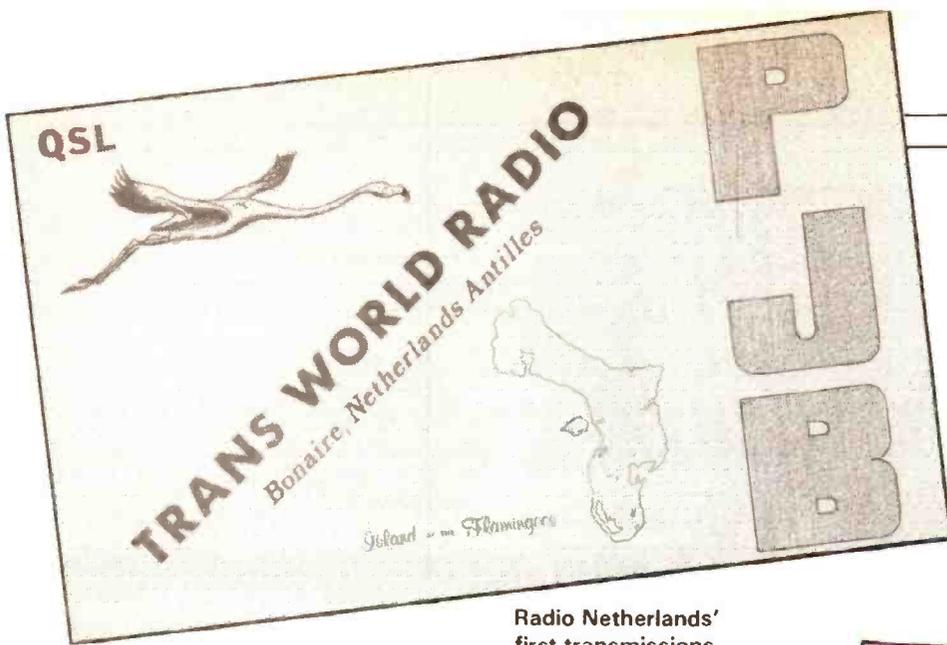
Record Carousel

So what sort of programmes are being put out by this new station? It was always intended that Atlantic 252 would be a sort of day-time Radio Luxembourg, attracting the teens to mid-30s age range, but the style is rather different from Luxembourg. There seems to be a much smaller play list, with perhaps a dozen or fifteen records being played over and over again, and with very few other records getting an airing. The DJs do not say very much — indeed they usually play several records one after the other without any speech at all; one of the station's policies is that there are no non-musical breaks of greater than 90 seconds. If this sounds similar to the former ship-bourne Laser 558 slogan of "never more than a minute away from music", this is no coincidence. The former manager of Laser 558, John Catlett, is consultant to the new station and he has brought Charlie Wolf across the Atlantic with him. Charlie gained considerable notoriety in the mid-80s when, on Laser 558, he good-naturedly taunted the DTI officials watching them from a nearby (and considerably smaller) vessel.

In my opinion, I find the very small play list makes for rather boring radio, and after half an hour or an

. . . and one of the new series from 1989.





recently issued a series of special full-colour commemorative QSL cards to celebrate the event. However, the story of Radio Netherlands' broadcasts from the Caribbean area goes back much further than 1969. I was interested to learn recently that the Antilles government had suggested to Radio Netherlands that they should build a relay station in the Dutch Antilles as long ago as the mid 1950s. In those days very few international broadcasts stations had relay sites, and so the idea was never taken up. However, by 1963 the Christian broadcaster Trans World Radio had

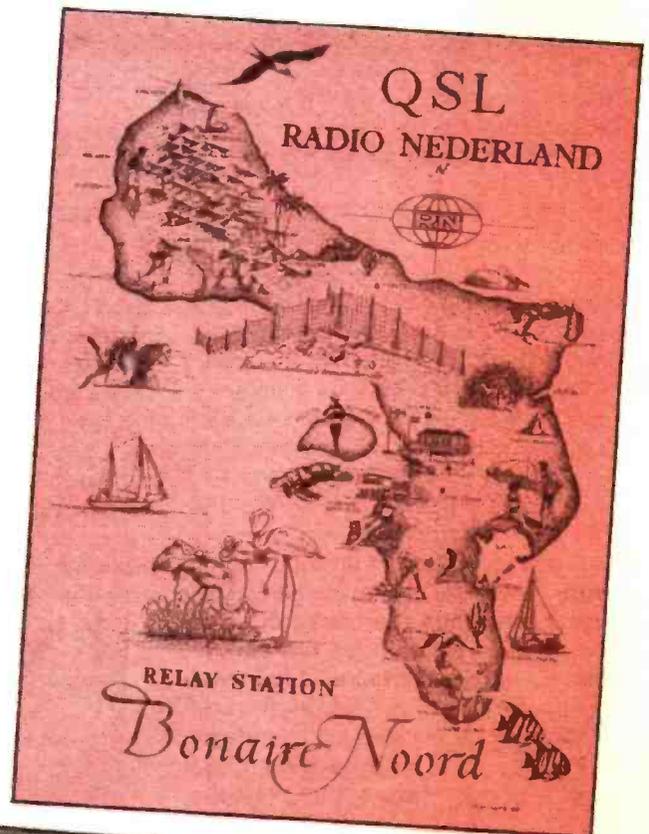
hour, when you hear the same records coming round yet again, you know it is time to tune to another station. Atlantic 252's saving grace is Charlie Wolf, who is on the air from 4pm to 7pm, every afternoon/evening. His style has been linked to that of Robin Williams in the film "Good Morning Vietnam" – very loud and brash and very American, but always causing at least a smile on the face of whoever is listening. Atlantic 252 is on the air from 1600-1900 GMT (in the winter) and is on 254kHz. If you wonder why it is called Atlantic 252 when it is on 254kHz, the answer should be that it is because it is coming from Ireland, but in fact they will move down 2kHz in February as part of the European longwave band plan!

1989 marked the 20th anniversary of Radio Netherlands' Bonaire relay station, and the station has

Radio Netherlands' first transmissions from Bonaire were via the Trans World Radio station there, in 1963.

This QSL was issued by Radio Netherlands when their Bonaire relay station started test transmissions, prior to becoming fully operational in early 1969.

The station is named after a former director of the service, Drs Tijmstra. The satellite dish is used for receiving near-studio quality feeds of programme for re-broadcast.



built a station on the island of Bonaire, and Radio Netherlands signed a contract to hire time from this transmitter. The experiment proved successful and so plans were made for their own station there. The 300kW transmitters were bought from the Dutch Philips company and by 1969 the station was operational. For almost ten years, the station received feeds via AM or SSB radio from Netherlands, though these days a satellite feed, providing much better audio quality, is used.

The station is located right on the coast, to take advantage of sea water paths to the target areas, which are largely North America, but also in-

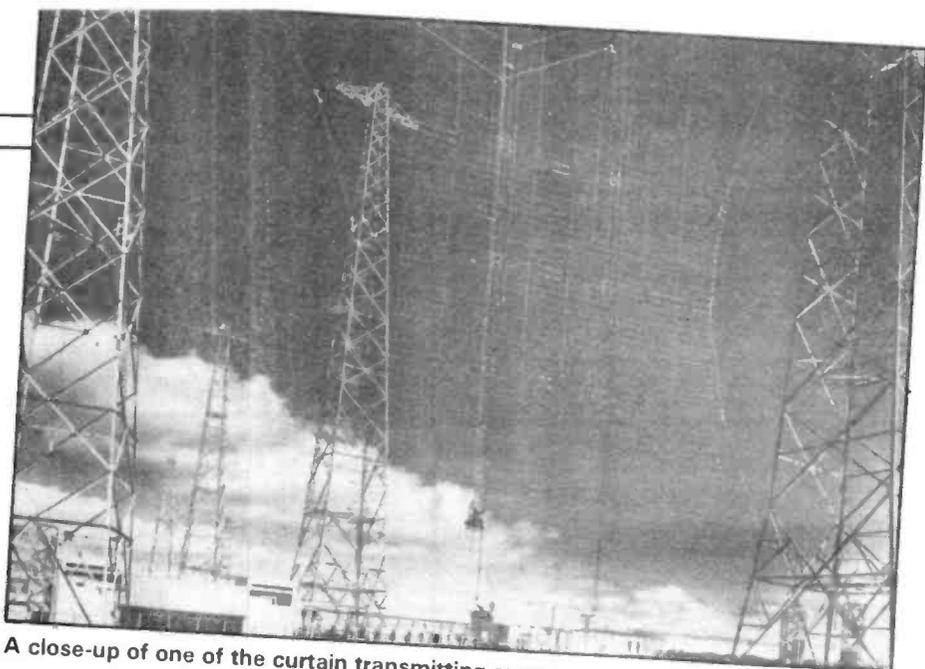


clude listeners in the Pacific. There are fourteen antennas, mainly curtain arrays, but with an omni-directional antenna to cover the Caribbean area itself. In 1989 one of the 300kW Philips transmitters was replaced by a new 250kW Brown Boveri Company transmitter, the Philips one now being kept as a stand-by. Obviously, to run two transmitters like these simultaneously it is necessary to generate an awful lot of power: in fact about 1 Megawatt! Three huge diesel generators at the relay station are kept running continuously for months at a time, with others on stand-by and ready to take over whenever maintenance is required. The statistics are awesome: the generators require 6000 litres of fuel *a day* at a cost of about £800, every day.

The best time to hear the Radio Netherlands Bonaire relay station at present is at 0730-0825 GMT on 9630 or 15560 kHz, or at 1830-1925 GMT on 17605 and 21685 kHz, but see the table for the complete Radio Netherlands English service frequency schedule. So what programmes can be heard from Radio Netherlands?

Happy Station

Except on Sundays, when the "Happy Station" programme is broadcast, all programmes begin with news, followed by Newslines, which examines the background to the news and includes correspondents' reports. Newslines is followed by a different half-hour feature programme every day. On Mondays, Research File is broadcast. This science magazine programme looks at developments in medicine, the environment and technology. On Tuesdays, Radio Netherlands' cultural magazine programme, Images, covers the Dutch opera, film and literary scene, while on Wednesdays is a series called Mind Your Own Business. This programme is looking at Dutch commerce and finance, especially international export industry. Following Mind Your Own Business is a review of recent Dutch CD serious music releases. On Thursdays, arguably Radio Netherlands' most popular programme, Media Network is broadcast. I have often quoted from this in *Listening On . . .*, as it always contains some news of interest to short wave listeners and DXers. Recent programmes have included a



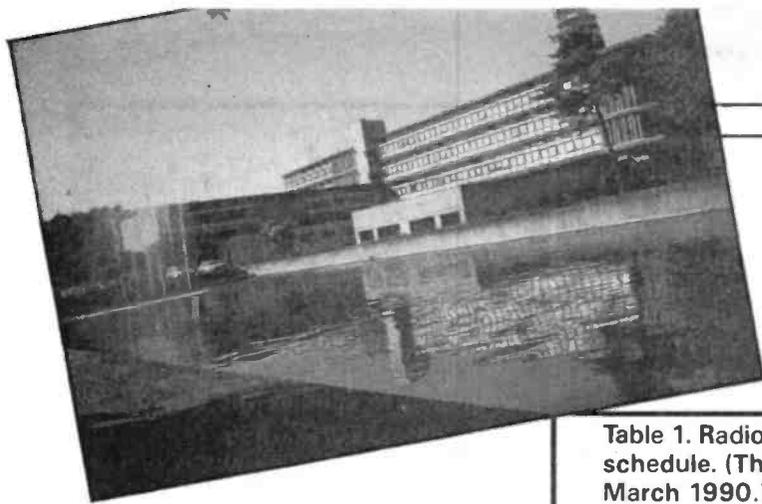
A close-up of one of the curtain transmitting arrays.



Radio Netherlands' latest series of QSLs show the Netherlands' contribution to space research.

Such programmes as "Research File" and "Rembrandt Express" make use of Radio Netherlands mobile studio and radio car, which sends material to . . .





... the studios and HQ, known as "the Dragonfly" because of its odd shape.

cards showing the Netherlands involvement in space. Apart from another relay transmitter in Madagascar. All three transmitter sites are well received in Britain (not all broadcasts are well heard) and Radio Netherlands will always indicate the transmitter location on the QSL card.

feature on American broadcast stations operating from Mexico, the new Dutch commercial TV set up, TV-10, and a report from the BBC's Monitoring Service at Caversham Park.

On Fridays regional programmes are broadcast: for Africa, *Airtime Africa*, a magazine programme devoted to African affairs and with plenty of African music; for Asia, *Asiascan* does much the same thing; while for the rest of the world the *Rembrandt Express* is broadcast. This magazine programme is designed to give you an insight into what it's like living in Holland in the 1980s. As part of the *Rembrandt Express*, the *Gay Front*, dealing with homosexual and lesbian issues, is broadcast once a month.

Finally, on Saturdays is what I think is a fairly unique programme. Called *Over To You* it is a fairly typical "mailbag" show, as broadcast at some time or other by most international broadcast stations, but with one difference. You are invited not just to write to the station, but to phone in and leave a message on their listeners' answer line. The number is 010-31-35-218700. You then have 90 seconds to leave a message which may be used on the air in the *Over To You* programme. Unlike the normal phone-in such as on local radio stations, you can talk about whatever you want, and you won't be interrupted by the presenter, although there is no guarantee that they will use your piece on the air, or that it won't be edited!

If you would rather write to the station than 'phone (it is certainly cheaper) the address is Radio Netherlands, PO Box 222, 1200JG Hilversum, the Netherlands. This is also the address for reception reports which are verified upon request by QSL card. Following the Bonaire 20th anniversary QSLs, Radio Netherlands is presently sending out a series of

Table 1. Radio Netherlands complete English-language transmission schedule. (These times and frequencies are all valid until the end of March 1990.)

Time GMT	Frequency site	Transmitter	Target area
0030-0125	6020	Netherlands	North America
	6165	Bonaire	
	15315	Bonaire	
0330-0425	9590	Bonaire	North America
	11720	Bonaire	
0430-0455	9895	Netherlands	Middle East and Africa (this transmission only carries African service "Sunday Spotlight" prog)
	13700	Netherlands	
0730-0825	9630	Bonaire	Australia and New Zealand
	15560	Bonaire	
0830-0855	9770	Bonaire	Australia (Monday to Saturday only)
0830-0925	17575	Madagascar	Asia
	21485	Madagascar	
1030-1125	6020	Bonaire	Caribbean
	9505	Bonaire	
1130-1225	5955	Netherlands	Europe
	9715	Netherlands	
	17575	Madagascar	
1430-1525	21480	Madagascar	Asia (broadcasts European programme on Friday)
	21615	Madagascar	Asia (as above)
	5665	Netherlands	Europe (Broadcasts Asian programme on Fridays)
1630-1725	13770	Netherlands	Asia
	15150	Madagascar	
	17575	Madagascar	
	17605	Netherlands	
1630-1725	15375	Madagascar	Africa
	15570	Madagascar	
1830-1925	6020	Madagascar	Africa
	15560	Madagascar	
	17605	Bonaire	
	21685	Bonaire	
2030-2125	9860	Netherlands	Africa
	13700	Netherlands	
	15560	Netherlands	

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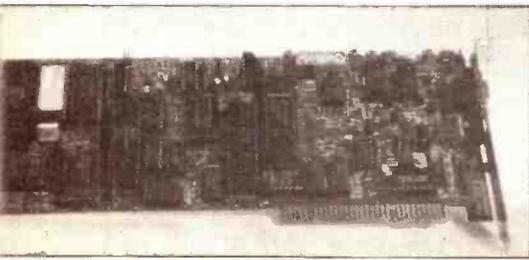
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PC-320 PC Pac



Do you get put off, trying to wire up the correct RXD, TXD, CTS and RTS lines between multi-way connectors, and then spending hours trying to figure out why you can't see anything on your computer screen when you should be seeing packet radio QSOs? It often happens — radio users are extremely skilled in radio technology but often use computers simply as a tool. There are other plug-in TNCs on the market, but these often suffer from the problem of needing the

between the two. In use, the card appears to the computer as a normal RS232 comms port, whether you have one physically fitted or not, and any standard terminal program as well as the programs provided may be used for communicating with the card.

On Screen Displays

With normal stand alone TNCs you have various led status indicators on the front panel, to indicate Tx, data carrier detect, connected status, HF tuning display and the like. With the PC-320 all this can be put up on the computer screen. An MS-DOS disc with three Pac-Comm programs comes for use with the card. The first, SETUP320.EXE allows setting of the position and colours of the screen display, and matches the serial

the system and the rest is just step-by-step, and you can use the same program to change the position and colour of the on-screen display as often as you like. Alternatively, to get going straight away you can pop in the supplied disc, type 'PC', and off you go.

Personal Message System

A battery backed personal message system (PMS) is resident in the eprom software of the PC-320. This is provided with third party message inhibit, together with a CW ident facility to comply with current UK licensing regulations (that is to say, you can leave your packet station running, receiving and transmitting messages on 2m while you mow the lawn, watch tv, or nip down to the pub).

All the usual send/read/kill etc. commands are used for the PMS, but a few extra printer commands are also available for you to quickly print out your stored messages while sitting at the computer, a handy way to retain a hard copy of your messages before erasing them.

When another station connects to you while you're not in the shack, then the PMS in the PC-320 greets them with:

```
*** CONNECTED TO (PMS Callsign)
Logged on to (PMS Callsign)'s
Personal Message System
(optional message from SText, may
be blank if required)
```

```
CMD(B/H/J/L/M/R/S/V/I?)>
```

These commands also allow the PMS to be compatible with auto-forwarded messages to your station from your local friendly Network BBS

HRT tests a plug-in card which turns PC into a packet radio station — just connect the rig and off you go.

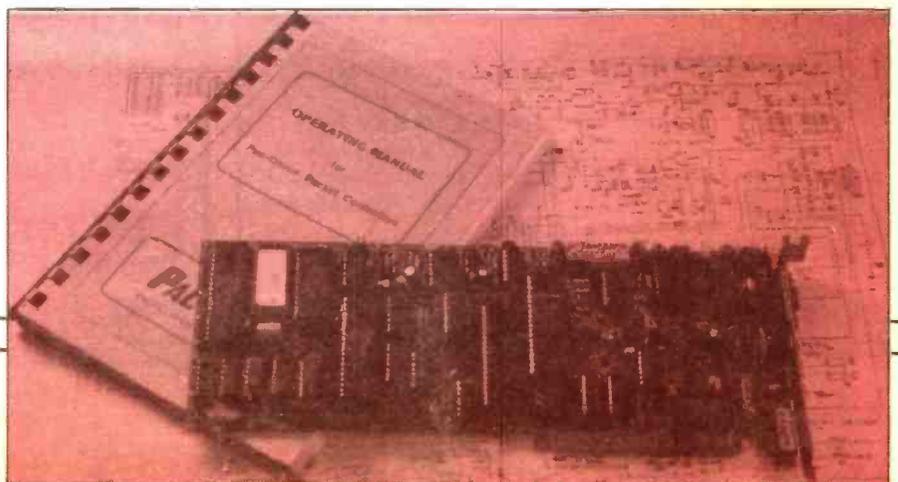
computer switched on at all times to keep the TNC running. The PC-320 goes one stage further by being 'intelligent' — it resides in the background, active all the time to receive and transmit messages from its personal mailbox or act as a digipeater while you're otherwise engaged. When you switch on your computer and select a terminal emulation mode, it starts talking to you as well.

Hardware

The unit is a three-quarter length card that will simply plug into a standard PC expansion card slot. It normally draws its power from the computer but you can also connect an external 13.8V DC supply to the TNC card's end mounted DC connector, which lets the TNC keep working while your computer is switched off. A nine-way screened D-type plug is used to connect either a vhf/uf fm transceiver or a HF ssb transceiver (or both) for 1200 baud and 300 baud packet use, with software switching

port, interrupt, and parallel port address parameters of your computer to those set on the PC-320 card. The next program, PC320.EXE, is a Terminate and Stay Resident program which monitors the PC-320 and provides the on-screen display. This may easily be set to load automatically (through an AUTOEXEC.BAT file) and run every time you switch your PC on. Finally, the MAKEDATE.EXE program prevents the file date of PC320.EXE from changing when you set the program parameter.

If all this sounds complicated then don't worry, it isn't, all you do is type SETUP320 when you first run



Packet Radio Card

operator. Here, by prior arrangement (ONLY if your station is switched on 24 hours a day) the network BBS can automatically forward received messages addressed to you onto your PMS. The latest version fitted also allows messages you have entered at the PC-320, destined for amateurs at other Network BBSs, to also be picked up by your local Network BBS, and even automatically erased from the PMS store if required after having been successfully forwarded. All this can occur at quiet times such as the middle of the night, saving you sitting in front of your computer waiting for a connection at times when everybody else also seems to be on the air!

Set Up The Switches

Despite the array of preset switches and potentiometers, the main thing you must do to the PC-320 before you plug it in is to tell it what COM port on your computer you want it to communicate with. A dip switch row does this and you may select serial ports COM1, 2, 3 or 4, or 350H for an 8255 base port, 330H, 250H or 230H, and a further two switches select IRQ3 for COM2 and 4, and IRQ4 for COM1 and 3. Again, if this is all too much, just leave it as it is, set to its supplied COM1 (19,200 baud, 8 bit, no parity, 1 stop bit) setting, and use that as the default when you fire up your terminal program.

In Use

Despite all the above, on test I just retained the default settings, fired up 'Procomm' (a public domain, ie copyright-free, terminal program which was also provided on the disc), hit return on the computer keyboard and instantly received the TNC's sign-on message on the screen. No problem, now let's connect a 2m FM rig! Wiring a lead up for this took me around 10 minutes, my rig having the required TX, PTT, TX audio, RX audio and ground connections on its microphone connector. Plug it in, switch on, and look at that lots of packet data received on the screen. After entering MYCALL G4HCL (it's surprising how many NOCALL callsigns

you see on the air from new users) I attempted a connection to my local TheNet node, and within two seconds the magical CONNECTED message appeared on the screen. 'Seems to work', I thought!

After disconnecting, I ploughed through the thick TNC manual, setting things like my Personal Mail callsign, the time and date for the internal clock, connection text message and the like, as well as selecting a COM port which I didn't want to use for other purposes. Trimmer potentiometers are provided for fine tuning the output audio level to your transmitter, the output port being controlled under software using the 'POrt' command, with various jumpers selecting low impedance (speaker) or high impedance audio inputs, and HF filtering in or out.

The unit operated faultlessly for quite some time, with several hundred kilobytes of messages and files being downloaded off air onto disc using the terminal program facilities. The on-screen indicators were certainly useful, and I also found a nice touch: by using the cursor keys, this on-screen display could be moved around the screen to wherever I wished, or indeed switched off altogether.

Technicalities

Packet boffins may like to know that a Texas Instruments TCM3105 modem is used for the VHF port, with an EXAR 2211 PLL modem combined with a six-pole active filter used for HF operation. The HF modem may if required be re-tuned to other frequencies apart from the 1600/1800Hz tones normally used, including 1200/2200Hz for VHF operation, by altering two resistor values followed by fine tuning of the associated potentiometers. An expanded auxiliary modem header also lets you connect an external 9600 baud fsk modem (or indeed one of the future 9600 baud 2m radios with built-in modems) for use in due course when we've all had enough of 1200 baud.

The on-board firmware supports the full TAPR 1.1.6 command set including KISS (Keep It Simple, Stupid)



so once learned, rarely forgotten. Newcomers to the multitudes of commands however would certainly need to refer to the instructions in the supplied manual. A 'Look-up' card is also provided carrying a short description of each command function. As well as this, a complete circuit diagram of the unit is supplied for those brave enough to attempt repairs or modifications!

Conclusions

As with most TNCs, the PC-320 performed faultlessly on air, although as always newcomers to the mode would be well advised to seek assistance from an experienced packet user during their first steps on packet. Setting up the card was quite easy, but again computer users rather than computer experts would be well advised to ask the dealer to set up the card ready to plug straight in to their intended computer if at all possible.

Using my computer for word processing while the fitted PC-320 was quietly using my 2m rig to communicate with was certainly a new experience for me, was there a 'Big Brother' out there finding out what I was up to or am I just getting too curious about what's happening in my old age? Until I fit DOSGATE (see this month's *Packet Radio Roundup* — Pac-Comm have promised me it isn't residing as a 'hidden file in their disc!') I'll just have to get used to the extra intelligence that has suddenly entered my computer.

The PC-320 currently retails at £179, and my thanks go to Andrews Computer Services Ltd. of Watford for the kind loan of the review PC card.

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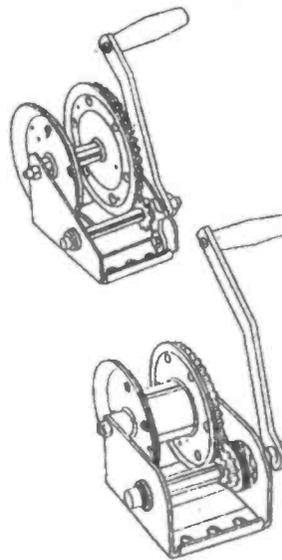
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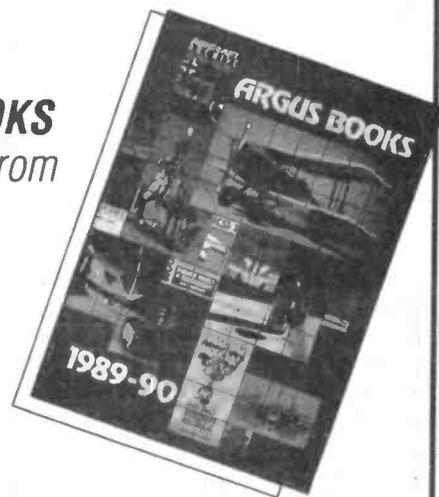
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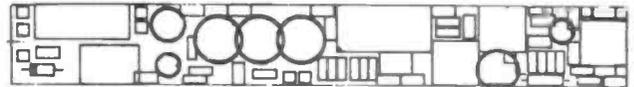
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muTek limited announce the RPCB202ub, a complete replacement receiver front end for the Icom IC202 series portable transceivers. It employs advanced circuit design techniques to provide a combination of low noise figure and superior dynamic performance. Production is scheduled for November 1989; The unit will cost £60 plus £2.50 postage and packing.

The unit is physically very compact measuring 5.5" x 0.7" and fits in the space vacated by the telescopic antenna. A BNC connector is provided and a flexible antenna can be connected to this if desired.

The RPCB 202ub has a signal path designed for minimum noise and high dynamic range. A low loss nitrogen filled relay replaces the diode antenna switching system used by the transceiver manufacturer. This is followed by a very low noise rf amplifier using a modern silicon dual gate mosfet. The noise figure of this device is of the order of 0.6dB, however as this order of sensitivity is unnecessary for any terrestrial communications (as this parameter is limited by external noise) the design trades some of the noise figure for extra dynamic range. Following the RF amplifier a very high performance three pole Tchebyshev bandpass filter provides image rejection and feeds the mixer via a resistive pad. Considerable care has been taken to ensure that the mixer terminations are adequate as failure to do this will result in a considerable degradation of potential mixer performance. A high dynamic range mosfet amplifier with negative feedback follows the mixer and is also matched for low noise. The output from this stage drives the original crystal filter and noise blanking circuitry.

Technical Data

Noise Figure	<2.0dB
Image Rejection	70dB
Intermodulation free dynamic range	>90dB (level of one signal in two tone pair wrt noise floor)
Signal for S9	0.5uV (depends on original setting of S meter)

These figures are from measurements made on the prototype unit. Production units are not expected to differ substantially.

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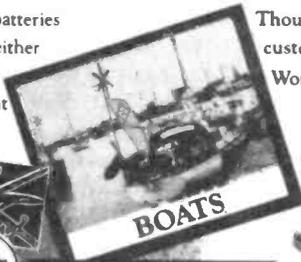
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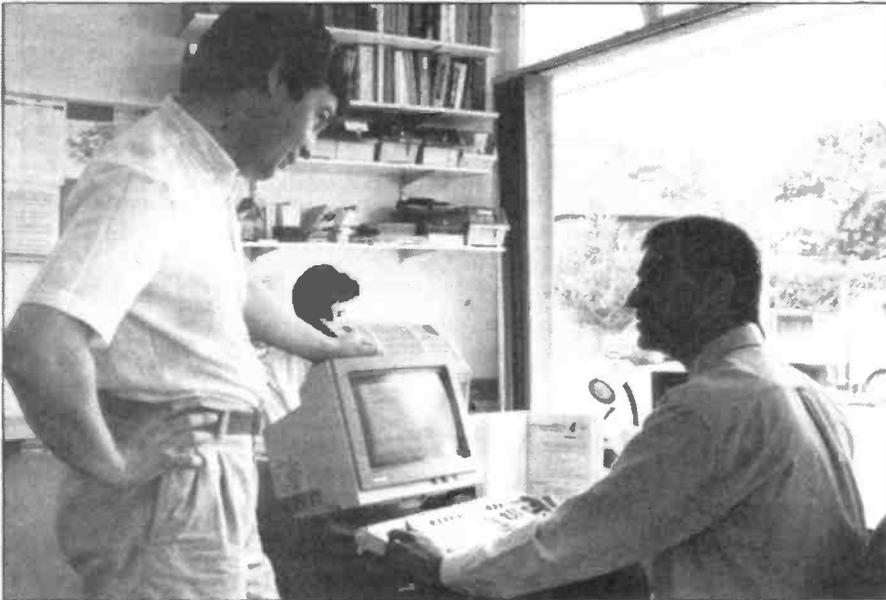
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Dealer Profile

Andrews Computer Services



Chris Lorek G4HCL meets the man who packages packet — and computers in general.

Andrews Computer Services are well known to amateurs in the Packet Radio field, with their regular attendances at rallies across the country. With Andrews now being in their fourth year of business, we at HRT thought it would be nice to see 'behind the scenes' so to speak, with a visit to their shop and packet radio demonstration station in Watford.

When he's not riding through the city streets as a business computer system trouble-shooter on his high-power motorbike, manager Paul Andrews can be found offering advice to radio amateurs far and wide on packet radio and computer systems, assisted by his full-time staff of Adam, John and Rachael, together with consultants Steve and John.

Saturdays are the best time to visit, where licenced amateurs can have a supervised 'play' to their heart's content with the operational packet

stations on display. With the business not being 'tied' to one make or supplier of packet gear, amateurs leave with the feeling of having chosen the best system for their needs rather than being pressurised to part with their money for something they may not get on with. Indeed Paul has even searched out a British-made PC Clone computer system with built-in RF screening as standard, which he stocks to allow amateurs to be able to run both computers and radio gear at the same time without EMC problems rearing their ugly head . . . amateurs with plastic-encased computers will certainly know what this means!

Radio Software

As well as TNCs and computers, both public domain ('PD') and commercial software is available at the shop, and if you part with your hard-earned cash for a computer system you also leave with a nice bundle of free amateur radio software as well, such as sstv, Packet and Terminal programs, Bearing/Distance and DXCC programs, and some useful electronic circuit design programs, either on floppy discs or ready-loaded onto hard disc as appropriate.

The digital revolution can often overtake many amateurs, and the





out yourself!

A good example of Paul's service came up when during our visit an amateur called into the shop for advice, having recently bought a multi-mode TNC. The suspected problem turned out to be an on-air problem rather than a fault or any case of 'finger trouble', but this was quickly diagnosed and explained with expert efficiency.

Keep up the service Paul, and long may it last!

problem of RS232 RXD/TXD wiring, Terminal Emulation baud rates, File Transfer protocol set-ups and the like can often fox amateurs who just want to sit down and communicate on the air. This field is where Paul offers his specialist services, where a complete system with ready made-up connecting leads and suitable computer software, together with a 'sit down and we'll show you how it's done' session is often provided. This of course is in stark contrast to the discount 'box merchants' where you probably get your system for a few quid less but you've got to work it all



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SCOTLAND

Aberdeen ARS. Don. 04676 251.
Ayr ARG. Robert Paterson GM4CUB. 0292 262496. 2 Fris, Community Centre, Wellington Sq., Ayr.
Dunfermline RS. GMODYD. 0383 413440.
Galashiels DARS. GM3DAR. 0896 56027.
Glenrothes DARC. John Hardwick GM4ALA. 0592 742763 (hm) (0506 410677 (wk)).
Inverness ARC. Brian. 0463 242463.
Lothians RS. P J Dick GM4DTH 21, West Maitland St., Edinburgh EH12 5EA. Prestel (NOT phone) 314471210. 2,4 Thursdays 7.30pm Orwell Lodge Hotel, Polworth Terrace, Edinburgh. Nov 22 A talk GM4DIJ; Dec 13 Social; 10, 14 Jan TBA.
Louth DARC. G1IZB. 047286 595.
Mid Lanark ARS. David Williams GM1SSA, Holytown 732403.
Waterside SWC. Bernie Lyford. 0703 893937.
Westmoreland ARS. G. Chapman. 0539 28491.

NORTH EAST ENGLAND

Barnsley ARC. Ernie Bailey G4LUE. Barnsley 716339. Mons St. Mary's Church Hall, Laithe Lane, Barnsley.
Bishop Auckland ARC. Peter Fawcett G0FBK Bishop Auckland 606819. Most Thurs.
Bourne DARS. Vince Cawthron G4ODG. 0778 422795.
Denby Dale DARC. G3SDY 0484 602905.
Derby DARC. Kevin Jones G4FPY. 0332 669157. 119 Green Lane, Derby. 7.30pm. Most Weds.
Doncaster ARC. K McMahon. Doncaster 852938. Mons, Corporation Brewery Taps, Doncaster.
N. Ferriby ARS. Frank G3YCC 0482 650410 Fris. NFU Football Club Room, Church Rd., N. Ferriby, Yorks.
Hornsea RC. Richard. 0401 62498. The Mill, Atwick Rd., Hornsea. 8pm.
Hoyland ARC. M Wardle G0GDC, 11, Sokell Ave, Wombwell, Nr. Barnsley. Weds West Bank House, opp Hoyland Leisure Centre.
Keighly ARS. K A Conlon G1IGH. Bradford 496222. Weds, 8pm, The Clubroom, Victoria Hall, Keighly, Yorkshire. Nov 14 Film show; Nov 21 natter; Nov 28 Short wave data listener, demo G4ZVD; Dec 5 The Sun L M Doherty MSc; Dec 12 Natter; Dec 19 Christmas buffet; Dec 26 Boxing Day (it says).
Leeds DARS. G1EBS. 0274 665355.
Loughborough ARC. Philip. 0509 412043.
Maltby ARS. K Johnson G1PQW. Rotherham 814135. Fris Hellaby Hall, Hellaby.
Mansfield ARS. J M Coates G4GYU. 0623 27257. Fris.
Mexborough ARS. D Thomas G6FUM. Doncaster 859654. Fris Harrop Hall, Mexborough.
Northern Heights ARS. Stan Catton G0IYR. 0274 673116. 1,3 Weds 8.15 Bradshaw Tavern, Nr. Queenbury, Bradford. Nov 15 Getting started in the 1030s Leslie Cobb; Dec 6 Members equipment alignment evening Alan Robinson G3TQA; Dec 20 Social; Jan 3 Videos; Jan 17 Annual dinner.
Pontefract DARS. Colin Mills G0AAO. 0977 43101. Carleton Community Centre, Pontefract.

Rotherham ARC. F Moody. Rotherham 552925.
Rugby ATS. Kevin G8TWH. 0203 441590 David G4DDW. 0455 52599. Tues. Nov 21 Escape from Norway J. D. Berry G4DDW; Dec 5 UC 1332 Upconverter Steve Hunt G3TSQ; Dec 9 Annual Dinner see G8HYU.
Scarborough ARS. I G Hunter G4UQP, 46 Station Rd., Scalby, Scarborough, N. Yorks. 0723 376847.
Sheffield ARC. M Sables. Sheffield 886083. Mons Firth Park Pavillion, Sheffield.
Sheffield Packet Group. P Green, 6 Yews Close, Worrall.
Spalding ARS. Terry G4TWR. 0775 2940.
Stockton DARS. G Noble c/o Causeway Community Centre, Billingham, Stockton on Tees. Weds Causeway Community Centre 7.30. Regular RAE and morse tuition.
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.
Worksop ARS. John Huggins G0DZX Sheffield S31 7BX. 0909 565856. The Clubhouse, West St., Worksop.
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.
Cheshire: N. Cheshire RC. C Kirsop G6KSA, Morley Green Club, Wilmslow.
Chester DRS. Dave 0244 336639.
E. Lancs ARC. Stuart 0227 68913.
Fylde ARS. Frank G4CSA. St Annes 720867. South Shore Lawn Tennis Club, Midgeland Road, Blackpool. 2,4 Thurs. Nov 23 Construction competition; Dec 14 supper and social.
Isle of Man ARS. J Wrigley. 0624 834257.
Kirkby ARC. Via Weds Kirkby Sports Centre, 17 Valley Rd., Westvale, Liverpool 7.30.
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.
Preston ARS. George. 0772 718175.
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 Verjty G4ECI. 061 439 3831. Dialstone Community Centre, Lisburne Lane off Dialstone Lane, Offerton, Stockport. 8pm. 2,4 Weds.
Todmorden DARC. E. Tyler G0AEC. Halifax 882038. 1,3 Thurs

Queens Hotel, Todmorden. Nov 20 Natter; Dec 4 George Dobbs Annual Christmas Lecture; Dec 18 Fun and games night.

Warrington ARC. Paul GOCBN. 0925 814005.

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

Wyre ARS. Ian Broadbent GOKMT. 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. Nov 19 1989 Rally Bridgend Recreation Centre, Angel St., Bridgend, Mid. Glam. 11am C Trotman GW4YKL 0443 226198 D George GW10UP 0656 723508.

Delyn RC. Stephen Studdart GW7AAV. 0244 819618. Daniel Owen Centre, Mold, Clwyd. Alt Tues. Nov 21 Old members reunion; Dec 5 RSGB video; Dec 19 Mince pie night.

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

Newport ARS. GW7BSC. 0633 62488.

North Wales: Clwb Radio Amtatur Y DDraig GW4TTA. Tony Rees. 0248 600963. Four Crosses, Penraeth Rd., Menai Bridge. 7.30pm. 1,3 Mons. Nov 20 Surplus sale; Dec 4 The United States — The Welsh Connection Llewellyn Jones; Dec 18 Christmas party.

THE MIDLANDS

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. 2 Tues sometimes 3 Tues as well ring for details. Thurs natter. BBC micro night last Mon. Unit 16, 60 Regent Place, Hockley (Jewellery Quarter), Birmingham. 7.30 Morse tuition Weds, 7pm Raynet. 4 Tues. MARS Birmingham Rally, Sun 19 Nov Stockland Green Leisure Centre, Slade Road, Erdington. 10 to 5, 50p, free parking. Pete G6DRN 021 326 7515, Bob G4YUI 021 472 7998I. Nov 21 WAB and QSL bureau Dave G6OVO TBC Dec party date TBA.

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.

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

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. Nov 20 Winter surplus sale; Dec 4 On air/natter; Dec 18 Nicad batteries.

Telford DARS. Tom Crosbie. 0952 597506.

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

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

Wolverhampton ARS. Keith. 0902 24870.

Worcester DARC. D Batchelor 0905 64173.

Wythall RC. Chris Pettitt GOEYO. 021 430 7267.

SOUTH WEST ENGLAND

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

Bath DARC. Howard G6EY 0225 428010.

Blackmore Vale ARS. Stuart Brunton GOEXI. 0747 840558. 2,4 Tues 8pm Old Coach House, Bell & Crown, A303, Wilts. Nov 14 Safety in the shack Dave GOGWC, Filter Steve G1ZTO; Dec 12 Christmas dinner.

Bristol: North Bristol ARC. Ray G1YRS 04545 2768.

Bristol: South Bristol ARC. Len Baker G4RZY. 0272 834282.

Whitchurch Folk House, East Bundry Rd., Whitchurch, Bristol BS14 0LN. Weds. Nov 15 10m activity; Nov 22 Free ice-cream evening; Nov 29 Bring and buy/junk.

Evesham: Vale of Evesham DARS. John G3DEF. Evesham 6407.

1 Thurs at 7.30pm at MEB Club, Worcester Road, Evesham.

Exeter ARS. R. J. Donno G3YBK 0392 78710. 1 Mons, Community Centre, St. David's Hill, Exeter 7.30pm. Dec 11 Contest.

Salisbury RES. Neil. 0980 22809.

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

Stratford Upon Avon DARS. A Beasley GOCXJ. 060 882 495. 7.30 Baptist Church, Payton St., Stratford Upon Avon. Nov 13 Practical projects; Nov 27 visit to Stratford Exchange (tbc).

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. Nov 15 Project evening; Dec 6 Quiz.

Torbay ARS. G3NJA, G8HJA. Walt G3HTX. 0803 526762. ECC Club, Ringslade Rd., Nr. Highweek. Club nights Fris 7.30. Nov 17 Meeting; Nov 24 Club night; Dec 1, 8, 15, 22, 29 Club nights.

Trowbridge DARC. Ian Carter G0GRA. 0380 830383. Most 4 Weds, 8pm, TA HQ, Bythesea Road, Trowbridge. Nov 22 Social; Dec 6 Christmas party.

Yeovil ARC. David Bailey G1MNM. QTHR. The Recreation Centre, Chilton Grove, Yeovil. 7.30pm, Thurs. Nov 16 Photography (talk) C Pursey; Nov 23 RF resistance G3MYM; Nov 30 natter; Dec 8 Videos. QRP Convention 13 May 1990, more details nearer the time.

SOUTH EAST ENGLAND

Aylesbury Vale RS. Maritn Baker G0GMB 0908 560026. 1,3 Weds 8pm. Hardwick Village Hall (A413 N of Aylesbury); Dec 20 Informal; Jan 10 Social — advance tickets only; Jan 20 AGM.

Basingstoke ARC. D Deane G3ZOI. 0734 332777 (hm) 0734 787930 (wk). Forest Ring Community Centre, Sycamore Way, Winkelbury, Basingstoke. 7.30pm. 1 Mons.

Bedford DARC. Ray G0EYM. 0234 244506. 3 Tues, Victory Social Club, Kechill Gardens, Hayes 7.30. Nov 21 Stereo photography; Dec 19 Christmas party; Jan 16 AGM.

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.

Burnham Beeches RC. G6EIL. 0628 25720.

Cambridge DARC. D Wilcox. 0954 50597.

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. Nov 15, 29 Natter; Nov 22 AGM; Nov 26 Verulam Rally; Dec 6 Top band operation Neville G3RFS; Dec 13 Natter; Dec 20 Christmas social; Dec 27 no meeting.

Chichester DARC. H Kaminski G1NBX Chichester 781785. St. Pancras Hall, St Pancras, Chichester. 7.30. Club net G8WSX S11 Monds 7.15. 1,3 Tues. Also Raynet inf.

Clifton ARS. Martin Brown GODGC. 01 691 2341.

Coulsdon ATS. Alan. 01 684 0610

Crawley ARC. Jack. 0293 28612.

Dover: South East Kent YMCA ARC. Des Edwards 0304 203073. Dover YMCA, Godwynehurst, Leyburne Rd., Dover, Kent CT16 1SN. Weds. Nov 15 Morse tests.

Dunstable Downs RC. Tony Kelsey-Stead 0582 508259. Room 3, Chews House, 77 High St. South, Dunstable, Beds. Fris.

Eastbourne EARC. G1BRC 0323 29913.

East Kent ARS. Stuart 0227 68913.

Edgware DRS. Ian Cope G41UZ, Hatfield 65707. Watling Community Centre, 145 Orange Hill Rd., Burnt Oak, Edgware. 2,4 Thurs.

Farnborough DRS. Tim Fitzgerald G4UQE 0276 29231. 2,4 Weds, Railway Enthusiasts Club, off Hawley Lane (M3 bridge), Farnborough, Hants. Nov 22 AGM; Dec 13 Christmas social; Dec 27 TBA.

Felixtowe DARS. G4YQC. 0473 642595.

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.

Harrow RS. Harrow Arts Centre, Uxbridge Rd., Hatch End 8pm, Fris.

Horsham ARC. P Godbold. Steyning 814516. Guide Hall, Denne Rd., Horsham, Sussex. 8pm. 1 Thurs. Dec 7 AGM.

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.

Loughton DARS: J D Ray G8DZH. 01 508 3434 (ev); 01-5083434 Micronet 800 mailbox, TeleGold 74:MIK1824; packet G8DZH at GB7ESX. Room 14, Loughton Hall, Rectory Lane, Loughton 7.45pm. Fris.

Maidstone YMCA ARS. G0BUW. 0622 20544. YMCA Sports Centre, Melrose Close, Maidstone, Kent. Fris 8pm.

Mid Sussex ARS. G0GMC. 07918 2937.

Milton Keynes DARS. Mike G0ERE. 0234 750629.

Norfolk ARC. Craig Joly G0BGD 0603 485784 QTHR. Norfolk Dumpling, the Livestock Market, Hall Road, Harford, Norwich. Weds 7.30. Nov 22 informal; Nov 15 Auction/B&B; Nov 29 should all amateurs belong to the RSGB? debate; Dec 6 informal/cttee; Dec 13 Beyond Packet — the computer works Alan Writhe G0KRU; Dec 20 Christmas part, non-members £1.25; Dec 27 no meeting. Thank you, Jim.

Northampton RC. D J Linnell G7CMA. 19 Beech Av., Northampton. Kingsthorpe Community Centre, Thornton Hall, Thornton Park, Kingsthorpe, Thurs. Nov 18/19 Northampton RC 800 event and Mayor's visit.

Peterborough RES. Peter G4PNW QTHR.

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. Nov 21 How linear is your linear? John Matthews G3WZT; Dec 19 Construction contest.

St. Albans Verulam ARC. Andy Ince G0BZS, Cottage No 1 Rounton, 28 Nascot Wood Rd., Watford WD1 3SD. RAF Association HQ, New Kent Rd., off Marlborough Rd., St. Albans. 7.30. 2,4 Tues. Nov 14 Activity meeting; Nov 28 7.30 for 8 annual Great Erg Race inter-club construction competition (postponed from Oct); Dec 12 Activity.

Sevenoaks DARS. Barry Leggett. 0732 741222 ext. 245 office hours. Emergency Control Centre, Sevenoaks District Council Offices, Sevenoaks, Kent. 8pm 3 Mons.

Shefford DARS. Tom Stellar G6RCT. 0707 372211. Church Hall, Amphill Rd., Shefford, Beds. 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. Nov 23 informal; Dec 14 AGM.

South Kent (YMCA) ARC. Des Edwards. 0304 203073. Dover YMCA, Godwynehurst, Leyburne Rd., Dover. Tues.

Stevenage DARS. Pete Daly G0GTE. 0438 724991 1,3 Tues. Ridgmond Training Centre, Telford Av., Stevenage 8pm (7.30 for tuition). Nov 7 Portable radar African style Tony G1ZZH; Nov 14 CW customs, technique and practice Frank G4ISO; Dec 5 junk sale; Dec 15 Using test equipment Tony G1ZZH. RAE course begins Nov 6, phone for details.

Sutton & Cheam RS. John Puttock G0BWV 01 644 9945 3 Fris, natter 1 Mons 7.30 Downs Lawn Tennis Club, Holland Av., Cheam. Sept 15 TBA; Oct 20 Junk sale.

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. Nov 20 TBA; Dec 4 AGM; Dec 18 Christmas Social. Regular nets.

West Kent ARS. B Guinnessy. 0892 32877.

West Sussex ARS. M Mundy, 142 Junction Road, Burgess Hill.

Wimbledon DARS. Nick Lawlor G6AJY. 01-330 2703. 2,4 Fris, St. Andrews Church Hall, Herbert Rd., Wimbledon London. 7.30pm. 10 Nov Fibre optics by Paul Matthews G4AWZ; 24 Film night: The Crowded Sky and Nothing on the Clock; Dec 8 Christmas part; Dec 29 no meeting.

IRELAND

Armagh and Dungannon DARC. J Murphy. 0861 522153.

Carrickfergus ARG. Geoff Pike G10GDP 09603 66109. Downshire Community Centre, Carrickfergus 7.30 Tues. Nov 21, Dec 5 Construction and CW; Nov 28 Using surplus transformers Fred G14NFG; Dec 12 Social.

Donegal ARC. E13BOB. 074 57155.

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. Ann Reynolds G8ZTF, 169 Ball Green Rd, Coventry, Warks CV6 7GW. 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. Occasional meetings.

International Short Wave League. Y Blain, 167 Wombridge Road, Trench, Salford, Shropshire TF2 6QA. Journal: Monitor.

UK FM Group, Northern. L Laughton, Claremont, Main St., East Ardsley.



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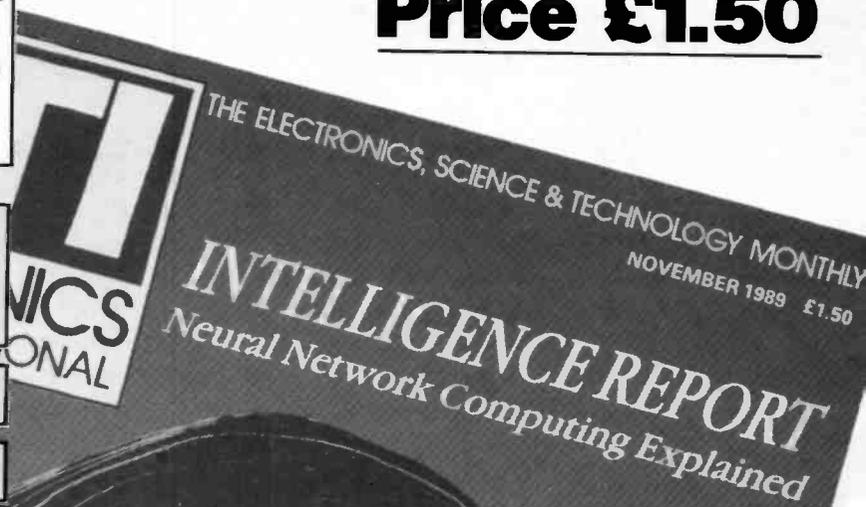
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TELEPHONE SURVEILLANCE

ETI SAVES THE MANX SHEARWATER SEABIRDS



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FREE COMPONENTS FOR SURVEILLANCE BUG

GUITAR PEDAL POWER PROJECT

DIGITAL NOISE GENERATOR

MAINS FAILURE ALARM

ELECTRICAL SAFETY



HF performance you can have a real field day with.

With Yaesu's FT-757GX/II, you can enjoy full-featured HF performance just about anywhere.

On vacation. During field day. On the road. Or in your shack.

Because the FT-757GX/II packs all its HF performance into one highly compact, action-ready case. A case so small, it even fits under airplane seats.

Of course, you've probably noticed a similarity to its predecessor, the FT-757GX. That's purely intentional. And now its performance is even better.

With new features like memory storage of operating mode. Slow/fast tuning selection.

Automatic step-change according to mode. IF notch-filter. 10 memories. And VFO to VFO scan.

Plus you get an iambic electronic keyer. Woodpecker noise blanker. 600-Hz CW filter. AM and FM modes. AF speech processor. And 25-kHz marker generator. All at no extra cost.

Three microprocessors. Dual VFOs. Single-button VFO/memory swap. Receive coverage from 500 kHz to 30 MHz. Transmit coverage from 10 to 160 metres, including WARC bands. All-mode coverage (LSB, USB, CW, AM and FM). 100-watt RF output.

QSK operation. Massive heatsink

and duct-flow cooling system for continuous RTTY operation for up to 30 minutes.

Computer Aided Transceiver (CAT) System for computer control via optional interface.

Of course, the FT-757GX/II offers the kind of options you'd expect from Yaesu, too. Including standard and heavy-duty power supplies, automatic antenna tuner, hand and desk microphones.

So no matter where you work the DX, take along Yaesu's FT-757GX/II. The full-featured HF rig you'll have a real field day with.

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Prices and specifications subject to change without notice.