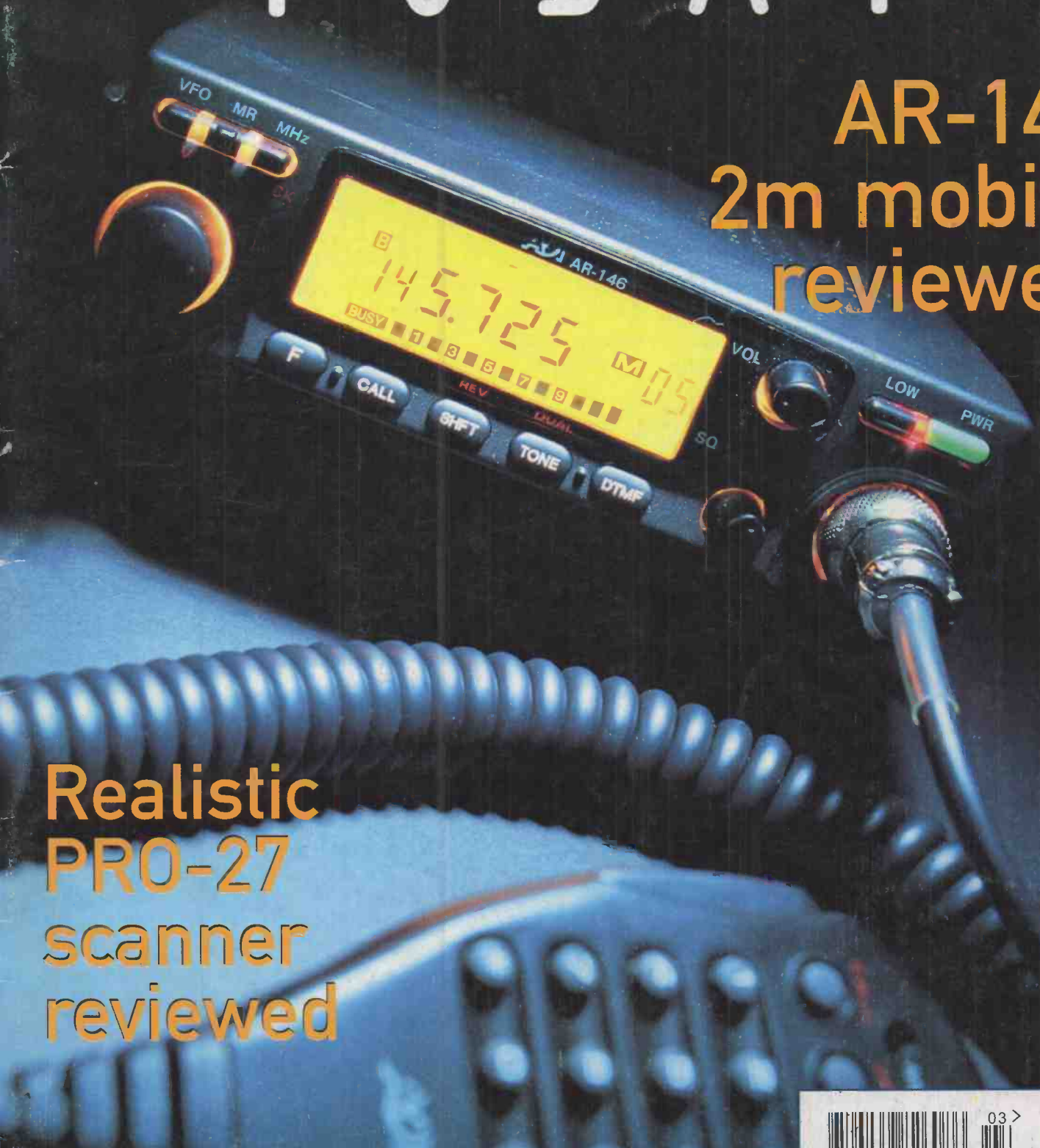


Ham Radio

TODAY

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2m mobile
reviewed



Realistic
PRO-27
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Ham Radio T O D A Y

HAM RADIO TODAY
VOLUME 14 NO.3
MARCH 1996

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REGULAR COLUMNS

AMATEUR RADIO SOFTWARE OFFER	4
Our popular monthly software collection, exclusive to Ham Radio Today readers!	
SCANNERS	16
Bill Robertson shows how to receive 'spy stations' on your scanner!	
FROM MY NOTEBOOK	38
Geoff Arnold G3GSR gives a selection of handy tips and suggestions this month to help you in the shack	
QRP CORNER	40
Dick Pascoe G0BPS asks whether 'minimalism' is the way forward for QRP	
VHF/UHF MESSAGE	42
Geoff Brown GJ4ICD looks at what's available to help with Sporadic E possibilities as well as satellite and EME operation	
DATA CONNECTION	44
Chris Lorek G4HCL looks at node maps and finds how getting onto packet can cost just £25	
HF HAPPENINGS	46
Don Field G3XTT looks back at the CQ Worldwide contest, and forward to activity from the 'most wanted' countries	
SATELLITE RENDEZVOUS	48
Richard Limebear G3RWL with this month's collation of AMSAT-UK news on the satellites including the latest Phase 3-D update	
FREE READERS ADS	54
Helplines, For Sale, Wanted and Exchange, published free	

REVIEWS

ADI AR-146 2M MOBILE REVIEWED	10
G4HCL tests a low cost, high performance mobile that packs a 50 watt punch on the airwaves	
REALISTIC PRO-27 HANDHELD SCANNER REVIEWED	14
Chris Lorek takes a handy scanner on 'walkabouts'	
BOOK REVIEW - TIME TO GO SPARKY	33
Ham Radio Today's Consultant Technical Editor looks at what life on the ocean wave was like	

FEATURES

STORNO 5000 CONVERSION	18
Graham Biggs G0OSF converts the Storno CQM 5662S synthesised ex-PMR transceiver to 70cm	
AR3000A MODIFICATIONS (PART 1)	26
The Ham Radio Today Editorial staff reveal how to upgrade your AR3000 or AR3000A receiver to the high performance 'plus' version	
1996 LONDON SHOW GUIDE	30
London show floor plan, exhibitor's list and lecture programme	

CONSTRUCTION PROJECT

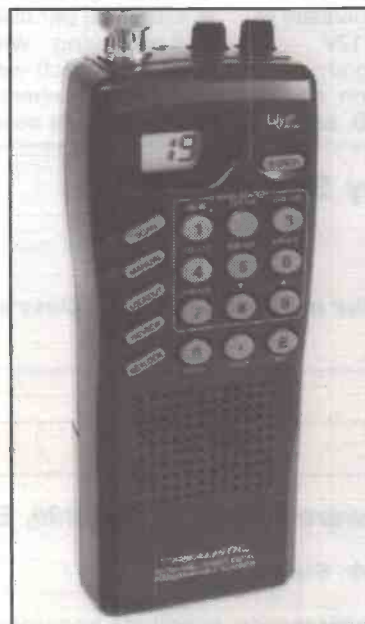
A SIMPLE MARKER FOR HF	22
Raymond Haigh shows how to build a useful and low cost alignment aid for setting up your HF receiver	

NEWS & VIEWS

CQ DE G8IYA EDITORIAL	5
It's getting hard to imitate an ostrich	
RADIO TODAY	6
The latest Amateur Radio news	
READER OFFER - EX-PMR CONVERSION EPROMS	34
Ready programmed Eproms for the MX290 series transceivers	
HRT SUBSCRIPTION OFFER	35
Make sure you get your favourite magazine each month, right through your door	
LETTERS	36
Ham Radio Today readers have their say, no censorship here	
CLUB NEWS/RALLIES	50
Dynamic go-ahead clubs and voluntarily-run RAE course contact details. Is your club listed? If not, why not?	
NATIONAL AND INTERNATIONAL ORGANISATIONS	52
Contact details for the RA, SSL, BARTG, ISWL, RSGB and other national organisations	
ADVERTISERS INDEX	58
Who's 'in' Ham Radio Today, trader-wise	



AR3000A receiver modifications - see page 26



REALISTIC PRO-27 HANDHELD scanner reviewed- see page 14


 SUBSCRIPTIONS AND
 BACK ISSUES HOTLINES:
ORDERS:
 01858 - 435344
ENQUIRIES:
 01858 - 435322
11.00am - 10.00pm

SOFT OFFER
MARCH '96

This Month's Software Collection

Another superb collection of software to let you get more out of the hobby, and maybe even help you work that elusive DX station

This month, we've again put together a collection of interest to amateurs (HF, VHF and UHF) and SWLs (both amateur and broadcast). Here's what's included on this month's bumper collection;

DXHELP is a ham and SWL propagation aid, to make chasing that rare DX a bit easier. The program shows the MUF (Maximum Usable Frequency) on an hour-by-hour basis to any given target, calculates the distance and bearing for directional aerial users, and helps you pick the optimum times to look for the rare one, it even lets you know when the propagation will just be zero to that particular area on a given day.

DX On Line is an aerial bearing/range and signal propagation system for more powerful machines. It has a primary display of a colour world map, with a continually updated representation of the "Grey Line" or day/night terminator shown.

As you move your PC map around the map, the aerial bearing and range is constantly updated, and if you click a mouse button, a window pops up with the current signal propagation prediction. It can even display a full colour graph predicting the propagation for the next 24 hours from your home QTH to a selected target. Grid square, CQ zone, prefix cross-references and QTH databases are also provided, and you can also print a listing of DX bearings from your home QTH to all locations in the target data base.

PCTOR V1.09 allows you to run AMTOR without the investment of a hardware TNC, a simple modem is all that's needed, i.e. ST-6 or equivalent to decode received audio to +/- 12V RS232 logic signals. The program features Split screen operation, all AMTOR modes, i.e. ARQ, FEQ, and

"Listen", text buffers and text file transmission, receive capture to file, and "PLX"-mode for upper/lower case.

SWL Database is a database for the Short Wave Listener, which will read your PC's Clock and give up to the minute information on broadcast station schedules, either on-screen or printed in regular column format in station, frequency, or country order.

Also on this month's disk, for VHF/UHF operators, are updates and enhancements to the **WinPack V5** and **UltraPak V4** programs in use by many amateurs (see this month's **Data Connection**). Note that we've arranged for these to have been already included on all WinPack and UltraPak program disks ordered earlier in 1996 from this software service, they're added on this month's software collection disk for the benefit of earlier users to save having to order a further complete disk. The WinPack enhancements are an updated ACK server, a Buckmaster Oct 95 Callbook CD Server, and an intelligent REQFIL file server. The UltraPak update is the 4.01 release of the executable program (not the entire program collection) to allow messages numbered greater than 99999 to be downloaded in compressed format, and an ACK server update.

How much does it cost?

Each copy of our Ham Radio Today Software Collections is supplied on a 1.44Mb High Density PC disk. The cost is just £1.00 per disk including postage and packaging - which only covers costs and which we believe to be the cheapest anywhere in the UK. Disks will be sent via second class post.

European residents (which includes Eire) should instead send either 3 US\$1 notes, or a Sterling (not foreign currency) bank draft/demand drawn on an English bank account to the value of £1.50 per disk. If you live outside of Europe, please send 4 US\$1 notes, or a sterling bank draft to the value of £2.00 per disk. All orders to the outside of the UK will be sent via airmail.

How to get your disk

To get your copy of the Ham Radio Today Software Collection, simply send a £1.00 cheque or Postal Order for each disk payable to **Mr Steven Lorek**, together with your completed coupon, to:

**Software Offer, PO Box 400,
Eastleigh, Hants, SO53 4ZF**

If you would like the added security of recorded delivery (UK only), please add 55p to the total and include a **fully completed** recorded delivery form (available from your post office).

Please note: Other payment methods can't be accepted. Please do not make your cheque or Postal Order payable to any other individual or any company. Disks are sent by standard second class post at readers' own risk. Queries regarding supply of these disks should be sent to the above address with an SAE for reply. Faulty disks will be freely replaced when returned with an SAE. **Please DO NOT contact Nexus or the Ham Radio Today Editorial staff with queries regarding these disks**, they cannot help you, it also slows down the staff who are already busy enough getting the magazine ready!

Please allow up to 28 days for delivery.

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Post this coupon to; **Software Offer, P.O. Box 400, Eastleigh, Hants SO53 4ZF.**

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CQ from G8IYA

Editorial

It's getting hard to imitate an ostrich

I keep trying to ignore it, I really do. But from the piles of letters I receive for publication, and the numerous on-air discussions, it's getting hard to imitate an ostrich. You've guessed. It's the question of whether a mandatory Morse test is going to continue to be an international requirement for amateur radio operators. It's due to be decided at the 1999 year's World Radio Conference, and from reports I've read, the years leading up to this are to give time for various countries to decide within themselves before the final international decision is made.

It's up to us

This time, I'm told that the decision is going to be steered by what we want. It's going to be up to us to decide whether we want Morse proficiency as a mandatory prerequisite to obtaining an HF licence for amateur radio.

At the moment, the word from the RSGB on the 'split' of opinion is 50/50 (given in last month's Ham Radio Today), this differing from the RSGB's formal survey conducted somewhat earlier where the majority of respondents were in favour of retention. The RSGB will soon be undertaking a further poll of opinion, which they say will be open to all including SWLs (i.e. beginners and prospective amateurs) besides existing amateurs. No prizes for guessing what the new result could be.

But is the 'decision' year of 1999 just a coincidence? 1999 is when all shipping etc., the 'traditional' users of Morse and the like for emergency and distress messages, must, by international law, stop using it for such communication. From then on, the internationally-made agreements of the GMDSS (Global Maritime Distress Safety System) become mandatory, although many use this right now.

On board

A couple of weeks ago as I write this, Ham Radio Today's Technical Editor, in his professional capacity, was honoured to have been invited by Cunard on board the QE2 to meet the Senior Assistant Radio Officer, the Chief Radio Officer, and the Training Manager. On his visit to the radio room (with its deficit of any visible Morse keys), amongst the racks of digital communication equipment Chris saw a number of brightly coloured GMDSS handholds, placed in 'grab and run' locations. He saw exactly the same 'grab and run' type GMDSS handholds located on the ship's bridge, this time amidst the multiple computer screens and digital navigation VDU map displays.

Significantly the two radio officers, both highly skilled and qualified professionals, were both in their 20's. I'm informed that over 50% of UK amateurs are aged over 50. We're all getting older, but currently our hobby is also getting older. It's quite common for existing amateurs to moan about today's youngsters not being interested in 'real' amateur radio, being instead just interested in computers and technology. Hey, hang on. Isn't 'new technology' what 'real' amateur radio was all about, almost a hundred years ago?

Case study

A close relative of mine is aged 14. He's very much 'into' electronic and radio technology, having built several receivers and amateur radio accessories from kits. He writes his own PC software, having had this published in several computer magazines and included

on front cover CD-ROMs of three such magazines. He's contracted by a couple of international communication companies for his services, and has the offer of a software reviewer's position with Microsoft. He was 13 when he had to send in his first income tax return. He also searches out and examines many ham radio programs each month, and helps put together the best of these for our monthly Ham Radio Today software collections.

From this, I hope you'll see he's well aware of a range of current amateur radio techniques and other forms of communication. Just the sort of lad to encourage into amateur radio with open arms. We desperately need 'young blood'. But he's not currently interested in becoming licensed. In fact, he's completely disinterested. Why? I'll leave you to think about it.

Conversions and reviews

Ham Radio Today will be at this year's London Show in the form of an audio-visual lecture presentation each day, with plenty of free give-away handouts. The Saturday lecture will be at 12.00 noon, on converting ex-PMR equipment onto the amateur bands. The Sunday lecture, again at 12.00 noon, will be on Ham Radio Today equipment reviews. Both will be accompanied with plenty of free photocopied conversions/reviews, lists, and other information, for visitors to take away. You'll have a chance to ask questions about any particular rig you're interested in, maybe even one you're thinking of buying at the show. So if you're at the event, come along and say 'hello', and take something away free courtesy of Ham Radio Today.

RA Statement on the Morse Requirement



A copy of a letter, sent for publication to Ham Radio Today magazine from Roger Louth, Director of Mobile Services of the Radiocommunications Agency, states;

"I wrote in the November issue of RadCom to give some background to the discussions that were taking place with regard to the Morse Requirement. The matter was briefly discussed both within CEPT

and subsequently, at last month's World Radio Conference (WRC). It has now been agreed that the proposal to delete Radio Regulation 2735 should be discussed at the next but one WRC to be held in 1999. As Clive Trotman states in his open letter in the December issue of RadCom, four years is but a short time. I have asked the RSGB, as the national representative for radio amateurs in the UK, to consider formally this proposal and to view their views."

"We need to consider what the UK's position should be and to have done this well in advance of WRC 99, but this cannot be considered in isolation. Fundamentally we need to give thought as to whether there should be two classes of licence and, if there should, whether the Morse test is a relevant means of differentiation. Many licence holders telephoned or wrote to me following the publication of my previous letter and I would like to take this opportunity to thank them for passing on their views. It is clear that this is an issue on which there are differing and strongly held opinions. It is now timely to reconsider this issue and to decide whether the Morse requirement is one which radio amateurs see relevant to the next millennium."

QRP Fun Run 1996

This takes place on Tuesday 7th May to Friday 10th May, 8.00pm to 10.00pm UK clock time each evening.

Frequencies; 3560kHz and 7030kHz both +/- 10kHz.

Contacts; Contacts must be between QRP stations, maximum 5W output.

Call; "CQ FR".

Scoring; Each QSO with another QRP station scores 10 points, each QSO with Fun Run 'bonus stations' G0KZO and G3XUO scores 25 points. Each QSO with the Yeovil Club Fun Run station, GB2LOW, scores 50. All duplicates must be marked and no points claimed. Points will be deducted for unmarked duplicates at twice the QSO value.

Exchange; RST, Serial Number (see below), output power, name.

Serial Number; the three figure serial number *must* start at a random number of your choice not less than 100 and must be incremented by one for each QSO throughout the *whole* contest. However the three Fun Run bonus stations listed above will all commence at 001.

Entry Sheets; Separate log sheets for each band, with sub-totals of each evening, preferably in RSGB format. Also a separate signed RSGB style cover sheet stating output power, rig, and aerial used.

Send your entries to; G3CQR, 9 Quarr Drive, Sherborne, Dorset DT9 4HZ to arrive not later than Thursday 16th May 1996.

Awards; Certificates for the highest score on each band, the highest total overall score, and to the station consistently using the lowest power will be presented at the Convention on 19th May.

SW Listeners; The club will award a certificate to the SW listener who submits the most comprehensive report.

Note that apart from the Club's GB2LOW 'Fun Run Bonus Station', this year's other two 'Fun Run Bonus Stations' were selected from amongst last year's leading stations. This is not only to provide variety but also to allow a geographical spread of the bonus stations. The club expect to continue this procedure in the future.

Licence Survey

The RSGB's Licensing Advisory Committee tell us they will be supervising a survey of all radio amateurs to ascertain their views on the qualifications and licensing structure necessary for the United Kingdom Amateur Service. They say the survey will also be open to listeners and other interested parties. More details in the future...

Martlesham VHF Round Table

Martlesham Radio Society will be hosting another VHF Round Table event at BT Laboratories, Martlesham Heath, near Ipswich, Suffolk, on Sunday March 31. The event which commences at 10am will include round table sessions and seminars, testing facilities and a bring and buy.

For BT Labs' security requirements, all access is by advance booking only - please ensure that the names of all persons attending are included with the ticket request. For tickets, please send an SASE to Roy Smith G0RRC, Lykkebo, The Street, Burstall, Ipswich, Suffolk IP8 3DN.

The 'Big Highland Secret' is out at last!

No, the Loch Ness Monster has not been found. But Norman Baird GM4JNB's secret has been revealed! Norman, fondly known as GUB



'Gotcha' - Norman GM4JNB with packet users from the Highlands

(Great Uncle Bulgaria) is the SysOp of GB7INV located in Inverness. GB7INV covers one of the largest areas in Britain from Oban and Fort William in the west to the Isle of Lewis and the Hebrides in the north. For years, GUB has closely guarded details of his age and birthday, but some undercover work by one or two of his 'packet punters' has finally laid bare the facts.

As a token of their appreciation for the devoted work that Norman has put into the upgrading and maintenance of the Highland packet network in the past 5 years, a

surprise 50th birthday celebration was held in the Emergency Communications HQ bunker in Inverness on the 12th November. GUB had been lured there by a false emergency meeting!

Substantial donations were received from all parts of the Scottish Highland region, enabling the grateful packet users of GB7INV to purchase some badly needed equipment. These items and a suitable certificate were presented to Norman by Philip GM4SUF - SysOp of GB7SUF and GB7NOS who also provided the accompanying photo.

Norman was completely flabbergasted by the event- he has long been noted for his witty 'one liners' but on this happy occasion he was for once completely speechless!

New WAB award

The Worked All Britain organisation has announced a new award for amateurs and listeners. The award is based on the 10km squares of the National Grid, but without county boundary complications, and is known as the Millennium Award. It's been introduced because of the uncertainty regarding the future of local authority and county boundaries following the Review of Local Government. The new award will operate alongside the existing WAB awards programme. Full details of the requirements are available from Brian Morris G4KSQ, 22 Burdell Ave, Sandhills Estate, Headington, Oxfordshire OX3 8ED.

Junior Ham Club member for President?



Timothy Shread BRS-171314, Junior Ham Club member for President?

At the RSGB's 'Open Forum' meeting in Inverness recently, Timothy Shread, BRS-171314, a founder member of the RSGB Junior Ham Club, was permitted to try the Presidential Chain for size!

Tim is just 14 and a member of the Army Cadet Force (The Gordon Highlanders), son of RSGB Council Member Mike GM6TAN, and Elaine GM7TZT RSGB Liaison Officer West Grampian, Highlands and Western Isles. A keen musician who plays the euphonium, he hopes to join the armed services as an officer cadet upon leaving school.

The new Presidential Chain of office was introduced in 1995 by Clive Trotman, GW4YKL since the old one, now on display in RSGB HQ had worn out! The hallmarked medallion which is in solid gold, was minted in 1923 and worth around £3,500. President in the making? Tim just likes the hobby!



RSGB meeting, Inverness, l-r; Tom Menzies GM1GEO Zonal Council Member, Elaine Shread GM7TZT RLO, Mike Shread GM6TAN Council Member, Clive Trotman GM4YKL President 1995

ISWL Council Elections



Following the recent biannual council elections of the International Short Wave League, the ISWL Council is now:

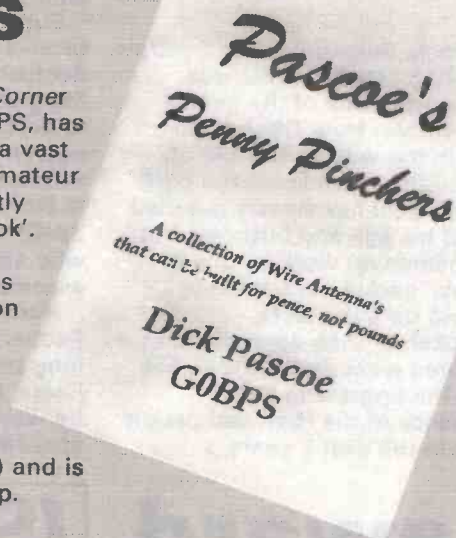
President; Mrs. Evelyn May (G0OZI/G-17197)
Honorary Secretary; Mrs. Maggie Carrington (G0WDM/G-20542)
Honorary Treasurer; Mr. David Beale (G0DBX/G-10618)
Editor-in-Chief; Mr. Ray Miller (G8JGH/G-12537)
QSL Bureau Manager; Mr. Tony Gale (G7NUR/G-13287)
Publicity Officer; Mr. Chris Carrington (G0IYZ/G-20365)
Council Members; Mr. Herbert Yeldham (G6XOU/G-20006), Mr. Peter Rayer (G-13038), and Mr. Bill Makie (GM4AIE/GM-9137).

The most significant change is the election of Maggie Carrington to the position of Honorary Secretary, as this also changes the address of the ISWL Headquarters to that of the Secretary's. Therefore, all correspondence with the ISWL should now be sent to; The Hon. Secretary, Mrs. M. H. Carrington, International Short Wave League Headquarters, 3 Bromyard Drive, Chellaston, Derby DE73 1PF, United Kingdom. (future Ham Radio Today 'Club News' entries for the ISWL will be suitably updated).

TRADE TOPICS

Pascoe's Penny Pinchers

Ham Radio Today's QRP Corner columnist, Dick Pascoe G0BPS, has over the years put together a vast amount of information on amateur radio techniques, and recently decided to 'put it all in a book'. The one because three, and "Pascoe's Penny Pinchers" is the first, detailing a collection of wire aerials that can be built for 'pence rather than pounds'. 36 pages, softback and staple bound, it's available direct from Kanga Products (Tel. 01303 891106) and is priced at £4.95 plus £1.00 p/p.



Free log book for IC-706 owners

Icom UK have been in touch to say that the new IC-706 HF/6m/2m mobile transceiver released last year (reviewed December 1995 issue Ham Radio Today), has been a great success. They say it has already been hailed as *the* transceiver for 1996. Icom have now produced an attractive log book for IC-706 owners, and tell us they will send one *free of charge* to the first 300 qualifying applicants, along with some other Icom 'goodies'. If you are an IC-706 owner and would like to enhance your station with this offer, write to, or fax, Mr. D. Goodwin at Icom UK, with proof of purchase.

Timewave DSP Unit

From Nevada comes the Timewave DSP-599ZX, which they describe as the "most powerful noise and QRM filter in amateur radio". Nevada say that it enhances voice, data and CW, remodulates RTTY, and with 80kB RAM on the DSP it combines a hyperspeed digital Signal Processor with an alphanumeric display, quick select push buttons and optical encoders, to wipe out noise and QRM like never before. They tell us that heterodynes disappear like magic,

weak signals pop up from the noise and the razor sharp filters slice away QRM, the DSP remodulator pulling out solid copy when you can barely hear a signal. Continuous DSP filter tuning to 5.4kHz also opens up the wider bandwidth modes like short wave AM broadcast and VHF/UHF FM together with other data modes. Priced at £349, we've a review planned, further details in the meantime from Nevada (Tel. 01705 662145).



The DSP-599ZX digital noise filter

New products for the London Show

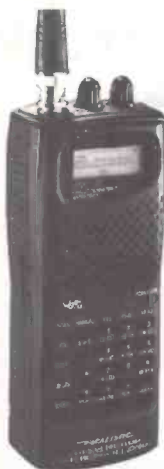
Waters and Stanton tell us they will be occupying their traditional Stand W in the centre of the blue hall at this year's London Show, and as usual will have the Alinco booth incorporated in the stand. New from Alinco will be a simple, rugged 2m handheld, the DJ-190, which with aerial, nicad and charger will retail at £199. From ADI will be the new AR-146 2m 50W FM mobile transceiver breaking price



barriers at £269 (see the review in this issue). New from Watson is the W-220 SWR/power meter with a frequency range of 1.7-200MHz, power reading up to 200W at £69.95. Also from Watson is a miniature SWR/power meter with built-in aerial tuner covering VHF and UHF amateur frequencies, with power ranges up to 60W, at £59.00. Finally, there is a professional 'police style' body harness for any handheld transceiver or scanner, priced at £19.95. Further details on the above from Waters and Stanton (Tel. 01702 206835).

(ABOVE) ADI AR-146, reviewed in this issue

PRO-62



200 Channel
Portable Scanner
68-88MHz
118-174MHz
380-512MHz
806-960MHz

RRP ~~£229.99~~
OUR PRICE
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SAVE £50.00



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200 Channel
Scanner with
continuous
25MHz to 1.3GHz
Coverage

£299.00



PRO-44
INCLUDING A
FREE CARRY
CASE WORTH
£15.00

£129.95

PRO-25

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Portable Scanner
68-88MHz
108-174MHz
406-512MHz
806-956MHz

£179.95



NEW

PRO-60
RRP ~~£269.99~~

OUR PRICE
£249.99



Grundig Yacht Boy 400

- 40 Memory channels
- Signal meter & carrying case
- 1.6 - 30 MHz
- Full s.s.b

129.95
+ £5 P & P



INCLUDING :

Free S.W. Antenna worth £14.99, FREE batteries, FREE Short Wave Frequency Book & FREE Headphones.

4th Edition Scanning Directory

£17.50

FREE P&P



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ALL MODE SCANNING RECEIVER
500KHZ - 1300MHZ
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purchase*

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PRO-2039 Base Scanner



200 channels with Hyperscan system which lets you scan at 25 or 8 channels per second. High speed search facility locates new and unlisted frequencies at a flash. Coverage: 68-88, 108-136.975 (AM), 137-174, 380-512, 806-960MHz.

Price £219.99 Save £70.

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For 1- 1300MHz BNC connector **£9.99/£1 p&p**



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— SKY SCAN —



Desk Top Antenna
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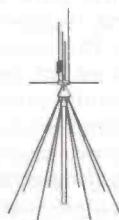
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ADI AR-146 2m Mobile Review

G4HCL tests a low cost, high performance mobile that packs a 50 watt punch on the airwaves

It's been said over the years that amateur radio is becoming more and more a 'chequebook' hobby, with the supposedly ever-increasing cost of Japanese 'black box' rigs. But things are changing. There's a 'new breed' coming onto the market, and the Japanese had better watch out. Manufactured in lower labour cost countries such as Taiwan, handheld rigs like those from ADI have been occupying quite a 'corner' of the market over the last year or so.

Technology is catching on, and I was very interested on receiving a sample of the first 50W 2m mobile rig to come from ADI in Taiwan, the AR-146. Priced at just £269, I feel it's destined to compete heavily in the market, and it's just the first of such rigs. That's because there's also a 70cm version, the AR-446, just 'round the corner'.

What's the difference?

The AR-146 looks much like many other 'basic' 2m mobiles, apart from the multi-function DTMF mic which comes as standard - you often have to pay dearly for this as an 'optional extra'. Within the set's case is a modern assembly of the latest chip-based circuitry, complete with a high power Toshiba PA module (rather than narrowband 'discrete' PA circuitry as I've seen in earlier sets from this region). Transmit power levels of 50W plus 'mid' and 'low' settings are switchable from the front panel, and a selectable 30 min transmit time-out timer prevents the 'stuck PTT' syndrome. Almost half of the set's depth is taken by the



substantial finned heatsink, even so the set measures just 140mm (W) x 40mm (H) x 166mm (D) and weighs a fairly light 1.2kg.

The receiver offers FM reception over the wide 130-174MHz range as well as 2m, and 40 memory channels plus a quick-access 'call' channel are fitted. Band scan, memory scan, program scan, all with time-operated and carrier-operated scan stop modes, as well as a 'dual channel watch' are fitted. The frequency, memory channel and so on are displayed on the set's front LCD, and as an alternative this may be programmed to instead display a large channel number only. A bargraph S meter is also

incorporated into the LCD, and a four-stage display dimmer saves distraction on the move while using the set at night.

Sub-tone encode is fitted as standard, with tone decode being available as a plug-in option for tone operated squelch use. To complement the supplied DTMF mic, DTMF selective calling is also available as a plug-in option, which includes a 'pager' function to let you know you've been called in your absence.

The mic has the usual up/down frequency/channel remote controls, plus additional buttons for selecting the call channel (which also provides a 1750Hz tone for repeater access when the PTT is



also pressed), VFO mode, memory mode, and 'MHz' step tuning for wider frequency shifts. For packet radio use, the front panel mic connector also carries receive audio at a fixed level of around 100mV.

On the air

Surely with all this, I thought the set *had* to have some 'nasty surprises' on air. But I didn't find any. My first tests were to really put the set through its paces, connected to my outdoor 2m aerial system. I usually suffer from a number of intermodulation problems on 2m when using handhelds, and the occasional 'low spec' mobile or base rig, like this. Not so with the AR-146, just nice, clean interference-free signals. Possibly not surprisingly, the 50W transmit signal from the set packed quite a 'punch' into distant repeaters, although I had to be careful to keep the heatsink well ventilated during long ragchews. My transmit audio was also reasonably punchy using the supplied mic, with no adverse comments being received.

I found the receive adjacent channel rejection, of both 12.5kHz and 25kHz signals, very good, and 'further out' even strong local signals from the bottom of the band (including packet signals on 144.65MHz) didn't cause me any problems.

On the move

I found the set quite easy to operate whilst on the move, my only slight 'gripe' being the small,

smooth knobs for volume, squelch and channel change which I found a little difficult to use, more so than with other rigs. However, I tended to use the mic-mounted buttons for frequency control and scan start/stop, the mic-mounted 1750Hz tone button being particularly useful on the move for accessing repeaters which didn't have a CTCSS access mode. The upward facing speaker gave quite a reasonable amount of receive audio, which I found was sufficient for normal driving although (as usual) I found motorway driving benefitted from an external speaker being plugged in. The set is supplied with a multi-angle mounting bracket for mobile use, which should allow installation in

most positions.

Overall, I had no on-air problems with the set, just plenty of trouble-free contacts!

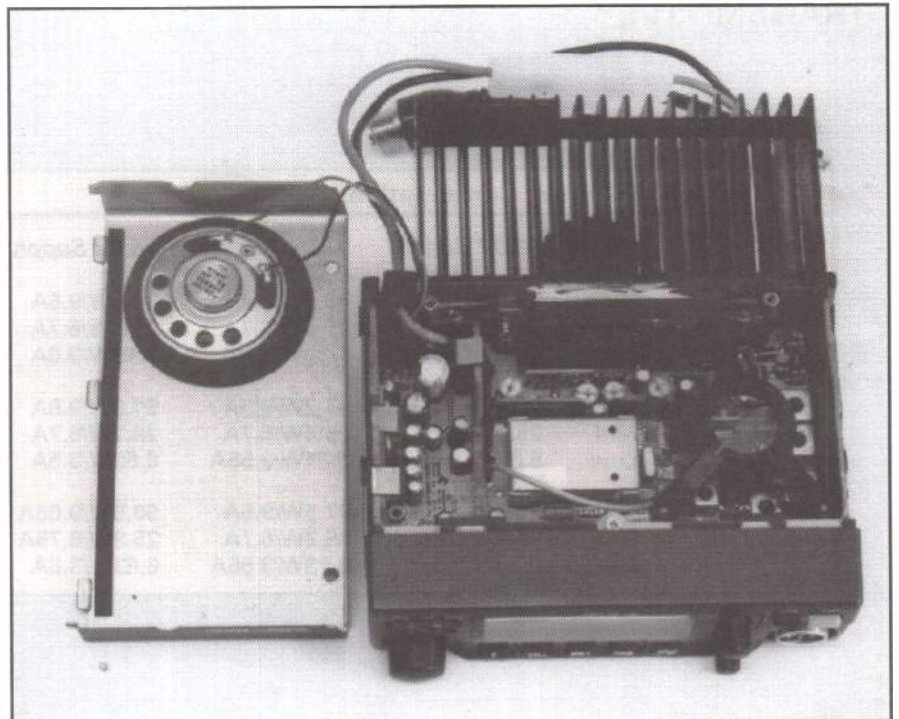
Lab tests

These showed both the transmitter, and receiver, to have a very good technical performance, no problems here. The receiver sensitivity was quite good in the centre of the band, although this tended to 'tail off' towards the band edges, unwanted signal rejection was however very good, as found on air. On transmit the harmonics were very well suppressed, the deviation and frequency being accurately aligned.

Conclusions

The AR-146 looks like it could very well be the first in a potential line of popular, 'no nonsense' rigs, offering the performance of much higher priced sets but at a significantly more affordable price level. I found the set performed very well on air, the high transmit power and good receive performance being well up with 'all the rest'. This set will, I feel, introduce some rather serious competition in the amateur radio market.

My thanks go to Waters and Stanton Electronics for the loan of the review transceiver.



LABORATORY RESULTS:

All measurements taken using stabilized 13.2V DC power supply and supplied DC lead, high power TX, unless otherwise stated.

Squelch Sensitivity;

Threshold; <0.06 μ V pd (<2dB SINAD)
Maximum; 0.24 μ V pd (18dB SINAD)

Sensitivity;

Input level required to give 12dB SINAD;

144MHz; 0.17 μ V pd
145MHz; 0.14 μ V pd
146MHz; 0.15 μ V pd

S-Meter Linearity;

	Sig. Level	Rel. Level
S1	0.26 μ V pd	-16.6dB
S3	0.27 μ V pd	-16.4dB
S5	0.50 μ V pd	-11.1dB
S7	0.86 μ V pd	-6.4dB
S9	1.79 μ V pd	0dB ref
S9+	3.35 μ V pd	+5.4dB
S9++	5.64 μ V pd	+9.9dB

Maximum Audio Output;

Measured at 1kHz on the onset of clipping (10% distortion), 8 ohm load;

2.37W RMS

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;

+12.5kHz; 55.3dB
12.5kHz; 47.1dB
+25kHz; 71.7dB
25kHz; 70.1dB

Image Rejection;

Increase in level of signal at 1st and 2nd IF image frequencies, and 'half 1st IF' over level of on-channel signal, to give identical 12dB SINAD signal;

Half 1st IF 82.3dB
1st Image 69.9dB
2nd Image 88.4dB

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;

+100kHz; 86.9dB
+1MHz; 96.3dB
+10MHz; 96.6dB

Intermodulation Rejection;

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

25/50kHz spacing; 70.5dB
50/100kHz spacing; 70.3dB



TRANSMITTER

TX Power and Current Consumption;

Freq.	Power	10.8V Supply	13.2V Supply	15.6V Supply
144MHz	High	30.8W/7.5A	46.2W/9.4A	49.8W/9.5A
	Mid	25.2W/6.7A	25.4W/6.7A	25.7W/6.7A
	Low	7.30W/3.6A	7.30W/3.6A	7.19W/3.6A
145MHz	High	29.6W/7.45A	47.2W/9.5A	51.0W/9.8A
	Mid	25.1W/6.7A	25.4W/6.7A	25.7W/6.7A
	Low	6.82W/3.55A	6.84W/3.55A	6.68W/3.5A
146MHz	High	29.9W/7.45A	47.5W/9.5A	50.5W/9.65A
	Mid	25.0W/6.7A	25.2W/6.7A	25.3W/6.75A
	Low	6.70W/3.55A	6.73W/3.55A	6.63W/3.5A

Harmonics;

2nd Harmonic; -82dBc
3rd Harmonic; -80dBc
4th Harmonic; -83dBc
5th Harmonic; <-90dBc
6th Harmonic; <-90dBc
7th Harmonic; <-90dBc

Peak Deviation;

4.78kHz

Toneburst Deviation;

3.13kHz

Frequency Accuracy;

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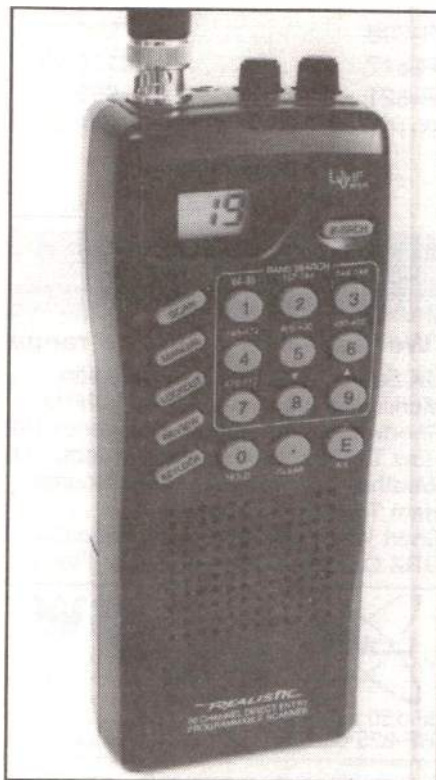
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Realistic PRO-27 Handheld Scanner Review

Chris Lorek takes a handy scanner on 'walkabouts'

I'm often asked the question; "What's a good 'entry level' scanner, one that's less than £100?". In the past, I've usually had to reply that there isn't one that I'd recommend. The reason for this is that, in this price bracket, such 'scanners' usually don't have a 'search' facility, and it's rather infuriating only being able to scan through, say 10 channels, all of which you've had to manually pre-program by direct frequency entry. Thus, you need to know the frequency of everything you want to listen to, first, and you can't scan across, 2m or 70cm, say, to find local activity. Such a limitation is, of course, quite OK for someone in a 'second' scanner or an additional monitor receiver for use in the shack besides the 'main' rig. But the beginner could have rather a boring time with such a set.

However, I think I may have found this elusive 'low cost starter' with the PRO-27. It's priced at a fraction below £100, and covers 66-88MHz, 137-174MHz, and 406-512MHz. Besides its 20 memory channels, which you can manually or automatically scan through after programming, it also has seven pre-programmed 'search bands' to find new, active frequencies. You do this simply by pressing the 'band search' (B-SRCH) button followed by a band number, 1-7, these respectively covering 66-88MHz, 137-144MHz, 144-148MHz, 148-174MHz, 406-450MHz, 450-470MHz and 470-



512MHz. Alternatively, you can also perform a 'direct search', up or down in frequency from a pre-programmed channel. In either case, the scanner halts when the squelch raises, and lets you listen to what it's found. You can then, if you wish, easily store that channel into one of the 20 memories for subsequent channel scanning.

With this economic price, there are, of course, bound to be some limitations. First off, if you're looking for an airband scanner you'll need to spend a bit more money, as the PRO-27 doesn't cover either civil (VHF) or military (UHF) airbands. Neither does it cover 900MHz, as used by

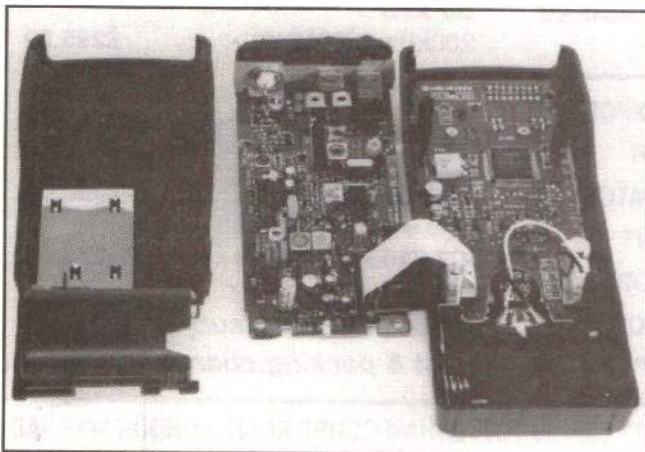
UHF CB and cellphones. You may also notice the two-digit display. This gives a direct indication of channel number and scan mode, but to view the received frequency at any time you'll need to press the 'Review' button. The frequency is then shown, the display sequentially 'cycling' through this one digit at a time.

The PRO-27 measures 162mm (H) x 69mm (W) x 39mm (D) and comes supplied with a set-top helical terminated in a BNC connector, belt clip, and instruction book. The set is powered by 4 AA sized batteries which you'll need to provide, either normal or rechargeable types may be used. Two DC sockets are fitted at the side of the set, one for nicad charging, the other for powering the set instead from a external 12V DC supply.

In use

I often use an 'old' Bearcat BC50 10 channel handheld scanner, which uses an identical method of scan and display, and I thus found the PRO-27 quite easy to use. However I feel that newcomers could take a short while to get used to the unique display, as I did several years ago. However, after such 'familiarisation', frequency entry, scanning, and searching for signals was very easy, indeed quite uncomplicated. Want to scan across 2m? Just press the 'B-SRCH' button followed by the '3' button (also marked 144-148MHz). When the set found an active frequency, I could give a quick press of the 'hold' (0) button to stay monitoring that frequency, the 'review' button letting me see the frequency the scanner was monitoring at any given time.

I found, on the two VHF ranges, that the scanner tuning in 5kHz steps only (in common with many other Realistic scanners), and not 12.5kHz as used in the UK, although UHF coverage was in 12.5kHz steps. This, I find, is a common limitation with such scanners, which are primarily designed for the North American





market rather than UK and Europe. The 'WX' button on the scanner also gives this away. Here the set cycles through 7 pre-programmed VHF weather channels, which again are only used in North America. I could, however, always enter 12.5kHz spaced frequencies, the set simply went to the nearest 5kHz increment, which caused me no real problems in use.

The scanner was quite light to carry around, the large plastic belt clip letting me use the scanner in 'hands free' mode with my earphone plugged into the set's 3.5mm headphone socket on the top panel. About the only limitation I found was that there was no LCD backlight, so I couldn't see what channel the scanner had stopped on at night without the use of a torch. I found the set was reasonably sensitive, both using the set-top helical and when plugged into my outdoor VHF/UHF aerial at home. In the latter case, the set did suffer the odd problem from other strong signals, which is to be expected, although I've encountered much worse performance from more expensive scanners!

Lab tests

The measured results show the scanner to have a similar technical performance to other such (and more expensive) dual conversion Realistic sets. Here, the only limitation I found was the rather poor image rejection on UHF, again in common to other such sets.

Conclusions

The PRO-27 operates, radio-wise, with the performance of its larger (i.e., more expensive) 'brothers' from Realistic. The main limitations in this set are in the number of available channel memories, bands, and display capabilities, these being reflected in an economic selling price. If you're looking for a sub-£100 scanner, either as a first set or a second unit to carry about, the PRO-27 could be a very tempting choice.

My thanks go to Link Electronics in Peterborough for the loan of the review scanner.

LABORATORY RESULTS:

All measurements taken at 145MHz, NFM, unless stated.

Sensitivity;	
Input signal level in μ V pd required to give 12dB SINAD;	
Freq.	Level
66MHz	0.28
78MHz	0.29
88MHz	0.40
137MHz	0.27
145MHz	0.28
165MHz	0.37
174MHz	0.49
406MHz	0.32
435MHz	0.47
450MHz	0.43
470MHz	0.38
500MHz	0.35
512MHz	0.44

Squelch Sensitivity;	
Level of signal required to raise receiver squelch	
Threshold;	0.34 μ V pd (18dB SINAD)
Maximum;	0.57 μ V pd (25dB SINAD)

Intermodulation Rejection;	
Measured as increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product;	
25/50kHz spacing;	55.7dB
50/100kHz spacing;	61.4dB
100/200kHz spacing;	59.9dB

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;	
+12.5kHz;	9.4dB
-12.5kHz;	8.7dB
+25kHz;	60.7dB
-25kHz;	59.5dB

Image Rejection;	
Difference in level between unwanted and wanted image (21.70MHz separation) signal levels, each giving 12dB SINAD on-channel signals;	
145MHz;	70.8dB
435MHz;	4.1dB

Blocking;	
Measured as 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;	
+100kHz;	60.1dB
+1MHz;	85.9dB
+10MHz;	93.0dB

Maximum Audio Output;	
Measured at speaker/earphone socket, 1kHz audio at the onset of clipping (10% distortion), 8 ohm resistive load;	
83mW RM	



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SCANNERS

Bill Robertson shows how to receive 'spy stations' on your scanner!

As promised in my last column, this month I'm taking a look at the mysterious 'numbers stations' you hear on HF, as well as a rather interesting book.

Uno, dos, tres

Tune across the HF range, let's say somewhere between 6MHz and 16MHz, and besides the usual broadcast, amateur, and commercial stations, you may well come across several speech transmissions which all seem to be monotonously repeating a set of numbers or letters. Listen for some time, and from day to day, and you'll find these change. What are they? I'm told that one source (from the GCHQ, no less) has in the past broadcasted the fact on the BBC World Service that these are navigational signals for boats on the Rhine. Pull the other one, mate! These signals, in their various form have been going on for years, well throughout the 'cold war', and it doesn't take much imagination to conclude the most probable reason for these are for coded covert, or 'spy' communication. There are many such transmissions, one type is reputed to be government communication to agents regarding the current political state, and any cautions to be taken or action to be avoided.

The signals are usually reasonably strong, and are normally located in otherwise 'quiet' parts of the HF bands, no doubt to facilitate reception using portable domestic type receivers which can no doubt be freely carried across country boundaries without suspicion. Unlike sophisticated satellite based communication systems, as you'd normally expect from today's spies!

'Numbers' station frequencies

Here are some reported numbers station frequencies which you may care to try. All are given in MHz, the mode in each case being Upper Sideband (USB);

English; 7.859, 9.041, 9.096, 11.123, 13.423, 15.450, 15.732, 15.938, 16.395, 18.356, 20.011, 20.368, 20.524, 20.872, 23.104.

German; 8.120, 10.135, 11.273, 11.4415

Spanish; 6.802, 7.725, 10.324, 10.665, 11.491, 12.2625, 12.3005, 14.421

Interproducts in Perth publish a useful book 'Intercepting Numbers Stations' by Langley Pierce (£9.95, ISBN 0 9519783 4 9) if you're interested in reading a lot more on this, including details of 'code breaking' tactics!

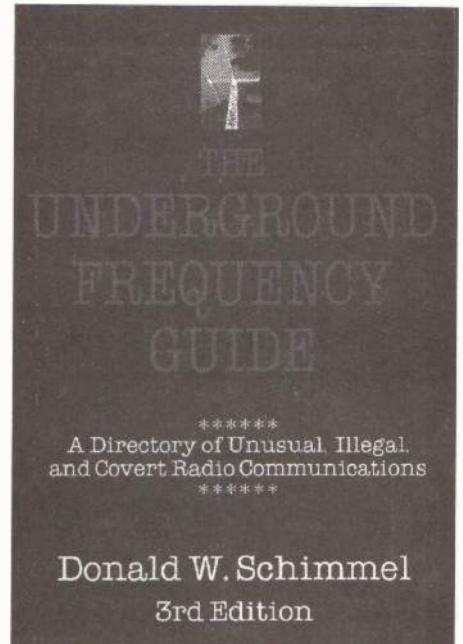
New station

The ILA (International Listener's Association) newsletter, 'Just Listening', has recently been carrying a series of short articles on this subject by Jim Bradbury. In here, Jim says that a new station has come to light using English language. Its nickname is 'Magnetic Fields' and starts its broadcast using a musical introduction from a Jean Michel Jarre recording of the same name. Jim suggests trying monitoring it on Mondays 18.00, on 6.647MHz. For more information on the ILA, see the November 1995 'Scanners' column, or drop an SAE to the ILA, 1 Jersey Street, Haford, Swansea SA1 2HF

The underground frequency guide

On a related subject, this guide, as its sub-title suggests, is a book dealing with unusual, illegal, and covert radio communications. It's exclusively concerned with HF (short wave) communications, and the author, Donald Schimmel, has obviously been on the trail of many short wave mystery signals for several years. In this book he's compiled hundreds of active frequencies used by all manner of unusual stations. These include 'numbers' stations (of course!), mystery networks including diplomatic traffic, smugglers, and several strange sounding 'raspers', 'chirpers' and 'mystery translators'.

209 pages, softback, ISBN 1-878707-17-5, it's published by Hightext Publications in the US (PO Box 1489 Solana Beach, CA 92075) at US\$14.95, and you should be able to order it from your bookshop or specialist radio book supplier.



The Underground Frequency Guide

New handheld

A new lost cost 20 channel handheld has been launched by Realistic, this being the PRO-27. It's a 'twin brother' to the PRO-50, and is due to sell for just under £100. (You'll see a review of this elsewhere in this issue - Ed).

That's all I've room for this time, as the Editor's got me helping the team to prepare an AR-3000A modification article for this issue also. As usual, if readers would like any specific scanning topics covered in this column, or if I can help with a question on hobby radio listening, please do drop me a line. See you next month.

Bill Robertson is pleased to hear from readers and answer queries through this column - address your letters to; Bill Robertson, c/o HRT Editor, Nexus, Nexus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST, or by fax or email to the Ham Radio Today direct Editorial contact points.

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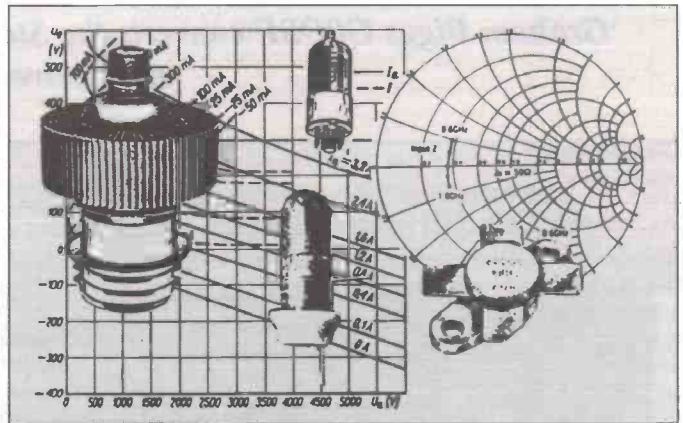
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Storno 5000 Conversion

Graham Biggs G0OSF converts the Storno CQM 5662S synthesised ex-PMR transceiver to 70cm



First of all you will require two series resonant crystals to Storno specification 98-0157. The first is 47.70000MHz and the second 45.32223MHz.

Referring to Fig.1, unscrew the top cover and remove the small PROM board (do not discard this board) then disconnect and remove all boards except the synthesizer. Remove all wiring to the synthesizer board.

Remove the RF screen (metal casing) from the synthesizer card and unscrew and carefully remove the synthesizer board. Refer to Fig.2 and check the transistor - if it is in fact a FET then you can skip the next paragraph after removing the RF screen, if it is a transistor then follow these instructions.

Carefully unsolder R1 and replace with a 39k 5% 0.125W resistor. Unsolder R2 and replace with a 4k7 5% 0.125W resistor. Add wire links and 560R 5% 0.125W resistor as shown in Fig.2. If you want a visual indication that the power is on and the 8.5V supply is working, then refer to Fig.2 and unless already fitted, connect the components and LED as shown (the LED is soldered directly to the board holes). This will act as an on/off indication and

will only light when the 8.5V stabilised supply is available. Replace the synthesizer card without the screening can, ensuring that all the screws (except those from the screening can) are replaced and tight, as some of these are used as earthing points, without which the synthesizer will not work.

Remove the transmit crystal and replace with the 47.7MHz crystal. Replace the receive crystal with the 45.32223MHz one (Fig.3). Connect the PTT switch and the 12V supply by soldering to the rear connector pins (Fig.4). By not connecting the PA supply at this stage prevents any damage and removes the need for a dummy load at the moment.

Switch the set on at the front panel. Using a counter with a simple coupling loop placed over the receive crystal oscillator (Fig.3), adjust L2 until the frequency is 45.32223MHz or as near as possible. Using a millivoltmeter or scope and diode probe connected to TP1, adjust L7 for maximum DC reading. Place coupling loop over C2, adjust C2 until the frequency reads 137.03MHz. Using a voltmeter, measure the voltage on TP6. When the synthesizer is 'in

lock' this voltage should be between 7.8 and 8.2V. Switch the set off. Take the PROM card removed earlier and remove the PROM from its socket. Carefully place the card onto its original connectors. Don't force it all the way down because there is no screening can - just make sure the connectors make contact. The receiver VCO should now be set to 138.09583MHz corresponding to a final receive frequency of 435.6875MHz which is the upper limit. Check that TP6 still indicates 'in lock'. If not adjust C2 until the synthesizer locks and then go back to check, with PROM board removed, that the synthesizer is still locked. Once this is achieved the transmit VCO is now configured.

Using a counter with a simple coupling loop placed over the transmit crystal oscillator, adjust L1 until the frequency is 47.7MHz, or as near as possible with the PTT pressed. Using an RF millivoltmeter or diode probe connected to TP1, adjust L4 for maximum DC reading. Place coupling loop over C1 and,

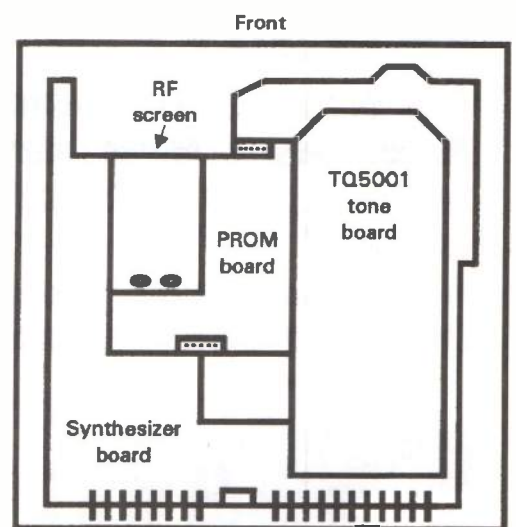
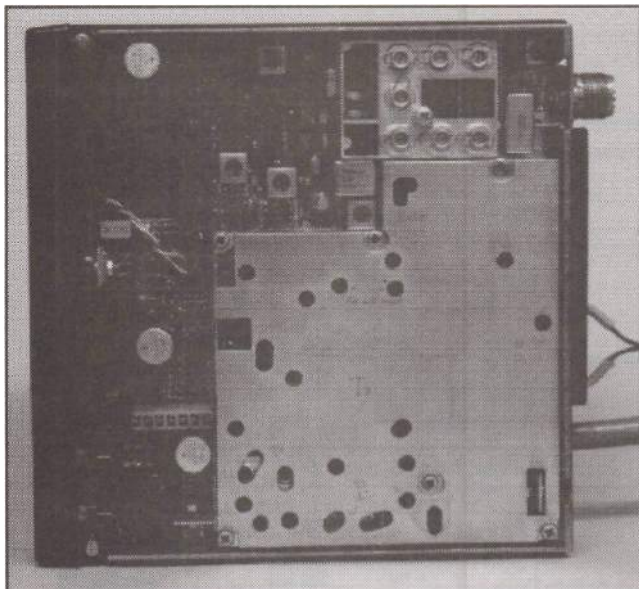


Fig. 1 Board location (top)



gold coloured ones from either side of the RF output transistor (see Fig.6) - keep these screws separate as they are a different size to all the others. Turn the set over and gently unscrew the hexagonal locknut from the underside of the smaller output driver transistor. Now carefully remove the transceiver board. There is a small board shown in Fig.5 which must be desoldered.

with PTT pressed, adjust C1 until the frequency reads 144.16667MHz.

Using a voltmeter, measure the voltage on TP6 with the PTT pressed. When the synthesizer is 'in lock' this voltage should be between 7.8 and 8.2V. Switch the set off. Again, take the PROM card removed earlier and remove the PROM from its socket. Carefully again place the card onto its original connectors, making sure you again don't force it all the way down because there is no screening can - just make sure the connectors make contact.

The transmit VCO should now be set to 145.22917MHz, with PTT pressed, corresponding to a final transmit frequency of 435.6875MHz which is the upper limit. Check that TP6 still indicates 'in lock'. If not, adjust C2 until synthesizer locks and then go back to check with PROM board removed that the synthesizer is still locked, making sure you press the PTT each time the check is made. Once this is achieved the transmit VCO is configured.

Switch the set off. Refit the synthesizer screening can. Re-check both the crystal oscillators and adjust as above if necessary. The synthesizer is now configured. Switch the set off.

Unscrew the bottom cover to expose the transceiver board and RF screen. Carefully remove the RF screen by unscrewing the six screws and inverting the set. Refer to Fig.5, if the extra board is fitted then proceed, if not then go to the paragraph 'Transmitter alignment'.

Remove all the other screws from this board including the two small

and its driver has not been wiped off and screw down. Don't forget the locknut on the driver transistor (do not overtighten).

Transmitter alignment

Now the transmitter board is ready for setting up. Refer to Fig.6. Switch the set on. When the PTT switch is pressed the red 'TX on' LED should light. Place a diode probe on TP1 and adjust L1 for maximum reading when PTT is pressed. Move the diode probe to TP2 and adjust L2 and L3 for maximum reading when PTT is pressed.

Place the diode probe on TP3 and adjust C1 and C2 for maximum reading with PTT pressed (you may not need to move these much). Switch the set and supply off. Add the +12V link on the rear connector to the PA supply (Fig. 4). Connect a dummy load capable of at least 20W to the RF socket. Switch the supply and set back on. Place a diode probe onto TP4 and adjust C3 and C4 for maximum reading when PTT is pressed.

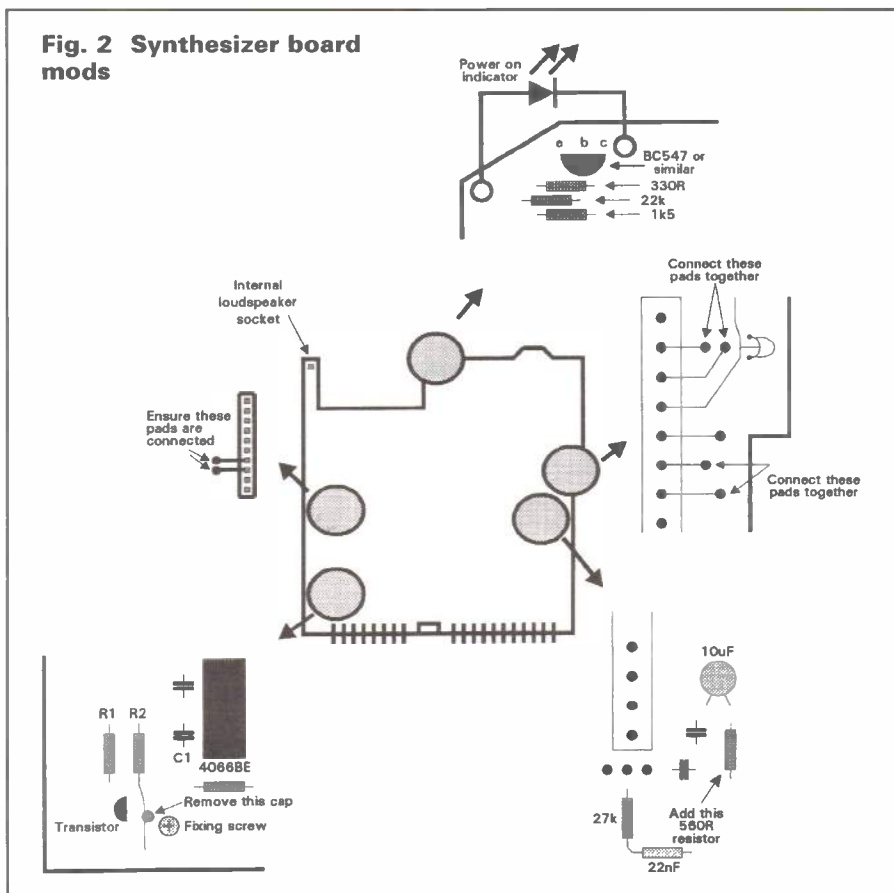
The transmitter is now tuned

Once this is done a

6k8 5% 0.125W resistor must be soldered into the place shown on Fig.5 as R10. Similarly a 4k7 5% 0.125W resistor must be soldered into the place shown in Fig.5 as R11. Solder a 1N4148 silicon diode into the place marked as D1 on the diagram.

Refit the transceiver board ensuring that the heatsink compound on the power transistor

Fig. 2 Synthesizer board mods



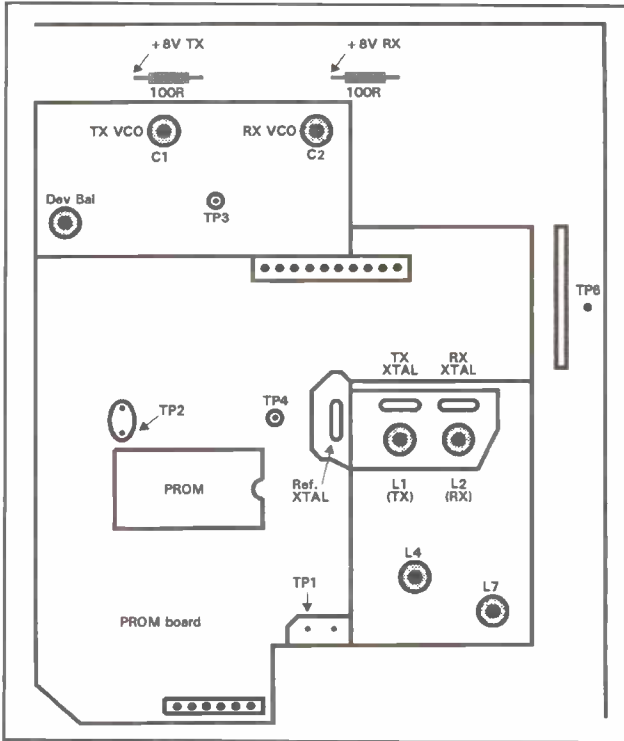


Fig. 3 Synthesizer board test points

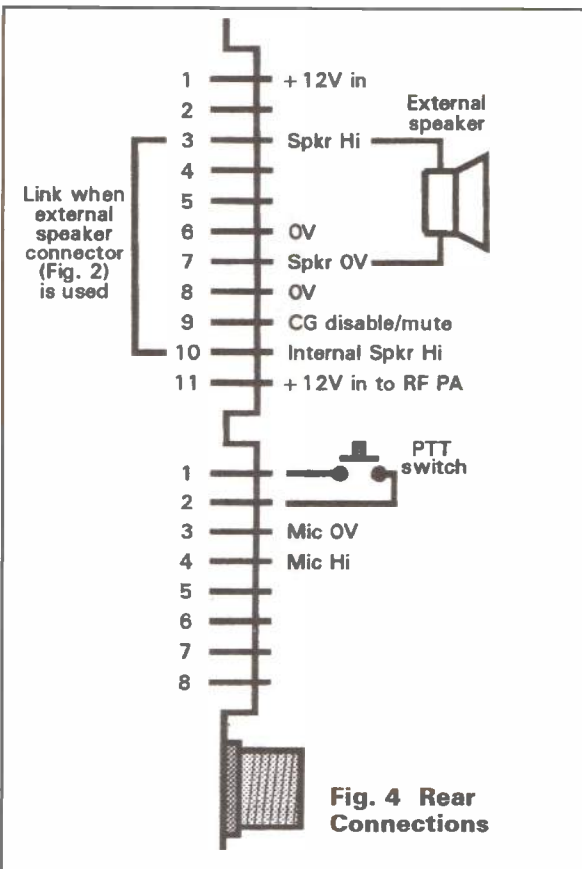


Fig. 4 Rear Connections

since the PA is wideband and will draw some 5 to 6A when transmitting on full power. The power output can now be set if required using an appropriate

With the set still switched on, place a diode probe onto TP10 and adjust L4, L5 and receive local

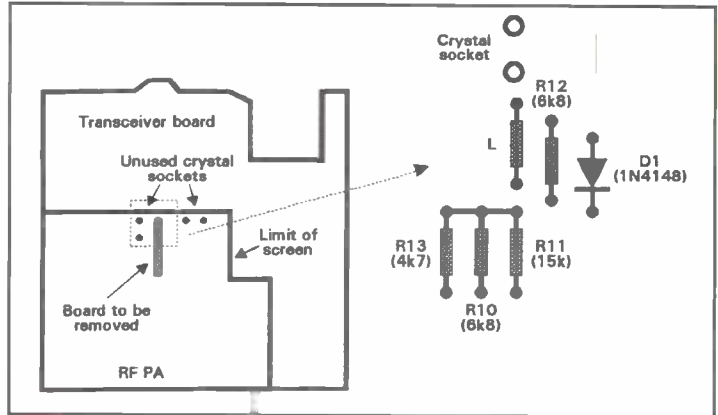


Fig. 5 Transceiver board mods

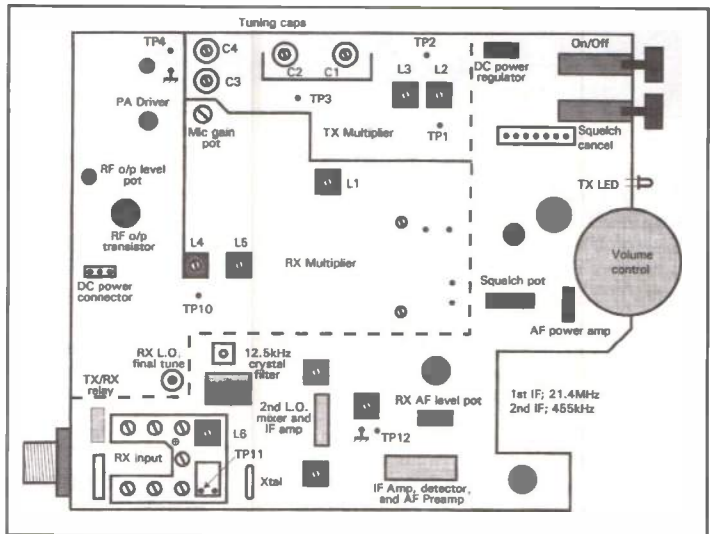


Fig. 6 Transceiver board layout

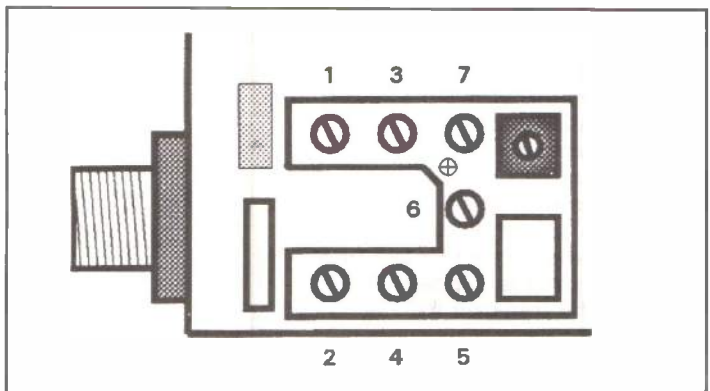


Fig. 7 Receiver tuning points

power meter and the control shown in Fig.6 (full clockwise is maximum).

Receiver alignment

oscillator final tuning capacitor (Fig.6) for a maximum reading. If you place a coupling loop over this tuning capacitor and connect to a frequency meter, the frequency here will be 21.4MHz lower than the frequency that the set is tuned to. Switch the set off and replace the RF screen. Refer to Fig.4 and, if no speaker already fitted, either connect a 4 or 8 ohm speaker to the rear connector as shown for an

external speaker, or put the link in for an internal speaker and connect it to the connector as shown in Fig.2.

Switch the set back on. Connect a signal generator, or use transmissions from another set close by, with the frequency set to 432.5MHz. Refer to Fig.7. With the 'squelch cancel' switch pressed, adjust the points 1 to 7 in turn to reduce the hissing noise in the speaker. As the hissing noise is reduced and the tone increases in volume, begin to reduce the input signal level so that the hiss comes back up and then go back to the adjustment. Keep going back until you are confident that it is tuned to the best of your ability.

The set is now converted and the bottom cover can be replaced. If it is purely for packet, then the packet output can be connected to the mic connections shown in Fig.4 and the LS output from the set can be connected to your TNC or whatever. Refer to the channel programming table for programming.

For voice communication then a small mic amp as shown in Fig.8 should be employed. Also the crystal filter (Fig.6) may be a little narrow and clip the signal. If this is the case then it would need replacing with a 25kHz type. Deviation level can be adjusted using the mic gain pot (Fig.6).

An EPROM board for multi-channel operation for these and the 2 metre 5114S models is planned for next month's issue, space permitting.

Queries regarding this conversion must be addressed to the author, enclosing a stamped self-addressed envelope if a reply is required. Write to; Graham Biggs G0OSF, 16 Maple Drive, Newport, Isle of Wight PO30 5QP. Any reported corrections to this feature over the next 12 months will be given on the Ham Radio Today 24hr info line, Tel. 01703 263429.

Please do not contact the magazine staff or the publishers (Nexus) for sources of specific ex-PMR equipment, as they cannot help. Check your local rallies and Ham Radio Today advertisements for this. If you have a copy of the '2-Way Radio Conversion Handbook' published by Argus Books (available from Ham Radio Today advertisers Poole Logic, Tel. 01202 683093), this also contains a list of ex-PMR dealers and suppliers.

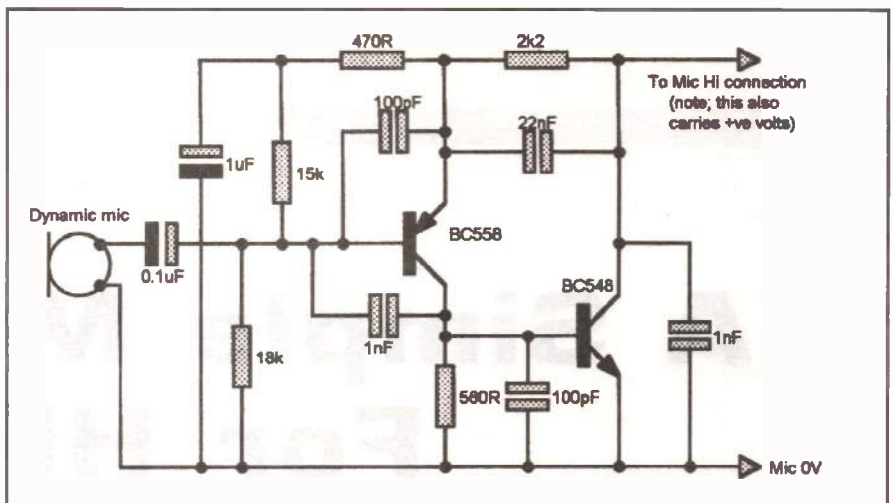


Fig. 8 Mic amp

Frequency programming

If the old PROM card is plugged back in with the PROM removed, then to obtain the frequency required, look it up on this table and then simply connect the PROM pins marked '0' to 0V. You can pick 0V on PROM pins 8 and 15.

	27	26	25	24	23	22	21	20
PROM pin No's	9	7	6	5	4	3	2	1
Freq (MHz)								
432.500	0	0	0	0	0	0	0	0
432.600	0	0	0	0	1	0	0	0
432.625	0	0	0	0	1	0	1	0
432.650	0	0	0	0	1	1	0	0
432.675	0	0	0	0	1	1	1	0
432.700	0	0	0	1	0	0	0	0
433.000	0	0	1	0	1	0	0	0
433.025	0	0	1	0	1	0	1	0
433.050	0	0	1	0	1	1	0	0
433.075	0	0	1	0	1	1	1	0
433.100	0	0	1	1	0	0	0	0
433.125	0	0	1	1	0	0	1	0
433.150	0	0	1	1	0	1	0	0
433.175	0	0	1	1	0	1	1	0
433.200	0	0	1	1	1	0	0	0
433.225	0	0	1	1	1	0	1	0
433.250	0	0	1	1	1	1	0	0
433.275	0	0	1	1	1	1	1	0
433.300	0	1	0	0	0	0	0	0
433.325	0	1	0	0	0	0	1	0
433.350	0	1	0	0	0	1	0	0
433.375	0	1	0	0	0	1	1	0
433.400	0	1	0	0	1	0	0	0
433.425	0	1	0	0	1	0	1	0
433.450	0	1	0	0	1	1	0	0
433.475	0	1	0	0	1	1	1	0
433.500	0	1	0	1	0	0	0	0
433.525	0	1	0	1	0	0	1	0
433.550	0	1	0	1	0	1	0	0
433.600	0	1	0	1	1	0	0	0
433.625	0	1	0	1	1	0	1	0
433.650	0	1	0	1	1	1	0	0
433.675	0	1	0	1	1	1	1	0
433.700	0	1	1	0	0	0	0	0
433.725	0	1	1	0	0	0	1	0
433.750	0	1	1	0	0	1	0	0
433.775	0	1	1	0	0	1	1	0
434.600	1	0	1	0	1	0	0	0
434.625	1	0	1	0	1	0	1	0
434.650	1	0	1	0	1	1	0	0
434.675	1	0	1	0	1	1	1	0
434.700	1	0	1	1	0	0	0	0
434.725	1	0	1	1	0	0	1	0
434.750	1	0	1	1	0	1	0	0
434.775	1	0	1	1	0	1	1	0
434.800	1	0	1	1	1	0	0	0
434.825	1	0	1	1	1	0	1	0
434.850	1	0	1	1	1	1	0	0
434.875	1	0	1	1	1	1	1	0
434.900	1	1	0	0	0	0	0	0
434.925	1	1	0	0	0	0	1	0
434.950	1	1	0	0	0	1	0	0
434.975	1	1	0	0	0	1	1	0

A Simple Marker For HF

Raymond Haigh shows how to build a useful and low cost alignment aid for setting up your HF receiver

This simple and inexpensive unit was designed with the constructors of the direct conversion receiver for the amateur bands recently published in *Ham Radio Today* very much in mind. It will, however, have a much wider application in the workshop. There must be many readers whose attempts to develop simple receivers for the amateur bands have been frustrated by the lack of a reliable and consistent frequency reference.

A signal generator or an accurately calibrated receiver can be used to pinpoint the bands, but not all constructors have access to equipment of this kind. An expensive signal generator is not, of course, required for the alignment of simple TRF and direct conversion receivers, but without some means of locating the amateur bands the constructor is left with the difficult task of searching the expanse of the HF spectrum. Activity on the amateur bands, especially on 14MHz and above, is variable and unpredictable, and this makes searching by tuning and listening a very tedious, if not impossible, business. By picking up signals from the local oscillator or regenerative detector in the newly constructed set, a receiver with an accurate dial can be used for band identification purposes. Again, however, not everyone has ready access to equipment of this kind.

Crystal markers which inject signals at 100kHz and/or 1MHz intervals are invaluable for dial calibration, but not a lot of use for pinpointing the actual frequency allocations. This simple unit works on the same principle, but uses a



crystal with a higher fundamental frequency and relies on the harmonic relationship of the HF amateur bands to inject appropriate markers. A suitable crystal is available cheaply, and most constructors will already have the remaining components in their spares box. Even if all of the parts have to be purchased, the total cost, excluding the plastic case, should be less than £2.00.

The Circuit

The theoretical circuit of the unit is given in Fig. 1. TR1 is arranged as a Colpitts oscillator, with positive feedback from the emitter connected to the resonant circuit via the capacitance tap formed at

the junction of C2 and C3. Quartz crystal, X1, takes the place of the usual inductor/capacitor tuned circuit, and determines the frequency of oscillation within very precise limits. C1, the crystal loading capacitor, is often combined with a trimmer used to 'pull' the working point of the crystal to some precise frequency (the possible frequency shift is very slight, no more than a few parts in 10,000). This facility is not required in this application.

R1 and R2 bias the transistor. RF output is developed across the emitter load resistor, R3, and connected to the output socket via DC blocking capacitor, C4. The unit is powered by a small 9V battery, and S1 is the on/off switch.

Components

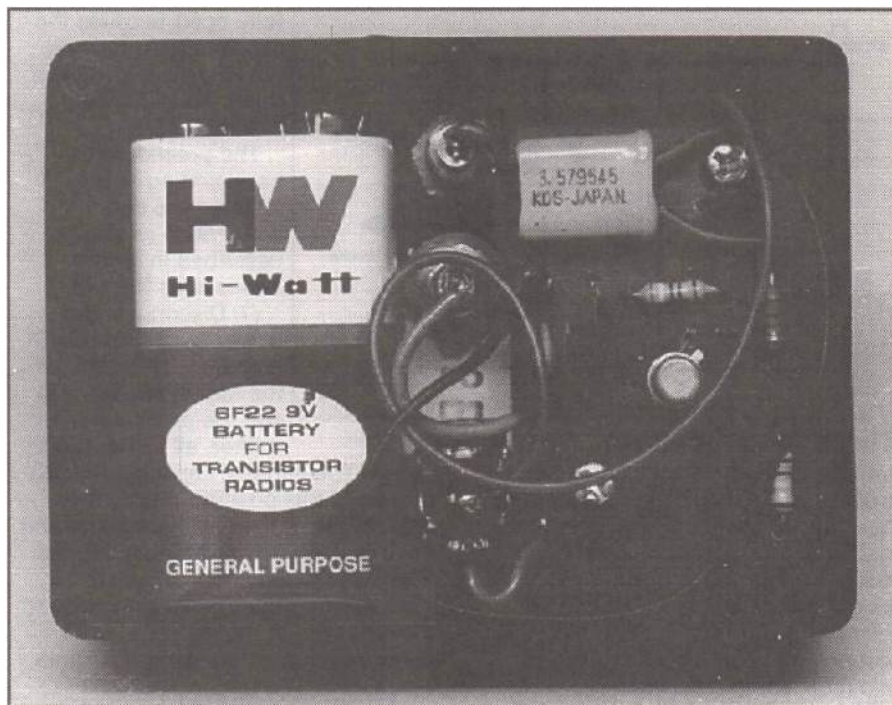
Almost any small signal NPN transistor will function in this circuit, but if one has to be purchased the BC109C, with its high h_{FE} and f_T , is recommended.

A 3.579545 MHz colour sub-carrier crystal, manufactured for use in American TV receivers, is used as the frequency determining element. A crystal cut precisely to 3.5MHz would produce more usable markers, but all we are looking for here is some means of pinpointing the bands and a crystal of this kind would cost many times more than the readily available item.

Capacitor types are not critical in this application, but the PCB has been designed around the use of ceramic components for C1, 2, and 3, and silver mica or even polystyrene types would probably be too large.

Construction

The components are all mounted on a small PCB. The copper track side of the board is illustrated in Fig. 2, and the component side in Fig. 3. The layout allows long leads to be left on the crystal to avoid soldering close to its base. Tie the crystal case down with thread or stick it to the



PCB. Vero pins inserted at the lead-out points simplify off-board wiring.

Housing the unit

The assembled PCB together with the on/off switch, output terminals and 9V PP3 battery can all be accommodated in a standard 75 x 56 x 25mm plastic case.

Principle of operation

The circuit oscillates at the crystal fundamental frequency and also at rising odd and even harmonics. The relationship between the various HF amateur bands and the marker frequencies is shown in Table 1. All frequencies are expressed in MHz and, for convenience, the fundamental of the crystal has been rounded up to 3.58MHz.

From the table it will be seen that, by using the fundamental frequency and various harmonics of the one crystal, markers can be injected into the receiver under calibration within, or very close to, all of the HF amateur bands.

Using the Marker Unit

The marker oscillates vigorously and direct connection with the receiver under alignment is not likely to be necessary. Just placing it close to the receiver aerial socket or the part of the circuit to be aligned or calibrated will usually provide sufficient signal injection. Indeed, it may be necessary to place the marker a metre or so away from TRF receivers in order to prevent detector overload and the complete suppression of regeneration.

The marker signal is not, of course, modulated, and any BFO in the receiver should be turned on, or any regeneration control advanced

Table 1.

Band	Marker frequency	Crystal Harmonic
80 metre 3.5 to 4 (3.5 to 3.8 in UK)	3.58	fundamental
40 metre 7 to 7.3 (7 to 7.1 in UK)	7.16	second
30 metre 10.1 to 10.15	10.74	third
20 metre 14 to 14.35	14.32	fourth
15 metre 21 to 21.45	21.48	sixth
12 metre 24.89 to 24.99	25.06	seventh
10 metre 28 to 29.7	28.64	eighth

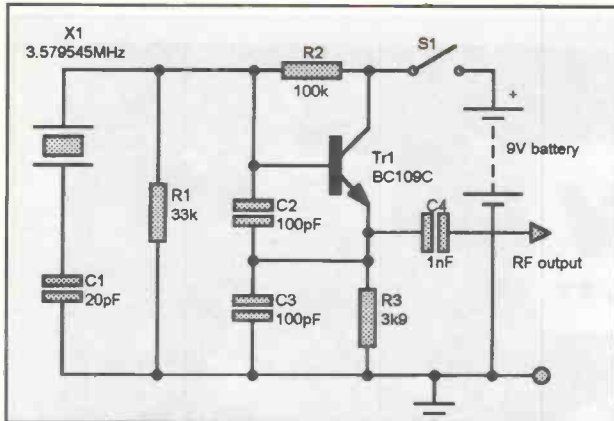
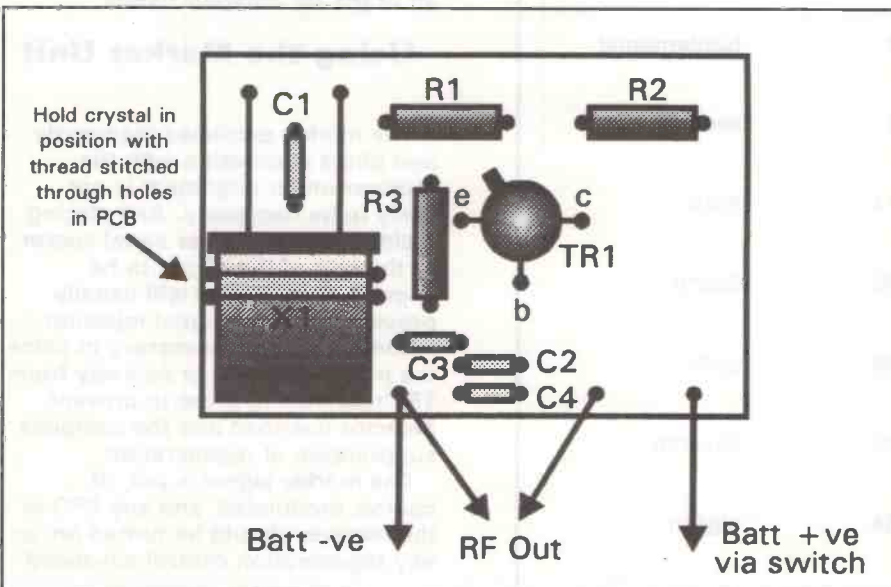


Fig. 1 Circuit diagram

until the detector is oscillating, in order to make the marker audible. If these facilities are not available, the marker signal can usually be recognised by the faint heterodyne whistles and hissing which can be heard as it is tuned in. Switching the unit on and off will confirm that the marker is being received.

Amateur band receivers have to be set to tune over very narrow segments of the HF spectrum and regard must be had to the position of the marker in relation to the band edges. Table.1 lists the frequencies generated by the unit and this will enable the tuning capacitor to be appropriately positioned before the setting up process begins. For example, the marker for 80m is at 3.58MHz, close to the LF end of the band, and the tuning capacitor must, therefore, be rotated fairly near to full mesh before setting the tuning inductor to zero beat with the injected signal. Conversely, if the receiver is being set to the UK allocation for 40m, the tuning capacitor should be turned almost

Fig. 3 PCB, Component side



fully open because the marker is just beyond the HF end of the band (band edge 7.1MHz, marker 7.16MHz).

The procedure for band-setting and aligning the direct conversion receiver described in recent issues is as follows;

(1) Disconnect the power supply to the RF amplifier, TR1, and set the tuning capacitor to suit the particular band marker, all as described

above. The variable capacitor should remain in this position during the adjustment of the oscillator stage and the initial alignment of the bandpass filter which follows the RF amplifier.

(2) Position the marker unit close to the input pin of the NE602 mixer/oscillator chip, set the AF gain

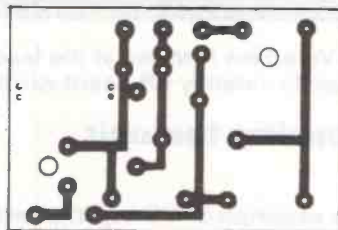


Fig. 2 PCB, track side, shown full size

control to mid-travel, and slowly rotate the core of L4 until the marker tone has been located and tuned to zero beat (the point of silence between two rising tones).

(3) Reconnect the power supply to the RF stage, set the RF gain control

mid-travel, and place the marker close to the aerial socket. Starting with the cores of L1 and L2/L3 two turns down from the top of the can, adjust them slowly until the marker frequency can be heard in the speaker. In cases where the circuits are very badly out of alignment at the outset, the marker output socket may have to be connected to the receiver's aerial terminal. As the bandpass tuner inductors are brought into alignment it will be necessary to turn down the RF gain control and probably to move the marker unit away from the receiver.

(4) Connect an aerial and earth to the receiver and tune it over the band. If it is active, a number of SSB and CW signals should be heard. Carefully stagger the tuning of L1 and L2/L3 to even out the response of the receiver across the band. The alignment of the receiver is now complete.

Queries regarding this project should be addressed to the author Raymond Haigh, c/o Ham Radio Today Magazine, enclosing a stamped self-addressed envelope if a reply is required. Any reported updates or corrections to this feature over the next 12 months will be given on the Ham Radio Today 24hr info line, Tel. 01703 263429.

Components List

Resistors;

(all 1/4W, 5% or better).

R1	33k
R2	100k
R3	3k9

Capacitors;

(all ceramic and all 16V working or greater).

C1	20pF
C2	100pF
C3	100pF
C4	1nF (0.001µF).

Crystal;

3.579545 MHz colour sub-carrier crystal for American standard NTSC television receivers.

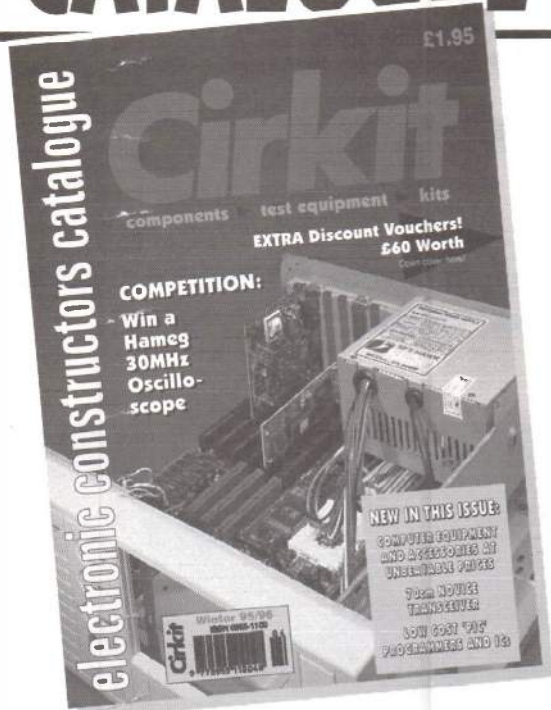
Semiconductors;

TR1 BC109C

Sundry Items;

PCB making materials, Vero pins, miniature toggle switch, output sockets, battery connector, PP3 battery, plastic box 75 x 56 x 25mm.

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AR3000A Modifications (Part 1)

The Ham Radio Today Editorial staff reveal how to upgrade your AR3000 or AR-3000A to the high performance 'plus' version

If you saw the July 1995 issue of Ham Radio Today, you'll have seen a review of the upgraded AR3000A 'Plus'. This adds the facilities of a WXSAT IF bandwidth, direct discriminator output, narrow/wide AM bandwidth, an IF output socket to link to the SDU500 spectrum display, and tape recorder compatibility. The modifications could, if you wish, be carried out professionally by AOR UK (as they still can if you're worried about 'delving inside' yourself!). But if you'd like to upgrade your AR3000 or AR-3000A, here's your chance, with full modification details.

The following modifications were originally developed by AOR (UK) Ltd. as a result of popular requests by enthusiasts. They are described individually and can be carried out on that basis but when all modifications are done together they are collectively known as the "AR3000A Plus" modifications. Our thanks go to AOR (UK) for their extensive help and information provided for this project.

The remainder of the modifications are planned for inclusion in next month's magazine. An information package of circuit and component layout diagrams plus large copies of *all* diagrams reproduced here, for this and next month's modifications, is available to readers, this will be available for up to 12 months from the date of publication of this and next month's issue. This is available for an A4 SAE stamped for 100g weight and marked *AR3000 mods*, plus the *original* corner flash (photocopies will *not* be accepted) from this article, sent to the Ham Radio Today Editor at the magazine's Nexus Head Office address in Hemel Hempstead (see rear of mag).



The AR-3000A

Preliminaries

The degree of difficulty in carrying out the modifications varies considerably. The discriminator modification simply involves the addition of one wire, whereas the narrow AM filter uses very delicate surface mount components, fine wiring and the drilling of a hole in the main PCB. We thus recommend that the instructions are read *very* carefully, and you should be confident of your technical capabilities before attempting *any* modifications (which will invariably affect any guarantee cover). This is *not* a 'beginner's project! However, no test equipment should be needed for carrying out the modifications, but a basic DVM (Digital Volt Meter) is useful for fault finding. All

modifications can be checked using off-air signals, and where applicable the AOR SDU5000 monitor where this is also being used. These mods have been carried out successfully, many times, in the past based on the following information. *The Editorial staff therefore cannot provide a 'help' service to readers apart from the above detailed photocopied further information.*

It's important, and of course assumed before starting these modifications, that your AR3000 or AR3000A is in full working order and that no previous modifications have been carried out. All descriptions here are based on the fact that the IF board has been removed from the set. However this isn't actually needed for some of the simpler modifications, and partial removal is recommended by removing the five coaxial connectors on the front of the

board and hinging the board on its remaining wiring loom over the back of the set.

In all the descriptions the front panel should be facing towards you (described as the "front") and naturally the rear panel thus being away from you (the "rear"). Where the colour of additional wires is given, it is simply for clarity of description and is based on the original development of the modification. Components described are again based on those used in the original development and in most cases can be substituted. Suggested suppliers are however given where the component is of a more specialised nature.

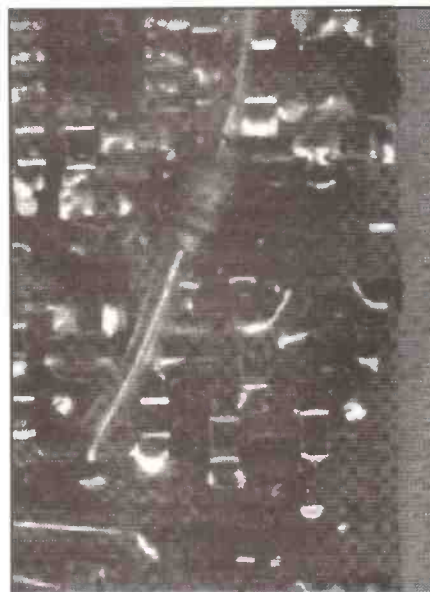
WEFAX satellite narrower switchable filter

The WEFAX custom modification has been designed to optimise the receiver's passband for reception of orbital weather satellites operating in the VHF band around 137.500MHz, and geostationary satellites operating in the UHF band around 1691MHz. Ideally an IF bandwidth of 30-50 kHz is required for reasonable results, unmodified the AR3000 / 3000A is too narrow on NFM and too wide on WFM.

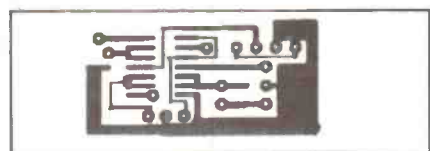
A small PCB is mounted on the IF PCB, which holds both the original WFM filter (for Band II and TV sound reception) plus a new filter offering approximately 50kHz bandwidth. The WFM filters are switched using an IC



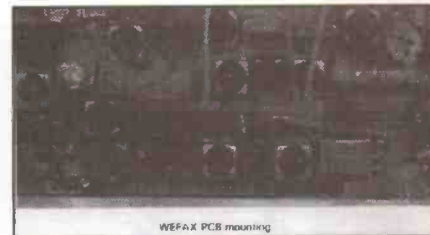
WEFAX filter mod - add supply, red wire



WEFAX mod - replace R57 4k7 with a 1k0 resistor



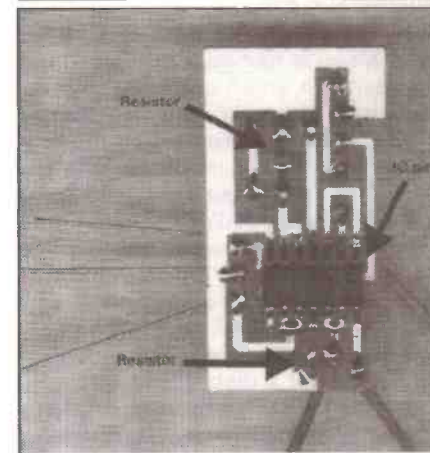
WEFAX sub PCB, track side, shown full size



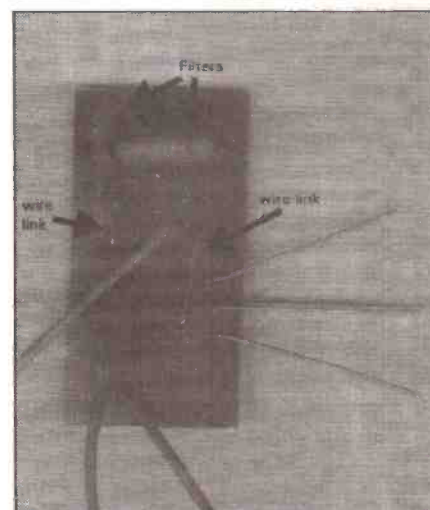
WEFAX PCB mounting



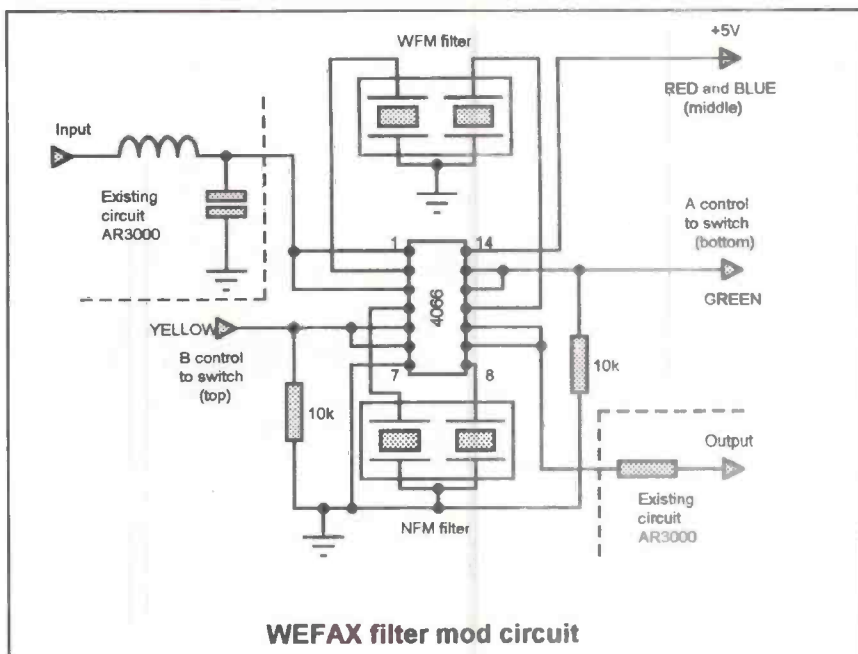
Discriminator mod - add output wire to pin 9 of the MC3357 IC

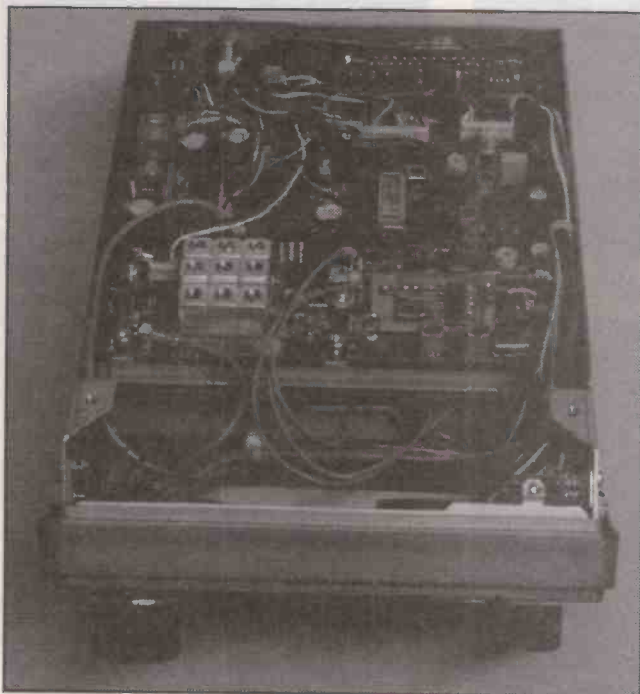


WEFAX sub PCB, track side, components fitted



WEFAX sub PCB, filters fitted





Inside the set

via a rear panel mounted slide switch (*up* is narrow and *down* is standard). A small component change is also carried out to ensure the squelch operates with the bandwidth switch in either position.

You will of course also need some form of data decoder, or a computer hardware/software package such as JVFAX (available from the Ham Radio Today software service) for WXSAT use. For VHF reception, a crossed dipole is quite adequate but a dish or yagi is needed for UHF along with a LNA (Low Noise Amplifier). The slide switch can easily be reached from the front of the set. The bandwidth is of course *not* selectable via computer control.

Using the accompanying diagrams and photographs, build the small WEFAX PCB, the parts list being given in Table 1.

Very carefully remove the existing WFM filter, XF1, from the IF board and solder it to the new WEFAX PCB. This is quite a fragile filter, so *be careful!* Add a 30 mm red supply feed wire to the hole in the IF PCB alongside the XF1 position. Fit the new WEFAX PCB to the IF board where the WFM filter XF1 was removed from. The board should lean backwards with the filters towards the rear of the set. Solder the 3 wires to the IF board and the left hand edge of the new board to L7 transformer alongside. Trim and solder the red supply wire to pin 14

of the 4066 IC on the new WEFAX board.

Now locate and remove R57, a 4k7 resistor, from the IF Board and replace with a 1k resistor. Refit the IF board, twist the blue, yellow and green wires together and run them down the right hand edge of the IF board with the main loom. Follow the main loom towards the position of the new slide switch.

Using a sharp knife cut out the hole in the rear panel escutcheon next to the aerial socket to allow the fitting of a miniature DPDT slide switch. Drill out the

mounting holes and fix the switch two screws (e.g. two M2X4 screws). Trim and solder the blue, yellow and green twisted wires to one set of switch contacts connecting the yellow to the top connection, the blue to the middle connection and the green to the bottom connection.

The new switch now selects the standard WFM filter in the *down* position and the new narrower WEFAX filter in the *up* position. As a 'non technical' test, just tune to a WFM broadcast signal and switch in the narrower filter. You should hear

WEFAX mod PCB position

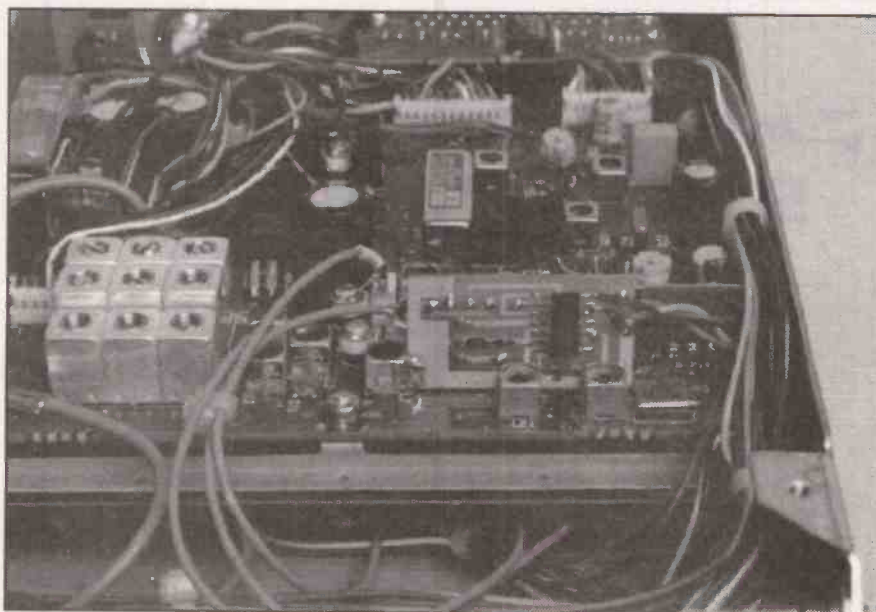


Table 1. WEFAX mod parts list

- 1 x blank PCB 30.5 mm x 15.5 mm
- 1 x SMD 4066 IC quad switch
- 2 x SMD 10k resistors
- 1 x Murata SFE 10.7 MF filter, bandwidth 55 kHz, Bonex part No. 080125
- Wire links as described

slightly distorted reception as the incoming signal is deviated more than the filter bandwidth. Refit the case halves, and the modification is complete.

Discriminator output

This modification provides an output to the rear panel AUX socket taken directly from the FM MC3357 IC. This ensures the best compatibility with specialist data modes, such as external decoders for POCSAG paging, 9600 baud packet data, etc.

On the underside of the IF PCB, solder a 300 mm black wire to pin 9 of IC1 (see photograph) and refit the board. Remove the DC socket and aux socket. Connect the black wire to pin 1 of the AUX socket and refit both sockets. Test the operation (AUX socket pin 1 discriminator output, pin 2 you'll find is at ground potential!) and refit the case halves. That completes the modification.

In next month's issue we shall be detailing the narrow AM switchable filter modification - don't miss it, order your copy today!



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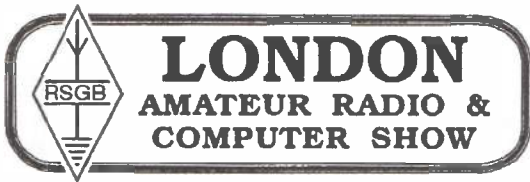
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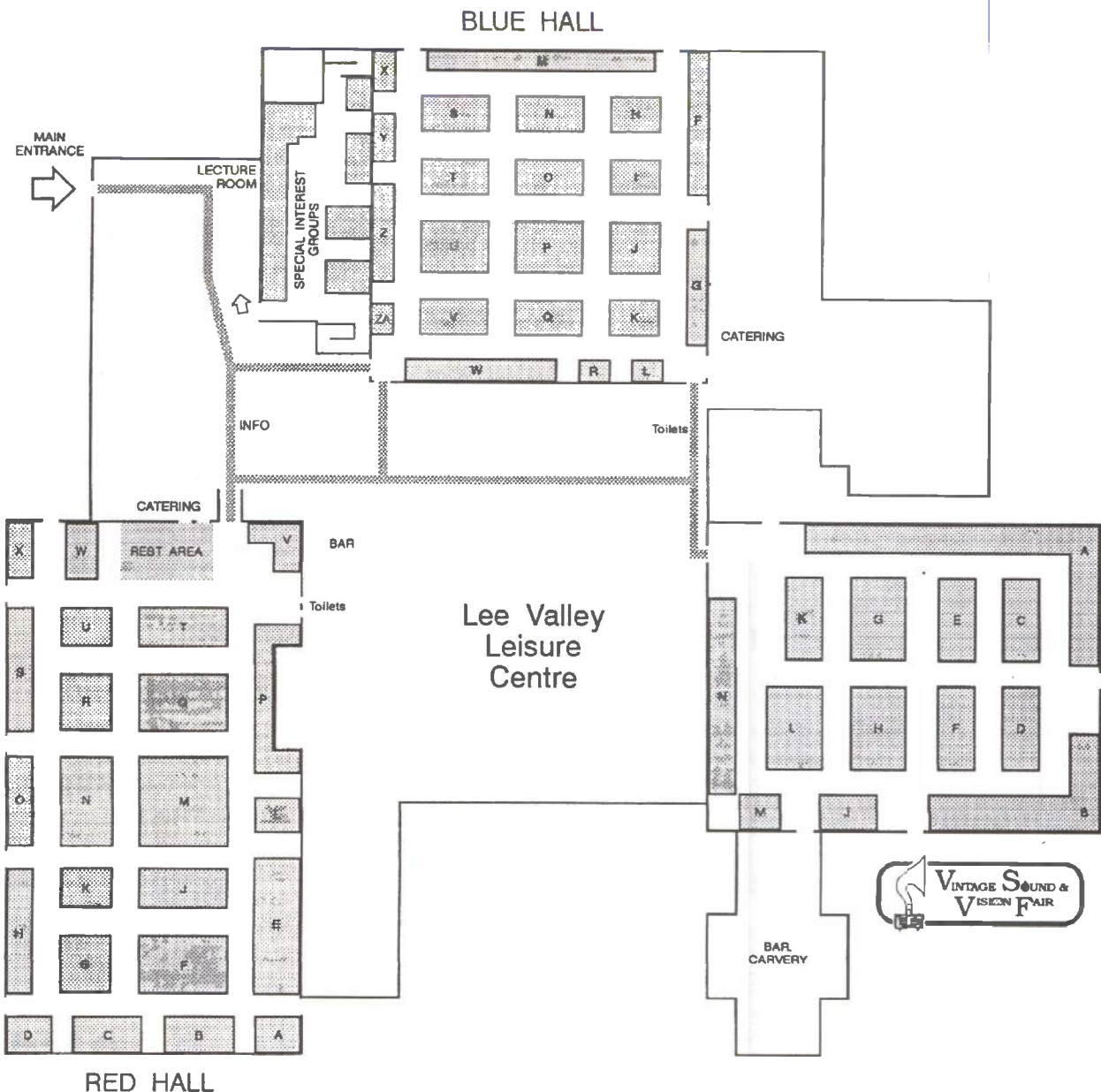
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Agile Tools	P
AOR (UK) Ltd	X
Bill MacDonald	P
Bonex Ltd	C
Cheshunt and District ARS	L
Coltec Electronics	E
Compelec	W
Display Electronics	L
Dosher J	P
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Trio Kenwood UK Ltd	N
UBM	A
Venus Electronics	U
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Yaesu UK Ltd	Q

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AA Computers	O
AJP Communications	X
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Computer Junk Shop	Y
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Sudbury Electronics	O
Telford Electronics	M
Tennamast Scotland	U
Thornton P	M
Vector Computing	V
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Vintage Sound & Vision Hall

Exhibitor	Block
Bring and Buy	A
J&J Classic Juke Boxes	J
Jim Cookson	B
Len Thompson	B
Old Time Supplies	A
Radio Bygones	K
Radio Fix	F
Southern Aerial Services	L
Sunrise Press	J
Talking Machine Review	B

Special Interests

Exhibitor	Block
Air Training Corps	10/11
BARTG	5/6
Grafton AR Society	9
Guide Dogs for the Blind	18-20
Hoddesdon Radio Club	8
RNARS	31/32
Worked All Britain	7

Lectures:

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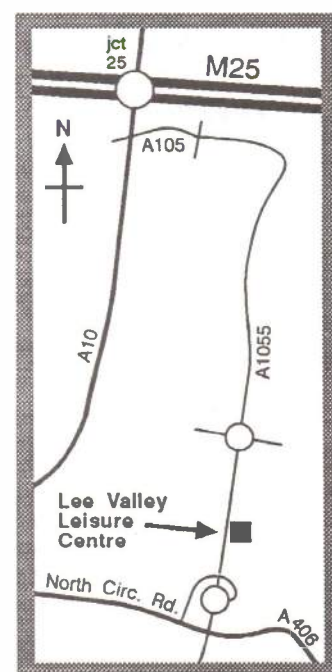
Saturday, 2.00pm
Instant Morse, by Steve White G3ZVW

Witness the amazing learning experience, where people master the entire alphabet in Morse Code in under one hour. Impossible? Come and see!

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Ham Radio Today Equipment Reviews, by Chris Lorek G4HCL

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Book Review - Time To Go Sparky

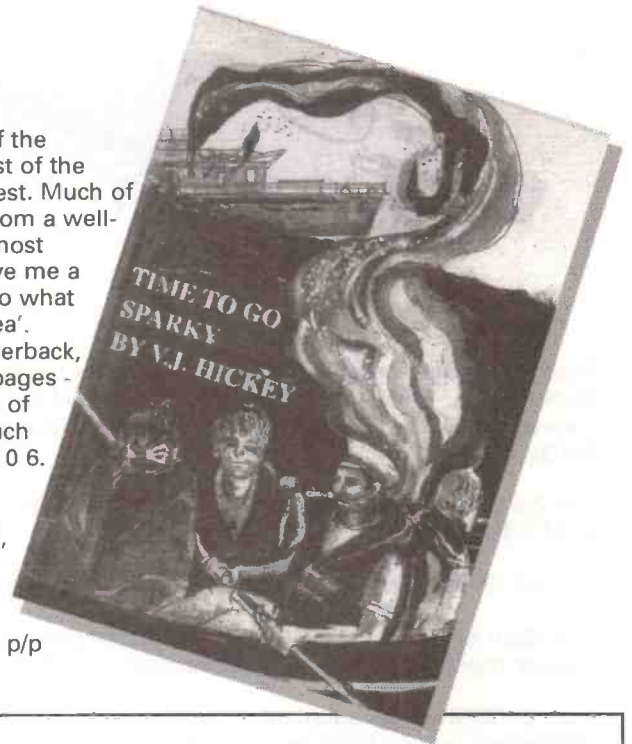
*HRT's Consultant Tech Ed looks at
what life on the ocean wave was like*

If you've ever longed to know what life as a Merchant Navy Radio Officer was like, or indeed if you were one yourself, you'll love this book. It tells the story of Victor Jack Hickey, who became such a Radio Officer in the days of passenger liners before the Second World War. It recounts his experiences as a 'new boy', and continues during his time over the war years when the Merchant Navy did so much to support Great Britain. The author was sunk twice during the war, the second time by a U boat which brought his career to an abrupt end.

Sometimes funny, sometimes sad, with a number of historic photos included, the book makes very interesting reading - I read it cover to cover. The book doesn't dwell purely

on the technical aspects of the author's work, indeed most of the content is of general interest. Much of it must have been taken from a well-kept diary, and I found it most interesting, it certainly gave me a degree of enlightenment to what really happens 'away at sea'.

The book is A5 size, paperback, 105 pages (with glued-in pages - my only problem as some of the pages fell out after much reading!), ISBN 0 9522814 0 6. It's published by G. D. Hornby, 3 Church View, Frampton Mansell, Stroud, GL6 8JF, and is available from bookshops at £6.95 or direct from the publishers at £7.56 inc UK p/p (£9.88 air mail overseas).



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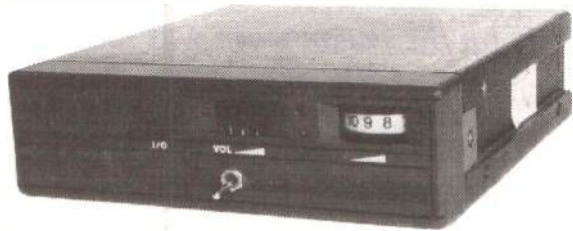
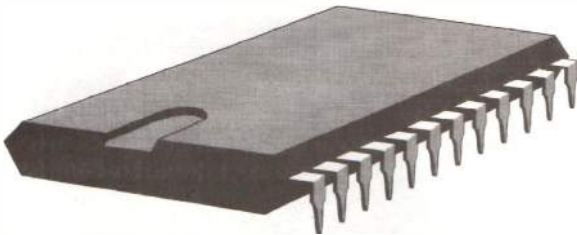
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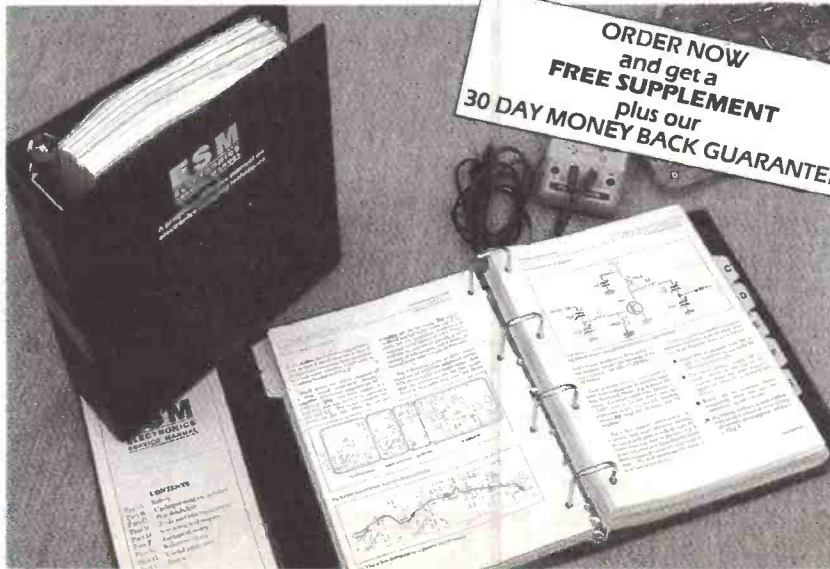
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SERVICING TECHNIQUES: The regular Supplements will include vital guidelines on how to Service Audio Amplifiers, Radio Receivers, TV Receivers, Cassette Recorders, Video Recorders, Personal Computers, etc.

TECHNICAL NOTES: Commencing with the IBM PC, PC-XT, PC-AT, this section and the regular Supplements will deal with a very wide range of specific types of equipment.

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(HR17)

LETTERS

Letter of the month

Dear HRT,

As you can see by my callsign, I am a Novice Licence holder of about 6 months. I have read in magazines that there appears to be some animosity between full licensees and novices. Maybe I am very fortunate in the area in which I live, but in the past 6 months I have received only help and advice from full licensees even to the extent of putting themselves out to be of assistance. I hope to obtain a full licence in 1996 and to be as helpful as others have been to me. I would like to see more activities for novices and would like to thank Poole Radio Society for the novice contest which they held in September.

B. Cannon, 2E1DZQ

To Morse or not to Morse

Dear HRT,

The "RA want the Morse test to be scrapped!" Good! This particular statement should have been issued years ago. It's probably the best news for the continued growth of Amateur Radio since the advent of the Class 'B' licence - and more recently of course, the so-called 'Novice' licence. Morse code is nothing more or less like a pot of yogurt long past its sell-by-date. Yet, lots of people who should know better, continue to 'eat it' as if it's a miraculous remedy that should be 'eaten' to transform oneself into some sort of super-hero of Amateur Radio - nothing could be further from the truth. It is divisive and creates a 'them' and 'us' scenario.

In answer to the December Editorial "Is the end nigh, or is there new life ahead?", no and yes in that order. However, what we don't want to do, is to willingly embrace the chilling concept of 'incentive licensing'. This would have the affect of taking six steps forward and six

steps backward. We would be swapping one terror for another. Those misguided (in my view) people who propose such a retrograde move must be (a) voluntarily removed from Amateur Radio reality or (b), be stark staring mad.

To guarantee that amateur radio as we know it survives means shedding the shackles of the past - one of them being the religious fervour of Morse code. We need new blood to survive. Morse code is akin to a dam holding back literally thousands of willing converts to what is probably one of the greatest hobby secrets in the world - Amateur Radio. Lastly, in my humble opinion, incentive licensing is a covert ploy to perpetuate what we in the UK like to do best - a continuation of a class-system - an élitist mentality. It will do nothing for Amateur Radio except to enable those who want it to inform everybody else that *they* are better than us!

Yours sincerely,
Ray J. Howes, G4OWY

Dear HRT,

Having read so many letters in Amateur Radio journals, with reference to the need to be able to read Morse before one can venture onto the HF bands, and the pro's and the con's of the ongoing argument, I find it difficult to understand the reticence of some of the B licensees in more or less demanding that the Morse test be scrapped. It is a true statement that if something is worth having it is worth fighting for, however difficult that is.

As an ex-Morse examiner and a civilian instructor with the Air Training Corp's, I have seen how some people find it difficult to assimilate the code. When most of the post war licensees obtained their tickets (G3 A to Z), we had to spend twelve months on CW before we were allowed to use phone, and show proof of having done so!

I cannot understand the excuse that the use of Morse is

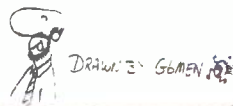
antiquated and that present day technology supersedes it, the latter is quite correct, but I cannot agree that it is a valid excuse for abolishing the test. Can I say that I get far more pleasure from a CW QSO than I ever did from a phone one. May I also point out that at the age of 77 years I found it rather difficult to use the type of equipment that the protagonist's of Morse no doubt have in front of them (I call it a one eyed monster!), but this letter alone I think should prove my point, it was cobbled together on such a machine and I may add that now that I have partially mastered it, I learn something new about it every day. So, come on you no Morse addicts have a go, and perhaps then, like myself, you will have a sense of achievement in getting the better of something that seemed impossible.

J. C. Peerless, TD, MSRE, Asc RTVS, G3JPJ

£10 for letter of the month

Do you have something constructive to say on the state of Amateur Radio today? Perhaps you'd like to put your viewpoint to the readers, get some discussion going, or give an answer to one of the issues raised? We'll pay £10 for the best letter we publish each month (normally paid during the month following publication). So write in with *your* views, to: *Letters Column*, Ham Radio Today, Nexus, Nexus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST, or fax your letter direct to the Editor's desk on 01703 263429 (fax letters for publication *only*, for general readers queries please see the 'Readers queries' section in the 'Who's Who and What's What in HRT' section at the rear of this issue), or email to chris@radshack.demon.co.uk. Please keep your letters short, we reserve the right to shorten them if needed for publication. Letters must be original and not have been sent to any other magazines, and must include names and addresses plus callsign if held. Reader's views published here may not necessarily be those of the magazine.

'TONE' BURST



Dear HRT,

Here's my contribution on Morse and UK licenses. Firstly, when the ITU do abolish the requirement for Morse tests, the RA should do the same, resulting in a Full licence and a Novice licence. Everyone would have passed the same theory as before, and this is the simplest and only logical answer. By all means add a higher grade licence with more power, it would let UK hams compete with the 'big guns'. But please *no* incentive sub-bands, that would only steal frequencies from the 'Class As'.

Dear HRT,

I would like to put my point of view regarding the Morse Test for the 'A' licence. Passing the RAE is to give proof that you are competent in the running of an Amateur Radio station. The Morse test has no significant bearing on your ability to run your station. It is comparable with a car driver who has just passed his driving test and is told that is not allowed to drive on the road until he has swum the Channel or something just as daft. I do not hold any licenses in radio at the present time, but I am taking night classes for an 'A' licence. I am 65 years of age and one examination is quite hard enough. The pleasure that it would give me in speaking to others throughout the world is immense, so why make it so hard to make the world a better place through friendship.

Yours respectfully,
Brian. A. C. Moran.

Disillusioned

Dear HRT,

I have held a Class 'B' licence since January 1992 and must admit I am totally disillusioned with Amateur Radio. I have spent one evening a week for ten months at my local technical college and many hours of home study to gain a credit in both RAE exams. I fail to understand why I am not allowed to use any HF bands, after all isn't 27MHz FM CB HF? I think basically I have made a bad choice and should have gone for the ten week Novice exam. It certainly looks like to me that there is more emphasis on Morse Code than there should be, isn't Amateur Radio supposed to be about what is inside the rig and how various components work?

G. Waters, GW7LLF

Secondly, if the RA are willing to give 'Class Bs' limited HF in the meantime, I have two alternative ideas;

- 1) Full privileges above 30MHz, Novice below 30MHz, or
- 2) Full privileges above 28MHz and below 2MHz.

The latter idea would really give more privileges, since Bs *don't* want CW frequencies anyway! My second idea is also easier to incorporate into BR68!

Alan Palmer, BSc, AMIEE, G8VUK,
N3KIP

Dear Sir,

First of all I would like to say how much I have liked the new front cover of your magazine, I found it extremely easy to find on the newsstand, as against trying to find it previously, nobody seemed to know where it was before, so congratulations!

Having read the article regarding the elimination or not of the Morse test, and having recently qualified as a Class 'B', I put this argument to a mixture of Class 'A' and 'B' holders, and the general opinion was that the majority are in favour of the Morse test being dropped, but not eliminated totally. Some feel that there is a need for Morse but that the test should be more on an optional basis than an obligatory one. A lot of class 'B' amateurs do not try for the 'A' licence precisely because of the Morse test, they do not see the need for it, especially as it was originally used only because voice transmission was not possible due to the equipment not having been invented at the time.

Many more amateurs are operating using 'packet' these days and only now is it being rumoured that 'packet operation' will be incorporated into the amateur examinations, whether Class 'A' or 'B' or both who knows? Opinion seems to be that times are changing, and that as amateur radio becomes much more sophisticated in terms of 'instantly useable' equipment the Morse test should be for those who wish to use it and not compulsory for everybody. Having said that I fully respect the ideas of those who think otherwise, only time will tell what the end result will be and the consequences of the decisions taken.

Yours faithfully,
John Wm. Flynn



From My Notebook

Geoff Arnold G3GSR gives a selection of handy tips and suggestions this month to help you in the shack

If I had to give a title to this month's selection of notes, it would be 'Odds and Ends'. Mainly these will be tips for making use of discarded items - junk, for want of a better word - but some will be about using materials for purposes which were not the intention of the original designer or manufacturer.

At the top of my 'useful junk' listing would come the barrels of empty ball-point pens. I'm thinking mainly of the common-or-garden hexagonal clear plastic type, usually considered a throw-away item once the ink runs out. I suppose you could also use their posher cousins for some of the applications, although that would be a bit of a waste.

Perhaps the most obvious use is for custom-built test probes, though the very small internal diameter really limits their scope as about the only components that would fit inside are miniature signal diodes or resistors. Just what you use for the probe point itself will depend on the application you have in mind. A 6BA or M2.5 brass screw and nut (screw-head inside the barrel, nut on the outside) can be used, filing the end of the screw to a point and tinning it to prevent corrosion. Obviously you need to remember to solder the wire to the screw-head before assembling the whole lot.

An alternative method I've seen suggested is to use the old refill as the basis of the probe tip, cutting off and discarding the plastic ink-tube and pushing the writing ball out of the end to leave a hole into which you can pass a sewing needle of suitable gauge. The wire is then soldered to the eye of the needle and the needle soldered into the refill tip. I must admit I've never tried this idea myself, and I'm not sure how easy it might really be to push the ball out of the tip of the refill. It also involves making two sound soldered joints to a nickel-plated steel needle, not

always the easiest of exercises.

Another use for empty ball-point pen barrels is to cut them up for use as spacers on fixing screws. This sounds a nice idea, but you need to be a pretty dab-hand with a hacksaw to get equal lengths and square ends to all the spacers you produce. Success with this one requires accurate marking off and sawing.

Up In the Air

My last idea for old ball-point pen barrels is to use them as aerial insulators. Often you will see the suggestion that can be used as spacers on two-wire transmission lines, with holes drilled through them to take the feeder wires. To stop all the spacers sliding to the bottom of the feeder, a 'whipping' of tinned copper fuse-wire at either end of each spacer is a must.

For lightweight wire aerials, you can actually use the pen barrels as insulators. What weight they will safely support would depend on the size of the holes you drill in your insulator to take the wire, which will need to be pretty thin.

A suitable wire to use for makeshift, or even semi-permanent aerials, is the plastic-covered steel wire sold by garden-centres for tying shrubs to stakes. This has the advantage of being very thin and almost invisible against many backgrounds. Use the green variety if it will be seen against a background of trees, or the brown if it will be seen against a building. Steel wire has the benefit of being 'non-stretch' compared with copper wire of the same gauge.

The purists will no doubt complain that the steel wire will be very lossy, but from my own experience of using such an aerial some years ago, I know that it works quite effectively - an SSB contact with a PY (Brazil) using just 10W speaks for itself. There is just one snag to the near-invisibility of garden wire (though this applies to all 'invisible' aerials), which is that birds cannot see it either, and will occasionally fly into it. However, during a period of a couple of years over which I had one of these aerials erected, I never knew a bird to come to permanent harm as a result.

A Good Grounding

Before leaving the general area of aerials, it's worth mentioning the use of the woven braid from lengths of discarded coaxial or screened cable. Braid makes an excellent low-resistance, low-inductance, highly-flexible earth strap, for such purposes as connecting across equipment case or cabinet hinges.

Usually these pieces of cable will be quite short, cut off when newly-installed cables are being cut to final length for termination. Before using longer lengths - whole coils that have been stripped out of a system, perhaps - you should examine the cable closely to make sure that the braid has not corroded due to moisture getting under the cable sheath.

Getting the braid out of the cable may be quite easy, or it may be devilishly difficult, depending upon exactly how the cable was manufactured. Sometimes the overall plastic sheath will slip off the braid and inner part of the cable without too much persuasion, but more often it will have moulded itself around the individual strands of the braid in which case it will be impossible to remove without slitting along its entire length. The important thing then is to avoid nicking the strands of the braid when slitting the sheath. There are proper tools to do this, of course, but they are quite expensive, and one of the type of trimming or craft knives having a retractable blade, so that you can set it with just the first millimetre or so of the tip showing, can do the job quite acceptably. Once the sheath is slit, it will peel away easily from the braid, which can then be 'shuffled up' along the inner insulation or dielectric, naturally increasing its diameter so that it will just slip off.

Incidentally, bad continuity between different sections of an equipment case or chassis, can cause the most unpredictable results. I remember some years ago, encountering a home-built receiver project which had been built in a case consisting of four aluminium extrusions with slide-in front, back, top and bottom, and screw-on end panels. Very convenient for access, but just slightly loosening one of the end-panel screws would cause the receiver to 'take off' in a most

violent manner. It was a totally unsuitable case for the project, and wouldn't easily lend itself to fitting earth straps between the ten separate parts which made up the case.

Fixings

With most modern radio and electronic equipment being based on lightweight components and printed circuit boards, there isn't the same demand for the drawers (or tobacco-tins) full of screws and nuts of various sizes which formed an essential part of any workshop or laboratory in years gone by.

Adhesives have now taken the place of many of these traditional fixings. These may be the two-part epoxy-resin type (Araldite and similar), the cyanoacrylate superglue type, or the impact type (Evostik and similar), depending on the particular requirement and materials involved. A useful alternative to these are products such as double-sided adhesive tape or foam pads ('sticky fixers') or strip.

The pads can be ideal for securing small PCBs to cases, although if the cases are metallic you need to ensure adequate clearance for any component lead-ends protruding from the back of the board. It may be necessary to build little stacks of two or more sticky fixers to raise the board sufficiently.

For securing flat objects, double-sided adhesive tape is convenient. Like the adhesive pads and strip, these are made in various grades, used professionally in different trades. For the hobbyist, it can be difficult to come by some of the 'beefier' types, but a visit to your local hardware shop or d-i-y superstore is likely to yield 'carpet tape' (extra strong double-sided tape), and waterproof double-sided adhesive foam strip used for various purposes in modern kitchens and bathrooms.

Copper-clad

Scraps of printed circuit board material can be used for constructing little chassis - such as might be used to carry a pre-amplifier or a filter circuit. Being copper-clad, it is easy to solder to, providing you have a soldering iron of adequate size and power. If

built up into trough or box shapes by running a fillet of solder along the joints between the board sections stood at right angles to each other, it provides excellent screening.

A scrap piece of double-sided PCB material can provide a simple answer to the problem of quickly measuring total current flow in the type of transistor equipment powered by a row of perhaps two or three 1.5V cells in a plastic holder. All that is required is a piece of double-sided PCB about 12mm by 50mm, with a connecting lead soldered to each face at one end. If the opposite end of the strip is slid between two of the batteries, a multimeter connected to the leads will indicate current flow in the set.

Providing you don't need to solder to it, aluminium foil provides an alternative to copper clad board or solid metal for some purposes, particularly screening. Some component suppliers stock 25mm-wide self-adhesive aluminium tape, but for larger areas, kitchen foil (the heavier-weight 'turkey roasting' variety is easier to handle) is useful and economical. Many years ago, when I was experimenting with corner-reflector and parabolic cylinder aerials, I built some out of hardboard, with a kitchen-foil covering stuck on with wallpaper paste, and they worked very well. Because of the unsolderability of aluminium, any necessary connections must be made by means of clamps or screws with large-area washers.

If using metallic foil for screening, to line an equipment plastic cabinet for example, you must take great care that it will not come anywhere near any live parts of the circuitry. A layer of suitable insulation material should be stuck over the face of the foil in any vulnerable areas. The foil itself should, of course, be earthed.

Odds and Ends

There are all manner of other things which can be used to provide a helping hand, or substitute for a tool which you do not have. Medical forceps, with their adjustable clamping action, can be a great assistance when you're doing one of those jobs which seem to require three

hands. You can sometimes pick up forceps which have been discarded as no longer suitable for hospital use, and they are even sold by some tool stockists, but often a pair of snip-nosed pliers with a substantial elastic band wrapped around the handles, so as to hold the jaws shut, provide a workable substitute.

Holding screws or nuts is made easy by pushing them into the end of a piece of suitable diameter plastic tubing, although since the plastic tubing often tends to have a natural curl to it, this can be a fiddly job. Once again there are proper tools, called nut-runners, made for the job, which at one time were given away as free gifts with radio hobbyist magazines. With the increased cost of oil, from which the plastic is made, I fear this is a sales promotion aid which is unlikely to be repeated nowadays.

A thin stick with a small lump of Blu-Tack or Plasticine on the end, forms a useful tool for placing manoeuvring small parts into inaccessible places inside equipment, or even better for retrieving them when they have been dropped.

Over the years, I have used all sorts of other fixtures, such as stationers' bulldog clips and hairdressers' curl clips, to keep wires or components under control while I worked on them. Other ideas include a piece of ordinary adhesive tape as a temporary restraining measure.

One of the most fiddly jobs in fitting a coaxial plug to the end of a cable is trimming the braid back neatly after fitting the retaining ferrule or body, depending on type. You can use a pair of side-cutters or similar, but I've found the best tool is nail-scissors. I have a pair in my toolbox which I've used for the purpose for around forty years, and I'd be lost without them.

In Conclusion

If you have any ideas on topics that I might tackle in future 'Notebooks', I'd like to hear from you. Your suggestions, please, to Geoff Arnold, 9 Wetherby Close, Broadstone, Dorset BH18 8JB, (or fax or email via the Ham Radio Today Editor), or come and have a chat with me on the *Radio Bygones* stand at a radio rally.

QRP corner

Dick Pascoe G0BPS asks whether 'minimalism' is the way forward for QRP



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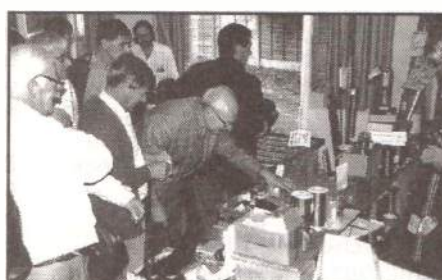
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1. Jurgan DL3KJE at GB2QRP 2. Klaus DK8MTG and son Florian operating GB0QRP 3. Joanne Dobbs G00WH on the key, Jennifer G8WVO operating 4. David GM4ZNX explaining the details of his latest toy, note the pinny! 5. Aerial goodies available from David G4PEN 6. John Leak, Club Membership Officer trying hand signals 7. Sheldon Hands GW8ELR of Hands Electronics explaining computer design

October saw the 21st birthday of the G-QRP club celebrated at the mini convention held at the church of St Aidan, Sudden in Rochdale. Over 300 enthusiasts turned out for the day including six from Germany, three from Holland and two from Sweden. This was the sixth convention to be held at the church hall and numbers have remained about the same ever since the first. Just as well the hall can't take any more!

There are a few traders present who have a direct link with the hobby such as the kit manufacturers. There was of course the usual bring and buy and Chris 'from the sheds' with his huge amount of surplus test equipment. The main difference in this event is not only the run of talks throughout the day but the large area in the middle for visitors to sit and chat

about their hobby and also take delight in the annual feast of meat pie and mushy peas, which I always enjoy. A local delicacy I am told.

The talks this year were from Gerald G3MCK on SWR, Rob Mannion and of course David GM4ZNX with his packed Question and Answer session which went on and on and on.....

The fun of the weekend is not just the show itself but the great comradeship shown by members who turn up early to help set up the hall, and stay behind to pack everything away and get it ready for the church folk on the Sunday. Of course those longer distance visitors stay over a while and a tiny, wee, party atmosphere may prevail. This small party atmosphere has nothing to do with the hobby of course, it's just that

we all love a dram and a Chinese meal. Not necessarily in that order or quantity!

Denco coils

The coils made by Denco have been sought after by many amateurs. Denco have been out of business for many years, but rumour has it that a Mr RGF Allwright is hoping to restart production following interest expressed by many enthusiasts. The address is; Denco (Clacton) Ltd, 259 Old Road, Clacton on Sea, Essex. CO15 3LU.

QRPer of the year

The QRP Society of Central Pennsylvania have elected Doug

Hendrick and Jim Cates of NorCal (the Northern California QRP Club) their award of QRP of the year for their dedicated work over the past couple of years. They have between them been responsible for making a couple of QRP projects available to the QRP fraternity, namely the NorCal 40 & 20, and the "endless hours spent on the R&D of their several projects" I can happily endorse these comments.

I have shared breakfast with these two gentlemen at Dayton and very much enjoyed their company and their complete dedication to this aspect of our hobby. It was quite an embarrassment for George G3RJV and I to be greeted as 'Experts' and treated to breakfast by Doug. But despite this we became firm friends, and agreed to share next years breakfast bill.

This of course generates the question, Who could we, at Ham Radio Today, nominate as the QRP of 1995? Who is the most predominant exponent of the hobby in the last year? George G3RJV is of course a contender, but as he will readily admit there

must be others out there who equally deserve the title.

QRP Plus

Jeff Stanton of Waters & Stanton recently wrote to me about the QRP Plus. It appears that some were shipped from the USA with lose fitting PTFE leads on the toroid output transformer. This caused some instability. It seems that the leads should be tight to the toroid and these were not, with either the legs of the lead being too long or a winding becoming lose on the side of the toroid. If you have some instability problems I understand that Waters and Stanton are very pleased to help with any purchased from them.

Minimalism

There has been an interesting thread floating around the net recently about 'minimalism' and the hobby. There has been much discussion on the statement of output power. As we all know (and love) the accepted level of power for QRP use is 5W of CW or

10W of SSB. For an average operator with a simple dipole and open wire feeder, quite a chunk of the transmitted power will be lost on the way to the ether. For those with a cubical quad, or beam aerial their signal will have a form of gain. Thus their 5W of CW may well be a massive 50W ERP from a 10dBd gain aerial, assuming no losses! Compare this to the lowly 5W watts of Mr Average!

The suggestion that we should consider the ERP to be our output power level must be a consideration. This would bring all operators down to the same level. We could all be true minimalists this way. And we would thus discourage all those who want to better their aerial systems.

The whole point of minimalism is to go as simple as possible, to use the minimal amount of equipment to almost make it hard on ourselves. It is even suggested that we may be a trifle masochistic! That we should even find another use for our whips by sticking them out of the window and loading them up on eighty or twenty!

It gets better and better doesn't it? Oh well, back to basics (now where have I heard that before?).

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VHF/UHF Message

Geoff Brown GJ4ICD looks at what's available to help with Sporadic E possibilities as well as satellite and EME operation

This month I would like to take a look at some software that will be of serious interest to the VHFer, EMEer and satellite enthusiast. The software is called Nova and was designed by W9IP, and combines simple operation and clear, bright graphics in a speedy DOS environment. Nova is a new all-graphics DOS program devoted to tracking artificial satellites, the Moon, Sun, planets, and celestial noise sources.

Nova provides full position information (azimuth, elevation, range, height, etc.) in real time, the data is updated approximately 5 times per second on a 33 MHz 486. All functions

are accessed via the mouse; you can operate Nova almost entirely without touching the keyboard. Nova includes 16 maps in 2 sizes, for a total of 32 maps: Mercator projection (rectangular) with zoom view of any continent, whole-Earth central longitude may be set for Europe, North America, or the Pacific; country name labels on/off; up-to-date political boundaries; easy-to-see satellite footprints; up to 6 satellites plotted simultaneously Orthographic (view from space) projection with full Earth positioning and manipulation, ground tracks, footprints, and real-time orbit shapes; up to 6 satellites visible. Sky

temperature (3 bands: 50, 136, and 400 MHz) with current satellite and aerial positions. Radar map showing all visible satellites and aerial position Grid square maps centred anywhere in the world, with point-and-click bearing / distance display (more about this feature later).

Nova provides autotracking via the SASI Sat Tracker, Kansas City Tracker, and AEA ST-1 hardware interfaces. It also includes full control of frequency (with or without real-time Doppler compensation) and mode of all modern satellite transceivers: Icom twins, '970, '820, and others, Yaesu FT-736, Kenwood TS-790. Frequency adjustment is made by on-screen knobs, buttons, sliders, or the keyboard. TX and RX may be adjusted separately or linked (normal or inverted). Frequency control is through a

user-selectable serial port via standard RS232-TTL level converter. 370 memories are available plus 8 individual memories for each satellite.

Additional features

Built-in logging (separate logs for each satellite if desired), easy Keplerian element updating (AMSAT or NASA 2-line), real horizon modelling for user-defined footprint display, satellite editor with drag-and-drop arrangement of satellites and groups (20 groups of up to 30 satellites / group); up to 2,000 satellites in database, fast rise-set AOS / LOS calculations, multiple-satellites / one observer, one satellite / two observers with mutual window information, multiple satellites / multiple observers in real time, satellite-to-satellite (+/- one or two observers) co-visibility, full eclipse predictions (orbit-by-orbit and full day summaries), satellite script, a time-ordered sequence of multiple passes of multiple satellites; printed listing or real-time aerial control. Daily and monthly Moon conditions, full listing capability to printer, screen, or text file, printing to dot-matrix or HP laser printer, customized grid square maps for any location, with point-and-click bearing / distance calculations (maps may be laser-printed), 2,000-city + DXCC country + EME directory databases + Buckmaster & QRZ! CD-ROM lookup, fully user-configurable colours, fast, easy shell to DOS or directly to ten other user-defined programs. Includes three TSR programs for background tracking / tuning (Icom, Yaesu, Kenwood). It includes a 'beta' version of Ant-Cal, the aerial correction utility for correcting non-linear position indicating potentiometers. Instant help is available by pointing & clicking right mouse button. Nova requires 420kb of conventional memory, and uses expanded (EMS) memory if available. The program requires a maths co-processor, VGA graphics, a Microsoft mouse, and about 2Mb of hard disk space, and runs well as a DOS application under Windows. In full-screen it is indistinguishable from its DOS execution; in a small window

The image shows three screenshots from the Nova software. The top-left screenshot displays 'Daily conditions' with a grid map and satellite data. The top-right screenshot shows 'Monthly summaries' with a similar grid map. The bottom-left screenshot is a 'Partial callsign lookup' table listing EME Database Information for various callsigns. The bottom-right screenshot shows 'Full EME database info.' for the callsign JACEBH, including name, address, country, and grid coordinates.

Daily EME conditions.		Monthly summaries																																													
<p>EME Database Information</p> <table border="1"> <tr><td>DL1EJA</td><td>J03ids</td><td>OLTUEE</td><td>REINDERS</td></tr> <tr><td>HB9JHA</td><td>JN47ce</td><td>NICHEL</td><td>HEINIGER</td></tr> <tr><td>JAOJQJ</td><td>PH85rh</td><td>HIFG</td><td>SHIOZAWA</td></tr> <tr><td>JACJHD</td><td>PH85jh</td><td>KAZUHIKO</td><td>ADKI</td></tr> <tr><td>JACJHD</td><td>PH85hu</td><td>TETSURO</td><td>OKAMOTO</td></tr> <tr><td>JABEJD</td><td>PH85na</td><td>YOSHIO</td><td>HAYAKA</td></tr> <tr><td>JAKLW/L</td><td>PH85ri</td><td>HIDEFUMI</td><td>KOMDO</td></tr> <tr><td>JAKLKB</td><td>PH84</td><td>SHIGERU</td><td>UEDA</td></tr> <tr><td>JAGDR</td><td>PH85ag</td><td>TAKASHI</td><td>KURAMOTO</td></tr> <tr><td>JABIQD</td><td>OH80gk</td><td>NICHINOE</td><td>NARUHI</td></tr> <tr><td>JABEYL</td><td>PH86ko</td><td>TOSHIKAZU</td><td>HENDAI</td></tr> </table> <p>More Info</p>		DL1EJA	J03ids	OLTUEE	REINDERS	HB9JHA	JN47ce	NICHEL	HEINIGER	JAOJQJ	PH85rh	HIFG	SHIOZAWA	JACJHD	PH85jh	KAZUHIKO	ADKI	JACJHD	PH85hu	TETSURO	OKAMOTO	JABEJD	PH85na	YOSHIO	HAYAKA	JAKLW/L	PH85ri	HIDEFUMI	KOMDO	JAKLKB	PH84	SHIGERU	UEDA	JAGDR	PH85ag	TAKASHI	KURAMOTO	JABIQD	OH80gk	NICHINOE	NARUHI	JABEYL	PH86ko	TOSHIKAZU	HENDAI	<p>EME Database Information</p> <p>CallSign : JACEBH Name : KIMIO NIEGARA Address : 87-9 SHIMO-ASOJIMA OHNO CITY 812 FUJUI Country : JAPAN Tel : 04779-65-6059 Notes : 4x15, 1K2 HL</p> <p>Grid : PH86fa Lat : 36.02 N Lon : 136.45 E</p> <p>Press any key to continue.</p>	
DL1EJA	J03ids	OLTUEE	REINDERS																																												
HB9JHA	JN47ce	NICHEL	HEINIGER																																												
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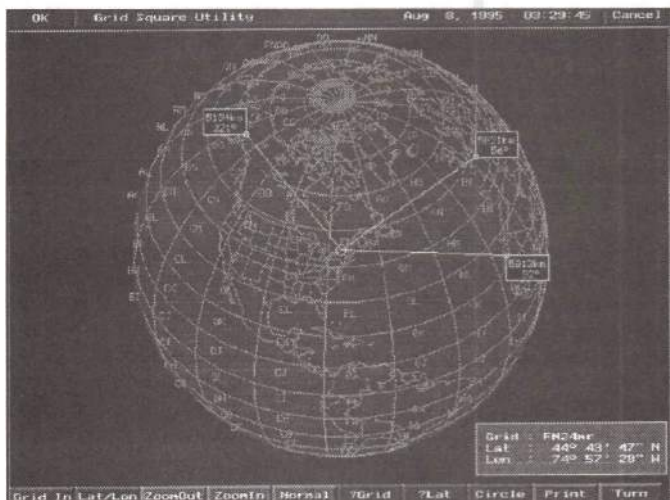
The image shows a screenshot of the Nova software interface displaying a satellite tracking map. The map shows the satellite's path and current position. Technical data for the satellite RS-15 is shown on the right side of the screen.

RS-15 Az	219.7°
Ant Az	8.8°
RS-15 El	-56.1°
Ant El	8.8°
Height	1882.8
Range	12738.8
SSP Lat	56.8°S
SSP Lon	154.1°W
HA count	251.2
Squint	8.8°
Op Mode	A
Optical Sun	
Bcn 1	29.35286
Dop. kHz	0.861
Bcn 2	29.48386
Dop. kHz	0.861

ADS: 18:27:28 (154°) Until: 18:53:52
 LOS: 18:52:33 (42°) Dur'n: 00:25:04

1 Obs Satellite: RS-15 2 Obs
 Track Group: Hansats Tune
 Sats ADS Script Log Obs Freq

NOVA 1.0 registered to E



Nova's colours are modified by Windows. Autotracking and Autotuning continue with Nova minimized under Windows.

Grid squares

Now, onto that comment that I mentioned earlier about grid squares. Nova is quite unique in that not just grids squares are point and click to determine a distance or bearing, but, it is possible to 'layer' radial ring distances onto the map. This means for instance that 500km rings can be overlaid onto any of the grid maps. "So what?" you may probably think! Well, by doing this it is possible to see just how Sporadic 'E' hops happen on 50MHz and 144MHz.

Predictions are possible to many areas, in other words you can see the dead spots between the multi-hops, very useful! Nova certainly contains some very useful utilities for anybody interested in VHF and above, and there is no doubt that I shall be using some of them to produce 'ES' maps this coming summer. Nova is available from Michael W9IP.

News and propagation

The ARRL kindly emailed me with the latest 50MHz DXCC update, which is as follows:

K5FF, W5FF, VE1YX, JA4MBM, JA1BK, W2CAP, K5CM, K8WKZ, K4CKS, WA1OUB, KA1PE, K1JRW, JA1VOK, JA3EGE, JE1BMJ, JE2KCP, W4CKD, JA2BZY, JA1PVI, J11DLZ, JA6RJK, J12CCF, JA1GTF, JA2DDN, JF2KOZ, N5KW, JR2AJS, JE2IIH, G4AHN, JH2NZM, PA0HIP, JR2HCB, GJ4ICD, JR6HI, JJ3WXG, G4UPS, JR3HED, G4CCZ, KH6IAA, PY5CC, WW8M, G3WOS, W3XO, JR2HOG,

W3JO, LU3EX, HC1BI, WB2CZB, CX8BE, WA6BYA, K2MUB, WB4OSN, W4OO, JR2AUE, PA3BFM, G3ZYY, PA0ERA, G3RFS, G4IGO, W3WFM, W2IDZ, PA2VST, SV1DH, KP2A, G4JCC, 9H1CG, K3QMX, K8EFS, JR3DVL, G3JVL, G1OTC, JH2TQH, W3WU, WB2MAI, K2QIE, WB2WSV, WZ8D, W5EU, JE2KDN, JA9SSB, WB8VYF, JR6WXY, K1TOL, K1GPJ,

JR6WPT, 9H1BT, JE2UAZ, JA3IW, JA9OGE, JK1PEC, JA3RQ, JG1TSG, JH6TEW, JA2BNV, NI6E/KH6, JR6VSP, JA5FFJ, JS6CDB, JA6TEW, W1JR, JF1CZQ, J11COA, OH2TI, SM7AED, SM7FJE, G3KOX, PA2HJS, G0JHC, K6QXY, JA2MJO, JA9IPF, OH2BC, OH5EE, JK2KEK, ON4ANT, 9H1PA, JR2SQZ, ON4KST, G4MKF, W5OZI, ZP6CW, I0AMU, JH3FQH, DL7AV, CX4HS, JH0RNN, SM6CMU, I0XGR, G3OIL, ON4GG, JR3IIR, SV1EN, OZ4VV, G6HCV, G3ZSS, W4DR, G3VYF, SV1OE, OZ1LO, DL7QY, SM7BAE, PA2TAB, WA1AYS, JF1IRW, JA2EMQ, JA1QVI, JA1ELY, G3COJ, JA1RJU, I0CUT, JA6QGG, OH1VR, JA9BHZ, JE3GUG, G4XNS, LX1JX, G4IFX, K8MFO, JA5GJN, DJ9KG, VK3OT, VE1ZZ, GD3AHV, ON4PS, DJ3TF, G3IBI, SM6FHZ, DK2PR, F6BSJ, JA7WSZ, G3TJW, S57AN, LU3DCA, DK5UG, DJ9ON, W2BXA, JA1UIU, W3EP, OZ8RW, PE1LCH, PA3FYM, WB4WTC, G3BJD, SV1OH, I5MXX, G7BXS, PA0LOU, VE1RAA, IK0FTA, I4CIL, IK8MKK, IK4BHO, W2CNS, KA1A, IK1EGC, WD5K, WB4DBB, JH1WHS, G6HKM, GW4EAI, IK8DYD, DL9GU. Total; 202.

It's nice to see 28 'G's' out of the 202 total certificates issued, although Japan seems to lead the field with 62 (I wonder why?) and the USA holding second place with 44. However the UK must feel proud of itself as it has three class 'B' licence holders who have worked and confirmed 100 50MHz DXCC countries and used only SSB to do it! Upgrades during the latter part of 1995 were PY5CC (150) and GJ4ICD (150).

Beacon news

There's a new beacon in Marion Island. A group of 9 scientists are on Marion Island until May 1996, and they

have a beacon operating on 50.200MHz 24 hours a day, using 170W to a 5 element yagi beaming to South Africa. The Call is ZR1BCE/ZS8. Now is the possible time for an opening to ZS so keep a look out on 50.200MHz (not the best frequency to pick!).

GB3NGI located in GI still seems to be off the air, as does GB3SIX located in Anglesey.

3V8BB/Tunisia 50MHz legality

There has been much talk on the 1995 50MHz operation by YT1AD and YT1AU. Around a dozen or so stations worked the expedition in late 1995. Those known to have worked the station in the UK include G4JCC, G3HBR, G3WOS, G3KOX, G4CCZ, G3SYC in Yorkshire (showing how widespread the event was), your's truly and I'm told G4UPS. Confirmation from the DXCC desk is that the club station is the licence holder, therefore any legal operation permitted by the club will be credited by ARRL DXCC desk. This means any operators and any band permitted by the authorities. However, this only seems to apply to the club station and not all the other 3V calls appearing. More news on those later.

Hungarian stations on 50MHz have now been accepted by both the RSGB and the ARRL awards managers, however, there seems to be only a handful of operators interested in 50MHz.

New 24GHz record

On Sunday 5 November 1995 at 11.22 UT Neil Sandford VK6BHT/P at the QTH ofVK6KZ in Melville Western Australia (Lat 32°02' 47" S Long 115°48' 15"E) and Walter Howse VK6KZ/P at Swan View near Perth (Lat 31°53' 23" S Long 116°03' 40" E) worked each other on 24048.025MHz. Signal reports on SSB were 55 to VK6BHT/P and 54 to VK6KZ/P. The distance between the two stations was 29.9km and creates claims for inaugural distance records for both Western Australian and Australia for the 24GHz band. Congratulations to both.

News and views can be sent via Email to equinox@itl.net, or it can be faxed/phoned on 01534 877067 anytime, or snail mail to Geoff Brown, TV Shop, Belmont Rd, St. Helier, Jersey JE2 4SA.

nodes in 24 hr unattended operation, these being operated under the provisions of the normal licence you and I hold. These are often coordinated by a local packet group, to whom the first port of call would be, your local BBS will usually have an 'information' file on this. My local group, SUNPAC, for example have multi-coloured node maps available for my local area, and I'd suggest that DANPAC (the Derbyshire and Notts packet support group) would be Keith's local group.

As the node and interlinking system throughout the UK is in a constantly changing state, most attempts at a 'national' listing or map is usually always out of date. However there are such lists, and occasionally maps, in books such as the 'Practical Guide to Packet Operation in the UK by Mike Mansfield G6AWD (available from firms such as Siskin) and the 'UK and Ireland Network Node Listings' produced by SUNPAC (Secretary; John G8OQN @ GB7HJP).

Packet software updates

Tim G4WFT, author of UltraPak, tells me he's noticed a slight 'bug' in V4.0, which prevents the downloading of BBS messages numbered greater than 99999. An updated executable is a new UPAK40.EXE with an associated README.TXT, which Tim has uploaded as UPAK401.ZIP onto the Internet (you'll also find it on the Radio Shack and other landline BBSs). The new executable fixes this bug, plus a problem of truncation of downloaded message numbers and a minor problem in the ACK server. I've arranged for all current Ham Radio Today software offer requests for UltraPak 4 to have this included.

WinPack V5; The author, Roger G4IDE, has created a number of updates to V5 of WinPack. First off is REQFIL V2.1, an intelligent file server which is an improvement on the original which only handles text files, the new one also supports binary files. A further update is ACK.EXE V1.2, an updated ACK server which fixes a problem with the original version that occurred if you weren't using compressed forwarding. Roger has now also generated a server, BUCK9510, to allow others to connect to your WinPack system and access the latest Buckmaster (Oct 95) CD-ROM callbook (you do of course need the CD and a CD drive to make this

work!). Roger says that with the next release of WinPack, the callbook server will also be accessible to the WinPack operator from the program command line. Roger has placed all these WinPack updates onto the UK packet BBS network in 7 plus format, and as usual requests for WinPack from the Ham Radio Today software offer will always attempt to have the latest version plus any known updates.

For the benefit of readers who already have the 'original' versions, I've arranged for all these updates, i.e. WinPack and UltraPak, to also be added to this month's 'software collection' disk.

PacTOR II

As of the beginning of December, I know of over 100 European stations operating on this mode, plus many others around the world (like XE1HOS, ST2SA, T97S, JK1DNW JA5TX, CN2SM, CP4PG, and 9A5CW). An update on the hardware side is that, by the time this appears in print, the PacComm PTC-II PacTOR II controller will be available, this being manufactured under licence from SCS (distributed in the UK by Siskin Electronics, Tel. 01703 243400). After a bit of searching, I'm told that Abacus continue to be importers of SCS products from Germany. You can contact Abacus on their new number



The new PacComm PTC II PacTOR II controller

of 01661 860258, which possibly explains previous difficulties in getting hold of them! My thanks to Harold G0MRQ for this info.

PK-12 BPQ?

Ian G7MWR asks me if I've ever attempted to run BPQ on the AEA PK-12. Ian has tried it in 'KISS' mode, but says it doesn't seem to work, in that it will receive but won't transmit. The first thing I'd suggest is to check the RS-232 word length, parity, stop bit etc. settings, for example ensure 8 bit rather than 7 bit is selected, as this can sometimes cause the 'receive but no transmit' syndrome in 'normal' terminal operation packet. However,

apart from that I open it up to readers. If you've had success, maybe they could share the 'trick' it with us? If you've had luck, you can contact Ian with a message to G7MWR @ GB7WRG.#19.GBR.EU.

California 'Wormhole'

I'm told that the Venus Electronics Society (GB7VES) that a new 'wormhole' to California is likely to come on-line soon from the Camberley area. Discussions are currently underway to integrate a connection to this into the proposed SUNPAC GB7FW node near Basingstoke.

RK3KP closes

Sad news comes from my friend Leo, UA3CR, who says that he's had to take the difficult decision to cease the operation of the RK3KP BBS and all its HF network nodes. You may have read about this in a pictorial feature by Leo on the system in the December 1992 issue of Ham Radio Today. From February 1, 1996 RK3KP will cease BBS forwarding and users will be able only to read their mail. From February 15, 1996, on the 6th anniversary of its opening, the BBS will cease activity and then just operate in an experimental mode in the local net.

Leo says that he realizes that the end of RK3KP operation will seriously spoil the network and many BBSs will have to find other optimal routes for mail forwarding. RK3KP serves not only the Moscow users but also many other towns and countries, and he hopes that a new Moscow BBS and Node system will successfully solve this problem. I believe Leo deserves much thanks for the many years of his time and effort in keeping the system going.

CTRL-Z, end of message

That's it for this month. As always, please do let me know what you're up to in the ham radio data communication side of things, or indeed what your local group are doing. Likewise if you'd like a specific topic covered in this column, or a question you'd like to ask, just get in touch and I'll try and help out. You can contact me either direct via packet, or via post, fax or email c/o the Ham Radio Today Editor. Until next month, 73 from Chris G4HCL @ GB7XJZ.#48.GBR.EU

HF Happenings

Don Field G3XTT looks back at the CQ Worldwide contest, and forward to activity from the 'most wanted' countries

During the CQ Worldwide CW contest at the end of November, 10 metre conditions really were at a low ebb. Usually the high level of activity during a contest demonstrates that propagation really isn't as bad as you thought. On this occasion, it demonstrated that propagation was every bit as bad as you thought! However, this was more than compensated for by the truly outstanding conditions on the low frequency bands. I operated single-band on 160 metres, and found myself working the West Coast of the US on both nights of the contest, as well as Alaska, and Northern Canada. Usually these northern paths (remember, we are talking great circle headings) are severely affected by absorption in the auroral region.

Over 100 countries were reported heard/worked in Europe on 160 metres during the contest weekend. On 80 metres John, ON4UN, worked 100 countries during the first 24 hours of the contest, and ended up with 118 countries in 35 zones. This included well over 200 contacts with Japan, and over 50 with the West Coast of the US.

By the following weekend, and the ARRL 160 metre DX contest, conditions were considerably down, although it was still possible to work well into the USA, but with very much lower signal strengths than the CQWW weekend. By the time the ARRL 10 metre contest came round in mid-December, although there was 10m propagation from the UK to Africa, that was about it.

The moral at this stage of the sunspot cycle seems to be to hang in there on the low bands if you want some good long-distance propagation, and from time to time you will be pleasantly surprised at just how good that propagation can be. Incidentally, during the CQ Worldwide CW contest, my 160m aerial was an inverted-L, about 24m high at its highest point, and with about 40 radial wires, ranging from 15m to 30m or so in length. This aerial had been mildly disappointing in the week before the contest, and only really came into its own when I removed my HF beam from my tower. This is the problem with trying to operate on several wavebands from a typical UK garden; the various aerials are in each other's near-field and can suffer significant interaction.

While on the subject of the CQ Worldwide CW contest, I want to commend the operators of TY5A in

Benin. This was a joint US/UK group, the UK being represented by Roger G3SXW and Rob GM3YTS. They had to travel first to Accra in Ghana (where they did some operating) and then by road across Togo to Benin. Their host in Benin was able to lend them his station, but they had to take with them enough equipment to set up separate aerials for all six bands, along with four (I believe) complete stations. They then went on to hand out over 10,000 contacts during the contest, and a lot more outside it. A superb effort all round, and an opportunity for many people to contact what is normally quite a "rare" country.

Most wanted list

Talking about rare countries, the DX Magazine has recently conducted its annual survey of "Most Wanted Countries". Although conducted mainly from a US perspective, the Magazine does break out the results by continent, and gets enough replies from Europe to produce a meaningful list.

By the way, North Korea does not appear in this list because it was added to the DXCC Countries List after the deadline of this poll. Otherwise it would, of course, be the number one most wanted country.

Sadly it now looks as though the proposed operation from Heard Island, number one on the European "wanted" list, will be delayed at least until late 1996. The group who were planning to go early this year have lost something like \$100,000, which was paid as a deposit for the ship which was to take them and later proved totally inadequate and potentially dangerous.

There are better prospects for Kermadec Island, number 3 on the European list, with a group consisting mainly of New Zealand amateurs having gained permission for an operation later in the year. Again, this will be expensive, but doesn't require the specialist type of vessel that a journey into the Antarctic regions entails.

Macquarie Island may also be active by the time you read this, as Warren VK0WH was scheduled to arrive there in November for a one year tour of duty. Let's hope he isn't frightened off the bands by the inevitable pile-ups that will be generated whenever he appears.

As for the others on the European

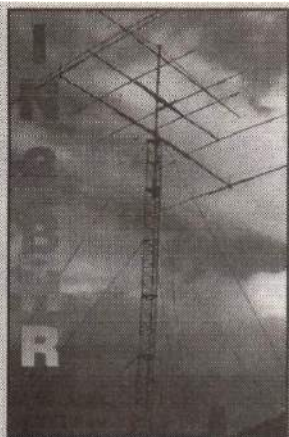
list, a large expedition to Wake Island (KH9) was promised for January, but the information came in too late for this column. And a Bulgarian amateur LZ1WR was hoping to get permission to operate from Libya (5A) sometime during March. There are also rumours that the new crew on Marion Island (ZS8), due there in March, will include a licensed amateur. I suspect many of the others will not be targeted by DXpeditions until better propagation returns, as it doesn't make sense to spend vast amounts of money to activate a remote spot if there will be little or no propagation to significant areas of the world.

Prefixes

Unusual callsign prefixes always seem to give rise to confusion, but this doesn't seem to reduce their popularity. During 1996, Austrian amateurs will be able to use the prefix OEM instead of OE to celebrate Austria's millennium, though the use of the special prefix is entirely optional. The RSGB's DX News Magazine carried a piece by PY2NY about Brazilian prefixes with the numeral zero. Often it is assumed that such callsign must indicate one of the offshore islands. Apparently, regardless of the prefix letters preceding the numeral (e.g. PP PQ PR ZY ZW), the key lies in the first letter after the numeral. An F indicates Fernando do Noronha, a T indicates Trindade, and an S indicates St. Peter & Paul Rocks. Otherwise the callsign counts for Brazil. For example, ZY0FF would be Fernando do Noronha, but PR0MM would be Brazil. Hope that's clear!

Tim, KJ4VH, put out a piece on Internet about Chinese prefixes. A BZ callsign is one issued to an individual for use only from a licensed club station. The BA prefix is for callsigns for home use (though you will hear very few of these, as equipment is hard to come by). Some amateurs hold both BA and BZ calls. Club stations themselves use the BY prefix.

Talking about China, in a fascinating article about the 1995 Beijing DX Convention, Roger G3LQP (the only UK amateur to attend the Convention) reports, among other items, that work on licensing in North Korea is progressing well. Indeed, since meeting North Korean officials in Beijing, Roger himself has received a personal invitation from the Ministry to



Don't we just love lusting after other Hams' aerials?

visit North Korea! When licenses are issued, it looks as though in the first instance they will have the prefix P51.

Myanmar

Reports from Myanmar (what used to be Burma) continue to be encouraging as far as amateur radio is concerned. There was a lot of activity in late October, and some of the operators were due to return early in 1996, with the intention of making a big effort on the low frequency bands. At the same time, they (OH2BH and others) are continuing to work with the Myanmar authorities to put amateur radio back on a regular footing, so perhaps we can expect regular activity in future, as has happened in recent years in a number of other previously inactive countries (Albania, Vietnam, Laos, etc.).

Pirates

During this sunspot minimum, one disconcerting development is the increase in illegal CB activity in many parts of the world in the 10 metre amateur band, drifting up from the 27MHz CB band. While the majority of us would be happy to welcome CB operators through the legitimate route of obtaining an amateur licence, this illegal activity is, I fear, going to be difficult to dislodge when good 10 metre propagation returns in a few years' time. The problem is, as I understand it, particularly prevalent in parts of the Far East, South America and around the Mediterranean. As always, the answer to a large extent lies in our hands, by making good use of our bands before they are infiltrated by others. The 30 metre band also suffers related problems, but in this case it is mainly commercial operators who search the short waves for a clear channel, and then place a data transmission on it. If we keep our bands busy, then they will look elsewhere.

Forthcoming contests

Finally, a reminder of some of the major operating events coming up. The ARRL (US national society) CW contest (US works rest of the world) is on 17/18 Feb. and the SSB leg is on 2/3 March. The CQWW 160 metre Phone contest is on 23/24/25 February. And the CQ WPX SSB Contest (the

one that brings out all the weird prefixes) is on 30/31 March. Enough to keep you all amused, I trust. And, of course, there are some nice RSGB-sponsored events during the same period, such as the 1st 1.8MHz contest, the 7MHz DX Contest and the Commonwealth Contest. After all, what else is there to do during the long winter months?!

I would love to have more reader feedback, to know whether I am covering the right topics. I try to answer all correspondence received, and particularly welcome news and photographs. Write via the Editor, or direct to me at 105 Shiplake Bottom, Peppard Common, Henley on Thames, RG9 5HJ. I am also available on Compu-Serve at 100646,2344 (on Internet, this is 100646.2344@compuserve.com).

Most wanted countries list

World

No.	Pfx	DXCC-Country	%
1	A5	Bhutan	65.5
2	VU4	Andaman Isl.	63.4
3	VK0	Heard Isl.	60.8
4	7O	Yemen	55.5
5	5A	Libya	55.0
6	VK0	Macquarie	48.7
7	FR/T	Tromelin	47.6
8	VU7	Laccadive	47.3
9	SV/A	Mount Athos	46.7
10	XZ	Myanmar	45.8
11	3Y	Bouvet	42.4
12	E3	Eritrea	40.3
13	FR/G	Glorioso Isl.	40.3
14	ZL8	Kermadec Isl.	40.0
15	3V	Tunisia	39.1
16	ZL9	Campbell Isl.	39.1
17	FT/Z	Amsterdam Isl.	38.6
18	3B6	Agalega Isl.	37.0
19	XW	Laos	34.9
20	FR/J	Juan de Nova	34.5
21	EPI	ran	34.3
22	ZS8	Marion Isl.	34.1
23	FT7W	Crozet Isl.	33.7
24	TT	Chad	32.8
25	3C0	Annobon Isl.	32.4
26	HK0	Malpelo Isl.	31.2
27	FT/X	Kerguelen	31.1
28	1S	Spratly Isl.	30.0
29	VK9C	Cocos-Keeling	29.8
30	8Q	Maldives	28.2
31	YA	Afghanistan	28.2
32	VP8S	Sth. Sandwich	28.1
33	VK9X	Christmas Isl	28.0
34	1A0	SMOM	27.5
35	3W	Vietnam	26.9
36	VK9W	Willis Isl.	26.6
37	XU	Cambodia	26.6
38	ST0	South Sudan	26.5
39	9N	Nepal	26.4
40	A6	UAE	26.1
41	PY0S	Peter & Paul	25.7
42	YK	Syria	25.7
43	YI	Iraq	25.6
44	9U	Burundi	25.2
45	S2	Bangladesh	24.5
46	3B9	Rodriguez Isl	24.3
47	KH5K	Kingman Reef	22.8
48	TN	Congo	22.8
49	3A	Monaco	22.3
50	ZD9	Tristan da C.	21.7

Europe

No.	Pfx	DXCC-Country	%
1	VK0	Heard Isl.	70.3
2	VK0	Macquarie Isl.	64.9
3	ZL8	Kermadec Isl.	64.9
4	A5	Bhutan	62.2
5	ZL9	Campbell Isl.	48.6
6	FT/Z	Amsterdam Isl.	48.6
7	VU4	Andaman	43.2
8	3B6	Agalega Isl.	43.2
9	KH5K	Kingman Reef	40.5
10	KH4	Midway	40.5
11	3Y	Bouvet	37.8
12	VK9W	Willis Isl.	37.8
13	KH5	Palmyra Isl.	37.8
14	T31	Central Kiribati	37.8
15	FT/W	Crozet Isl.	35.1
16	KH1	Baker & Howland	32.4
17	KH7K	Kure Isl.	32.4
18	3Y1	Peter 1 Isl.	32.4
19	7OY	Yemen	27.0
20	ZS8	Marion Isl.	27.0
21	CYS	able Isl.	27.0
22	3C0	Annobon Isl.	24.3
23	HK0	Malpelo Isl.	24.3
24	VK9M	Mellish Reef	24.3
25	TI9	Cocos Isl.	24.3
26	KH9	Wake Isl.	24.3
27	5A	Libya	21.6
28	FR/T	Tromelin	21.6
29	VU7	Laccadive Isl.	21.6
30	XZ	Myanmar	21.6
31	E3	Eritrea	21.6
32	FR/J	Juan de Nova	21.6
33	CE0X	San Felix	21.6
34	FO/X	Clipperton Isl.	21.6
35	FR/G	Glorioso Isl.	18.9
36	XW	Laos	18.9
37	VP8S	South Sandwich	18.9
38	PY0S	Peter & Paul	18.9
39	VP8G	South Georgia	18.9
40	3D2	Conway Reef	18.9
41	T33	Banaba	18.9
42	CE0Z	Juan Fernandez	18.9
43	C2	Nauru	18.9
44	ZK3	Tokelau Isl.	18.9
45	FT/X	Kerguelen	16.2
46	3B9	Rodriguez Isl.	16.2
47	KC6	Palau	16.2

Satellite Rendezvous

Richard Limebear G3RWL with this month's collation of AMSAT-UK news on the satellites including the latest Phase 3-D update

Dove's software load was completed at the end of October. S-band is on and should stay on; accurate measurements of its frequency (2401.220 MHz) would be appreciated, send to wd0e@amsat.org

Some folks worry that the telemetry shows minimal power output on 2m. With DOVE in its present mode, the telemetry is gathered when the transmitters are *off*, therefore it will always show zero power. If there is any reading other than zero it is because of noisy telemetry or an error in your decoder.

With S-band on, the 2m transmitter power is staying at about 1.4W all the time. That is, down from 3.6W during illuminated periods and 1.4W during eclipse without S-band on.

They are presently using (and normally use) transmitter *B* because it is slightly more efficient than *A*; they believe *B* uses left hand circular polarization.

KO-25 was off for quite some time after the command team decided to change over to the 145.980 MHz receiver. Previous problems have been connected with the beginning of the academic year, when a new command team takes over without reading up on the history. So they probably had to wait for the watchdog to time out. *KO-25* is now back, but still using the 145.980 MHz receiver (I wonder if the new command team realise this receiver causes frequent software crashes).

Phase 3-D

The P3D spaceframe has been completed and is in the clean room at the Integration Laboratory in Florida. The wiring harness is now being constructed and will be installed on the spaceframe soon. The propulsion system hardware is all but complete and some of it is already installed. The aeri-als are designed and flight units are being fabricated. The side of Phase 3-D which will face Earth is a *real* aerial farm with three dipoles for 2m, six patches for 70cm, a short backfire for 23cm, dishes for 2.4 and 5.6GHz, horns for 10GHz and 24GHz, plus three GPS "helibowls". To add to the crowding, in the centre of this face is the main motor nozzle.

The SBS, the cylindrical container which Phase 3-D will ride in during launch, has been completed and is ready to be shipped to Florida. The

electronic assemblies being built in Europe are nearly ready to go to Marburg for final testing before shipment to Orlando. The flight computer has been completed in Arizona and taken to Marburg for evaluation and testing. Good progress is being made on the GPS equipment and the RUDAK computer is in its final stage of construction and checkout. Specific plans have now been finalized for the vibration and thermal vacuum testing of the spacecraft. Although Germany and Brazil were seriously considered, it has been decided that the tests will take place in the US. This offers a number of advantages over overseas locations, in terms of both cost and logistics.

They are not as far along as they thought they would be by now. Correspondingly, the European Space Agency is experiencing a few delays of its own. First, it was announced that the flight of Ariane 502, the one we are on, would be delayed from April to May 1996. Then, recently ESA put out a press release saying the flight would take place in September, but that Phase 3-D *may* not be on it after all. That's the bad news. The good news is that it has now been learned that ESA has committed to launch us, if not on 502, then on an Ariane 4 vehicle prior to mid-1997. We believe that the most likely date is about December, 1996.

As you can imagine, no one is happy about the prospect of such a long launch delay. The most obvious disadvantage is that it postpones the date that P3D becomes available for amateur use until after the expected demise of AO-13. The other factor is that the longer we wait for a launch, the more costly will be the overall project. There are some costs which just keep on piling up no matter what efforts are made to minimize them. Of course, they will take steps to reduce expenditure to an absolute minimum.

Oscar 13

Oscar 13's engineering beacon (EB) 145.985 MHz is *on* from MA 0 to MA 40. This beacon is about 6db

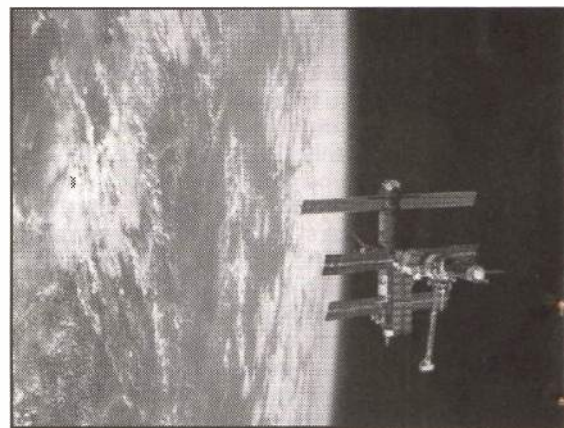
stronger than the general beacon (which is *off*), so facilitating telemetry collection at perigee when the omni-directional aeri-als are in use. The EB is PSK only; it does not transmit CW or RTTY.

Oscar 10

Its still operational in Mode-B. Despite good signals from the transponder, there are very few stations using it. Its currently available when in view but *please do not* attempt to use it if you hear the beacon or the transponder signals FMIing. (I had a go yesterday and signals were good; I didn't realise until later that I had only been using 25W to my 12 ele without the linear !)

Mir

The status on board Mir appears to be as follows:- Manuals for TM-733, lcom, and PacComm TNC are now up there; N7NSI donated the manual for his TM-733A transceiver and



Mir, as seen from the Shuttle
Photo; courtesy NASA

KC5BTL donated a manual for their lcom rig. The manuals were successfully delivered by the recent STS-74 crew. But there is no duplexer yet. Also Thomas still needs

a cable for one of the rigs but he at least has something to get started on.

The present intention is to use the TM-733 on 70cm and keep the old 2m radio working, so it will be possible to talk with them and work packet at the same time. Apparently there should be tests on 70cm soon.

As a reminder, the main 70cm frequencies are: 435.725 / 437.925 MHz (Voice) and 435.775 / 437.975 MHz (Packet). 2m frequencies are: 145.200 / 145.800 MHz and the usual 145.550 MHz. QSLs will be sent after the mission.

Thomas and his Russian colleagues will provisionally return at the end of February. The building of Soyuz rockets is being delayed by financial problems at the Russian space agency NPO Energiya.

Sarex

The SAREX Astronauts were very active on voice on the STS-74 mission. Canadian Astronaut Chris Hadfield, KC5RNJ, received his Amateur Licence only one week before the flight; callsign VA3OOG.

The Atlantis astronauts completed 5 scheduled contacts with US students as part of the Shuttle Amateur Radio EXperiment but there was no hardware to support packet radio contacts from the shuttle during this flight.

QSL cards and reports may be sent to ARRL EAD, STS-74 QSL, 225 Main Street, Newington, CT 06111-1494, USA. Include the following information in your QSL or report: STS-74, date, time in UTC, frequency and mode (FM voice). In addition, you must also include a SASE using a large, business-sized envelope if you wish to receive a card. The Greater Norwalk Amateur Radio Club in Norwalk, CT has generously volunteered to manage the cards for this mission.

Apparently the astronauts are not getting as much on-the-air experience as they used to, due to a change in training methods and time constraints. Where they used to get 10-15 sessions (2 hours) pre-mission, it's down to 6, and most of that is in how to set up and stow the hardware, operate it, etc. However, the current administration and trainer have agreed to decrease training to something that has less impact on other training and time constraints.

Upcoming space shuttle missions

(visible from UK) are;

STS-76; March 21, 1996, duration 10 days, Mir docking mission.

STS-79; August, 1996, duration 9 days, Mir Docking mission.

Science museum exhibit

Surrey Satellite Technology Ltd is pleased to announce it's participation in the latest exhibition at the Science Museum in Kensington, London. A full size model of the FASAT-ALFA satellite is on display as part of the 'Future Innovations' program.

This will be of particular interest to radio amateurs as it shows the UoSAT bus system used on UoSAT-5 and KITSAT. If you want to see how small these satellites really are, you have the perfect excuse to have a look at the Space Gallery at the Museum. The model shows the satellite in the process of deploying the gravity gradient boom and the various cameras and sensors are clearly visible.

The exhibition was opened on 22nd November and will be on show until May 1996. Further details of opening hours etc. are available from the Science Museum, Exhibition Road, London SW7.

SatLink

Jesse Buckwalter, NZ3F, has released version 951107 of his SatLink program (a Pacsat ground station program written for execution under MS-DOS). It performs both uploads and downloads and serves as replacement for PG and PB programs. The source code for Satlink is also available.

Satlink can be downloaded via anonymous FTP from the AMSAT-NA FTP file server on the Internet. The associated files are:
sl951107.zip - SatLink executable
sls51107.zip - SatLink source code
 satlink.txt - brief description of SatLink

The source code is C++ that will compile using Borland C++ 1.0 and 4.02 compilers.

AMSAT-UK news

Next year's Colloquium is booked for 25th to 28th July 1996. It has been decided that the first day

(Thursday) will be dedicated to administrative (political) affairs with the other days being used for all other subjects. The price will be the same as 1995 unless there's a VAT change.

If any of you have the Amsat-UK book called "The Guide to Oscar Operating" (38 pages of "how to-" for beginners') you might be interested in the upgrade that is now available. Its a four-page supplement to the Guide and was up-to-date at 2nd November 1995.

Send an SAE to the Amsat-UK office with a pound coin taped between two QSL cards (or similar). New purchases of the Guide will include this update at no extra cost. Don't forget to say what the order is for, as there are several Amsat-UK services which operate in a similar way.

Do you remember that, back in March, a plea for donations to P3D was sent out to 600 RSGB affiliated clubs; and do you remember that we got very few replies?

It's the club AGM season. Why not ask awkward questions at *your* club's AGM as to why they didn't answer. If only half the clubs had sent a fiver, that would have been another £1500 towards P3D!

Latest Keplers

AMSAT-UK Keplers are put out on packet fortnightly, sent to KEPLER @ GBR. The latest satellite Keplers as supplied by AMSAT-UK are also available by automatic fax retrieval from the 24hr Ham Radio Today fax-back line, 01703 263429 (*use with a personal DTMF, i.e. 'touch-tone', phone/fax keypad - follow the voice menu*), request fax document 17 from the satellite menu for this month's. You can also get a copy in the post by sending an SAE together with the corner flash from this page to the Ham Radio Today Editor, marking your envelope 'Keplers' and stating whether you want *all amateur* satellites (one A4 page) or *all* satellites (10-15 A4 pages).

For further information about AMSAT-UK contact: AMSAT-UK, c/o Ron Broadbent MBE, G3AAJ, 94 Herongate Rd., London, E12 5EQ. A large SAE gets you membership info. SWL's are welcome. All new joiners get the USAT-P tracking program on 5 1/4 disk. G3RWL can now be reached via Internet as g3rwl@amsat.org.

Club News

Aylesbury Vale RS meet on Wednesday evenings in the Village Hall in Hardwick, located off the A413 between Aylesbury and Buckingham. Club diary; Feb 7th - Operating techniques, G3KLT
Feb 21st - EMC revisited, G8PTP
Mar 3rd - Surplus equipment sale
Mar 20th - AGM
Apr 3rd - The PC in the shack
For further details and meeting times, contact Ivan Eamus G3KLT, Tel. 01296 437720

Braintree and District ARS meet on the first and third Monday of the month (except bank holidays), 8.00pm, at the Braintree Hockey Club, Church Street, Bocking. 2m club net on the 2nd and 4th Mondays at 20.00 GMT, 145.375MHz. Planned club events/talks; Feb 19th - Video evening
Feb 23rd - Annual dinner
Mar 4th - Operating evening
Mar 18th - Technical clinic
For further details please contact Club Secretary John Button G1WQQ, Tel. 01787 460947

Bristol (South) ARC meet every Wednesday at the Whitchurch Folkhouse Association, Bridge Farm House, East Dundry Road, Whitchurch, Bristol. Club diary of events/talks; Feb 7th - 10m activity evening
Feb 14th - Power supply construction
Feb 21st - Aircraft magazine evening
For more information and meeting times, Tel. 01275 834282 24hr. Answerphone.

City of Bristol Group meet on the last Tuesday in the month, 7.00pm for 7.30pm, at New Friends Hall, Purdown, Bell Hill, Stapleton, Bristol BS16 1BG. Club diary of events/talks; Feb 27th - Amateur Fast Scan TV, G8YMM
Mar 26th - Role of QSL Manager, Phil Whitchurch
Apr 30th - Past President Clive Trotman
Further details can be obtained from Dave Bailey G4NKT, Tel. 0117 9672124

Bromley and District ARC meet on the third Tuesday of each month, 7.30pm for 8.00pm at the Victory Social Club, Kechill Gardens, Hayes, Kent. Club net; Sundays 11.00am on 145.350MHz FM. Planned events/talks; Feb 20th - High voltage cables, Ian G4VTD
May 21st - Thames tideway rescue
Further details from Alan Messenger G0TLK, Tel. 0181 777 0420

Bromsgrove ARC meet on the second and fourth Tuesday of the month at Lickey End Working Men's Club, Burcot, Bromsgrove. Club diary of events/talks; Feb 13th - Technical topics/video evening
Feb 27th - Test equipment for the radio amateur
Mar 12th - Night on the air
Mar 26th - History of radio and stereo
Further details from Barry Taylor G0TPG, Tel. 01527 542266

Conwy Valley ARC meet on the first Wednesday each month, in The Studio, Penrhos Road, Colwyn Bay, Clwyd. Planned club events/talks; Feb 7th - An evening with Prof. David Last GW3MZY
Mar 6th - Stesion Waenfawr Station, the VK/GW Connection

Apr 3rd - An evening of members' construction efforts
Further details are available from Club Secretary Wynne Evans GW6PMC, Tel. 01745 855068, Ans/Fax. 01745 856406

Cornish RAC meet on the first Thursday each month, 7.30pm, at Perranwell Village Hall, Nr. Truro. Planned club events/talks; Mar 7th - Crime prevention, by Devon and Cornwall Police
Apr 4th - AGM
Apr 20th - International Marconi day
For further details contact Robin G0MYR, Tel. 01209 820118

Cray Valley RS meet on the first and third Thursday of each month, 8.00pm at the Progress Hall, Admiral Seymour Road, Eltham SE9, club net 3.720MHz 8.00pm every Monday. Planned club diary; Feb 1st - So what's a valve? by G0FDU
Feb 15th - Quiz with Darent Valley RS
Mar 21st - Construction contest
Apr 18th - AGM
For further details contact Tony G4WIF, Tel. 0171 739 5057 office hours only.

Dacorum AR and TS meet alternate Tuesdays, at the Girl Guide Meeting Rooms (next to British Legion), Queensway, Hemel Hempstead. Club net every Wednesday, 19.30, on 144.725MHz. Planned club events/talks; Feb 6th - Informal meeting
Feb 20th - Rust (aerial maintenance), John G4JOV
Mar 5th - Informal evening
Mar 19th - Amateur Radio retailing, by Martin Lynch
For further details contact Nick G7KFQ, Tel. 01582 620507, or John G0FSP, Tel. 01442 66787

Dragon ARC meet on the first and third Mondays of each month at the Four Crosses Hotel, Petraeth Road, Menai Bridge, at 7.30pm for 8.00pm. Visitors and new members are welcome. The club run several special event stations throughout the year. Club diary of events/talks; Feb 5th - Update on the Alderney wreck
Feb 19th - An evening in the hands of the Chairma
Mar 4th - Talk by GW3RXD
Mar 18th - General maintenance of a valve superhet
Apr 1st - Something different, by GW0ETF
Further details from the Secretary Tony Rees GW0FMQ, Tel. 01248 600963

Halifax and District ARS meet at 7.30pm on the first Tuesday each month, at The Tap and Spile Pub (formally Royal Oak), Clare Road, Halifax, for committee and Morse tuition. On the second and fourth Tuesdays they meet, 7.00pm, at Queens Road (note Queens Road is closed for some periods at school holidays). Planned club events/talks; Feb 20th - Talk by Tony G0WFG
Mar 19th - George Dobbs G3RJV
Apr 16th - The first 45 years, by Mike G3IGW
Further details can be obtained from Mr. D. Moss G0DLM, Beechwood Lodge, Lightcliffe, Halifax HX3 8NU, Tel. 01422 202306

Hastings Electronics and RC meet every third Wednesday of each month for their main meeting, West Hill Community Centre, Croft Road, Hastings, and every Friday for a social evening, at the Sea

Anglers Club, 16 Grand Parade, St. Leonards. The club is a registered City and Guilds examination centre, and also run RAE, Novice and Morse courses. Planned club events/talks; Feb 21st - Talk by a commercial airline pilot
Mar 20th - AGM
Apr 17th - Spring auction of equipment
For further details contact Reg Kemp G3YYF, Tel. 01424 830454

Hordean and District ARC meet on the first and fourth Tuesday of each month, 7.30pm, at Lovedean Village Hall, Lovedean Lane, Lovedean, Hants. The first Tuesday is usually a 'Natter Night'. Club nets are Sundays 1955kHz 09.00hrs CW, 09.30hrs SSB, and Wednesdays 145.350MHz at 19.30hrs. Planned Club events/talks; Feb 27th - Annual jumbo junk sale
Mar 26th - Marine radio, Michael G3JMG
Apr 23rd - History of public and domestic electricity supplies, Dr. Mike Pope
Further details can be obtained from Stuart Swain, Tel. 01705 472846

Ichen Valley ARC meet on the second and fourth Fridays each month, at the Scout Hut, Brickfield Lane, Chandler's Ford, Hants (just up the road from SMC), 7.30pm for 8.00pm. Planned club events/talks; Feb 9th - Then, Now and to come, by Mike G6AIQ
Feb 23rd - Amateur TV, by Mike G8LES
Further details from Sheila GOVNI, Tel. 01703 813827

Keighley ARS meet at the Cricket Club, Ingrow, near Keighley, every Thursday at 8.00pm. Many club meetings are 'Natter nights' and 'nights on the air', other events/talks include; Feb 8th - Natter night
Feb 15th - Visit by RSGB RLO
Feb 22nd - Night on the air G0KRS
Feb 29th - A very different frequency, by G3TDZ
Further details from Kathy Conlon G1IGH on 01274 496222

Kings Lynn ARC meet every Thursday, 7.30pm, at the Scout HQ, Chequers Lane, North Runcton, near Kings Lynn. All visitors welcome. Planned club talks; Feb 15th - Sporadic 'E', by Jim Bacon G3YLA
Mar 14th - The Nuclear Industry, by BNF, Sellafield
Mar 28th - Junk and surplus equipment sale
For further details contact Club Secretary Ian Cooper G0BMS, Tel. 01553 765614, or via packet @GB70PC

Liverpool and District ARS meet at 8.00pm every Tuesday evening at The Churchill Club, Church Rd., Wavertree, Liverpool. They run RAE, Novice RAE and Morse courses. Planned club events/talks; Feb 6th - Contest planning
Feb 17th - Club on the air
Feb 20th - Special Event preparation
Feb 27th - Surplus sale
Mar 5th - Coastguard video
Mar 12th - Club on the air
For further details contact Ian Mant G4WWX, Tel. 0151 722 1178.

Manchester and District ARS meet every Tuesday (except Bank Holidays), 7.00pm, at the Simpson Memorial Community Centre, Moston Lane, Manchester 40. They run RAE, Novice RAE and



Morse tuition classes, free for members. Club nights are natter and radio nights, with projects and construction. The third Tuesdays are normally formal meetings. Visitors welcome. Planned club events/talks;
Feb 6th - DX night
Feb 13th - Morse quiz
Feb 20th - Broadcasting from the 1930's to the Cold War years, by Gordon G3LEQ
Feb 27th - Discussion night on G3LEQ's talk
For further details contact G3IOA, Tel. 0161 681 5406, or Harold GOVJZ, Tel. 0161 338 4412

Mansfield ARC meet on the second Monday every month, 7.30pm, at The Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield. Visitors welcome. Planned club diary of events/talks;
Mar 11th - Radio related videos
Apr 1st - Talk and demo by Richard Hillier of AOR Ltd.
May 13th - AGM followed by a surplus sale
For further details contact Howard G1JGY, Tel/Fax. 01623 423697, or David G0RDP, Tel. 01623 631931

Maxpak, the Midlands AX25 Packet Radio Users Group, meet on the first Monday each month (when this is a Bank Holiday, the meetings are on the second Monday), 8.00pm, at the Perton Community Centre, Perton, near Wolverhampton. Non-members and visitors welcome (non-members 50p per evening to help cover costs). Planned events/talks;
Feb 5th - PCs and packet radio, with practical demo
Mar 4th - An evening with WinPack
Apr 1st - AGM
May 13th - BBS's nodes and the MaxPak LAN
For further information contact Club Secretary Edward Loach G4ZXS, Tel. 01902 741877 (evenings), or via packet G4ZXS@GB7MAX

Medway ARTS meet 7.30pm on Fridays at Tunbury Hall, Catkin Close, Tunbury Avenue, Walderslade, Chatham. Morse practice, construction and Novice help available. Club diary;
Feb 9th - Writing and publishing a text book for the RAE, by Brian Moran
Mar 1st - Something for nothing - the sequel, by Geoff G3YVF
Mar 22nd - Construction competition. Free choice. In addition YLs and XYLs are invited to bring or send an item of handiwork.
Further details from Gloria G3VUN, 40 Linwood Ave, Strood, Rochester, Kent ME2 3TR, Tel. 01634 710023

Norfolk ARC meet every Wednesday at The Norman Centre, Bignold Road, off Drayton Road, Norwich, 7.30pm for 8.00pm start. Informal meetings are usually held on alternate Wednesdays, where it is a night on the air, construction QRP and Morse practice evening. Club diary of events/talks;
Feb 7th - Surplus PMR conversion, Steve G0UYA
Further details can be obtained from Mike G4EOL, Tel. 01603 789792.

Nottingham ARC meet every Thursday, 7.30pm. in the Sherwood Community Centre, Mansfield Road, Nottingham. Visitors interested in amateur radio, whether as a transmitting amateur or SWL, are most welcome. Forthcoming events/talks include;
Mar 7th - Forum and night on the air
Mar 14th - Fox hunt review
Mar 21st - Security marking with G7SJD, bring your

equipment
Mar 28th - Construction and activity evening
For further details contact Simon G0IEG, Tel. 0115 9501733

Plymouth Radio Club meet Tuesdays, 7.30pm, at the Royal Fleet Club, Devonport, Plymouth. Planned club diary;
Feb 13th - Natter night
Mar 12th - Natter night
May 25/26th - Club rally
For further details contact the Public Relations Officer, F. P. Russell, Tel. 01752 563222

Salop Amateur Radio Society meet at the Oak Hotel, The Mount, Shrewsbury every Thursday. They run regular RAE tuition and workshop evenings. Planned club diary of events/talks;
Feb 1st - Surplus sale
Feb 15th - Know your locator?
Feb 29th - Slow Scan Television demo, G0ALV/G6DQY
For further details contact Ian G7SBD, 56 Roselyn, Harlescott, Shrewsbury SY1 4LP

Sheffield ARC meet Mondays, 7.30pm, at the Club 197, Brook Hill, Sheffield (this is the lecturer's social club opposite the main buildings of Sheffield University), and occasional Tuesdays for social events (times and venues set as required). The club runs RAE, Novice and Morse courses on Mondays starting at 7.30pm. Planned club diary;
Feb 5th - I invented radio, by Peter G4MRU
Feb 12th - Individual quiz night
Feb 19th - Data communication, is this the future?
Feb 26th - How to operate radio equipment
Mar 11th - Team quiz night
Further details via P.O. Box 365, Sheffield S1 1BY or Tel. 0114 2446282, or 2657912.

Silverthorn RC meet every Friday, 7.30pm. at the Adult Education and Community Centre, Friday Hill House, Simmons Lane, Chingford, London E4 6JH. A warm welcome is given to everyone. They have a fully equipped shack with packet radio facilities for members to use, and have regular 'on air' and social evenings. Planned club diary of events/talks;
Feb 2nd - Packet radio demo in the radio shack
Feb 16th - Talk on RAYNET
Feb 23rd - Social evening
Mar 1st - Extraordinary General Meeting
For further details contact Andrew Mowbray, G0LWS/G1NPT, at above address, or from Dave G0KHC, Tel. 0181 505 1871, or packet to G1NPT @ GB7TUT.

Southampton ARC, now flying again, meet at the CDT Block, East Building, Cantell School, Violet Road, Bassett Green, Southampton, or at the QTH of G1UWL (90 Evenlode Road, Millbrook Park Estate, Southampton), on the 1st and 3rd Mondays each month. The club run CW and construction classes. New members welcome. For further details contact Harold McIntyre, Tel. 01703 737715.

Southgate ARC meet on the second and last Thursdays of each month at the Winchmore Hill Cricket Club Pavilion, Firs Lane, Winchmore Hill, London N21. Meetings are held each 2nd and 4th

Thursdays of the month, between 19.30 and 22.00. The club also runs Novice licence courses and have regular 'on air nights'. Planned club diary of events/talks;
Mar 9/10th - London Show
Apr 11th - Surplus sale?
May 25th - Club 60th anniversary dinner
For further details contact M. E. Viney G0ANN, 20 Auckland Road, Potters Bar EN6 3ES, Tel. 01707 850146.

Stourbridge and District ARS meet on the first and third Mondays each month (except bank holidays), at the Robin Woods Centre, Scotts Road, Stourbridge. Planned club events/talks;
Feb 5th - On air and natter night
Feb 19th - Constructors' competition
Mar 4th - President's Annual Dinner
Mar 18th - AGM
Apr 1st - On air and natter night
Apr 15th - 'PCBs' design and practical demo by G4EEM
Further details from Gordon Bryant G0TZV, Tel. 01384 395206

Stratford upon Avon & District RS meet on the second and fourth Mondays, at the Home Guard Club, Main Road, Tiddington, Stratford upon Avon, at 7.30pm. The club also run an RAE course (write to Mr. J. Harris, 57 Evesham Road, Stratford upon Avon CV31 2PB, enclosing an SAE, or Tel. 01789 295257 for details). Club events/talks include;
Feb 12th - DX cluster, John G4PDQ
Feb 26th - Test equipment evening
Mar 11th - Visit to The Cable & Wireless Company College
Mar 25th - Surplus equipment sale
Apr 8th - AGM
Further details from Club Secretary Jeff Porter G4OHJ, Tel. 01789 773286

Sutton and Cheam RS meet on the first Thursday (natter night) and third Thursday (formal meeting) each month, 7.30pm for 8.00pm at the Sutton United Football Club, The Borough Sports Ground, Gander Green Lane, Sutton, Surrey. Club 'natter freq' 70.3875MHz, Club nets; 20.30 Mon starting on 145.500MHz then QSY, Tue at 10.30 on 3.760MHz. Club talks/events;
Feb 4th - 432MHz fixed/AFS contest
Feb 15th - Constructional contest
Mar 2nd - Annual dinner
Apr 16th - Visit to the Met Office at Bracknell
For further details, Tel. 0181 644 9945

Torbay ARS meet every Friday at the ECC Social Club, Highweek, Newton Abbot at 7.30pm. They have informal meetings most Fridays with a talk/event once a month, details as follows;
Feb 16th - AGM
Further details from Walt G3HTX, Tel. 01803 526762, or Peter G4VTO, Tel. 01803 864528 (day works No.)

Verulam ARC meet, 7.30pm, on the second and fourth Tuesdays each month, at the RAF Association Headquarters, New Kent Road (off Malborough Road), St Albans. On the second Tuesday they have an activity evening and on the fourth Tuesday the monthly meeting. Visitors welcome at all meetings. Planned events/talks;



Feb 27th - The Internet, by Kim G3YGA
 Mar 26th - The Hubble Telescope, Robert Forrest
 Apr 23rd - The present CB scene, Ray G7SWY
 For further details available from Walter Craine G3PMF,
 5 The Crescent, Abbots Langley, Watford, Herts WD5
 ODR

Wakefield and District RS meet every Tuesday,
 8.00pm, in the first floor rooms, Ossett Community
 Centre, Prospect Road, Ossett, West Yorks. We're told
 the club has a well equipped station and run both
 Morse and Novice classes. The club net is on 2m FM
 on Mondays. Club diary;

Feb 11th - Club rally
 Feb 13th - On the air
 Feb 20th - Avionics, by G3VTD
 Feb 27th - Video evening
 For further details contact Bob Firth G3WWF, 6
 Eastfield Drive, Woodlesford, Leeds LS26 8SQ, Tel.
 0113 2825519, or via packet G3WWF @ GB7WRG

Wigan - Douglas Valley ARS meet on the first and
 third Thursday of each month, at their new venue -
 Wigan Sea Cadet HQ, Training Ship Sceptre,
 Brookhouse Terrace, off Warrington Lane, Wigan. For
 further details contact D. Snape G4GWG, 30 Culcross
 Avenue, Highfield, Wigan, Lancs WN3 6AA, Tel. 01942
 211337

Wirral ARS meet at The Club Room, Ivy Farm, Arrows
 Park Road, Wirral L49 5LW, every Tuesday ('Natter
 Night') and every Wednesday each month, meetings
 besides those below are usually 'activities' nights.
 Planned club events/talks;
 Feb 21st - Surplus equipment sale
 Mar 20th - Wirral history on post cards part 2,
 by John Ryan

Apr 17th - SSTV/JVFX, by G6GAK
 For further details contact Tom Lennon G7IIP,
 'Hamnavoe', Uplands Road, Spital Park, Bromborough,
 Wirral, Merseyside L62 2BZ

Worthing and District ARC meet every Wednesday,
 7.30pm for 8.00pm, at the Parish Hall, South Street,
 Lancing. Planned events/talks;
 Feb 7th - Confessions of a Morse examiner
 Feb 14th - Whispers in the air (video),
 the story of Marconi
 Feb 21st - Junk sale
 Mar 6th - Short talk and discussion
 Mar 13th - Information Super Highway, by G7PIW
 Further details from Roy Bannister G4GPX, Tel. 01903
 753893

Yeovil ARC meet every Thursday at 7.30pm, at the
 Red Cross Centre, 72 Grove Avenue, Yeovil, Somerset.
 The club run Novice and RAE courses, plus Morse
 tuition if required, by arrangement with G3GC. All are
 welcome. Club nets, Sundays 10.30 on 3.665MHz (80m
 SSB), Tuesdays 20.30 on 145.350MHz (2m FM) and
 Fridays 20.00 on 3.550MHz (CW). Club events/talks;
 Feb 1st - The first transatlantic test, by G3MYM
 Feb 8th - Flint Stone Radio - the practical side, G7LNU
 Feb 15th - Surplus equipment sale
 Feb 22nd - Adapting the Pitney receiver for DF, G3GC
 Feb 29th - Club station on the air
 Further details can be obtained from Cedric White
 G4JBL, Tel. 01258 473845

National and International

British Amateur Radio Teledata Group (BARTG)
 have a quarterly magazine, and hold a rally and
 contests each year. For details of joining the BARTG,
 their membership officer is Peter Adams, G6LZB, Tel.
 01923 220774, for other information the group's
 Secretary is Ian Brothwell G4EAN, 56 Arnot Hill Road,
 Arnold, Nottingham NG5 6LQ, Tel. 0115 926 2360, or
 via packet G4EAN @ GB7BAD.

British Amateur Television Club, are particularly
 active with Amateur Television (ATV) - the
 transmission and reception of vision. They produce a
 quarterly magazine entitled 'CQ-TV' and have regular
 get-togethers at their rally stands. For details of BARTG
 membership write to; Dave Lawton, 'Grenehurst',
 Pinewood Road, High Wycombe, Bucks HP12 4DD.

G-QRP Club publish a quarterly journal devoted to
 low power communication, and hold regular get-
 togethers at their rally stands throughout the country.
 For membership details, contact their Secretary, Rev.
 G. Dobbs, St. Aiden's Vicarage, 498 Manchester
 Road, Rochdale. Lancs. OL11 3HE. Tel. 01706 31812.

International Short Wave League who as well as
 running an International QSL bureau for amateurs and
 SWLs, have a monthly magazine and regular get-
 togethers at their rally stands plus several on-air nets
 on HF and VHF. For more details send an A4 sized
 SAE to; ISWL HQ, 3 Bromyard Drive, Chellaston,
 Derby DE73 1PF

The Irish Radio Transmitters Society send out
 regular newsletters giving details of local activities,
 and publish the yearly IRTS callbook, they also have a
 video library. The contact man is Dave Moore EI4BZ,
 12 Castle Ave, Carrigtwohill, Co Cork. Tel. (Eire) 021
 883555.

Radio Amateurs' Emergency Network (RAYNET)
 can be contacted at Hunters Moon, Newton le
 Willows, Bedale, N. Yorks DL8 1SX. 24hr national
 emergency contact line; 0141 621 2121. The RAYNET
 Training Team produce a quarterly newsletter for
 people interested in the National Training Scheme,
 and can be contacted at P.O. Box 2, Chinnor, Oxon
 OX9 4JY,

The Radio Amateur Invalid and Blind Club
 are a registered charity who raise money for
 radio/computer equipment, and audio cassette
 courses for home study, for blind, deaf and disabled
 amateurs. Information from Vice Chairman Margery
 Hey, Tel. 01953 454920. The club attend rallies
 throughout the year, and collect surplus equipment for
 resale. If you have equipment to donate, contact Ian
 2E1EGV, Tel. 01274 783583. The Northern Ireland
 Club collect unwanted tokens or vouchers (e.g. petrol
 etc.), these can be sent free of charge to; The
 Charities Appeal Officer, RAIBC NI, Freepost BE
 1789, Belfast BT15 3BR.

Radiocommunications Agency are the licensing
 authority for all UK radio amateurs. They have a large
 number of free publications, including the booklet

'How to Become a Radio Amateur', and their 'Novice
 Licence Information Sheet', and can offer advice on
 general aspects of licensing. South Quay Three, 189
 Marsh Wall, London E14 9SX. Direct Amateur Radio
 line; Tel. 0171 211 0160. General enquiries; Tel. 0171
 211 0211, answerphone service; Tel. 0171 211 0591

Radio Society of Great Britain are based at Lambda
 House, Cranbourne Road, Potters Bar, Herts. EN6
 3JE, Tel. 01707 659015. They have a unique blend of
 full-time staff at Potters Bar coupled with many
 volunteer officials around the country, and can help
 their members with many aspects of amateur radio.

Subscription Services Ltd. handle the issuing of
 amateur licenses in the UK, on behalf of the
 Radiocommunications Agency. They can help
 regarding enquiries concerning individual licences
 rather than general licensing matters (which the RA
 handle, see above). Contact details; The Radio
 Licensing Centre, SSL, P. O. Box 884, Bristol BS99
 5LF, Tel. (manned 8.30am - 10.00pm, Mon-Sat
 inclusive) 0117 925 8333.

*To include your club, or rally, in this feature, make
 sure you send us your events details early. We only
 list active clubs, i.e. those who send us their diary of
 planned talks/events, (due to space restrictions we
 can only include clubs who send us details of events
 and talks, not natter nights for every meeting) so if
 they're not listed here they're obviously not very
 dynamic! Is your club listed? If not then give your
 Secretary a boot! If your club also has a regular 'net',
 let us know, we'll let your prospective members know.
**Dates to be included in the issue published on the
 5th April must reach us by the 15th February** (we
 cannot guarantee to include details received after this
 date, several clubs are being missed out either
 because their details arrive too late, or the club
 newsletters we receive don't contain any events/talks
 dates which we can use. Please also note that Ham
 Radio Today is published on the first Friday each
 month, therefore club events/talks details which occur
 just before this date should be included in the
 previous issue), addressed to; **The Editor, Ham
 Radio Today (Club News), Nexus, Nexus House,
 Boundary Way, Hemel Hempstead, Herts HP2 7ST**,
 or you can fax your club's details direct to the Editor's
 desk on 01703 263429.*

Rallies

**If you're travelling a long distance
 to attend rallies, we recommend
 you contact the organisers of the
 events first, before travelling, to
 check if there has been any
 changes since this magazine went
 to press. If the magazine is
 informed of any changes, the
 information will be available on the
 24hr Ham Radio Today Voicebank
 line, Tel. 01703 263429.**

February 4th

South Essex ARS Radio Rally, The Paddocks, Long Road, Canvey Island, Essex (situated at the end of the A130). Doors open 10.30am, featuring traders, bring and buy, RSGB Morse testing on demand (two passport photos required), home made refreshments, free car parking with space outside main doors for disabled visitors. Admission £1.00. Further details from David G4UVJ, Tel. 01268 697978

February 11th

The **Northern Cross Rally**, is now at a new and better venue - Thomes Park Sports Centre, Wakefield. Easy access from M1 junctions 39 and 40 - well signposted and with talk-in on 2m and 70cm. One large hall, doors open 11am (10.30am for disabled visitors and bring and buy). For further details Tel. 0113 238 3622

February 24th

Rainham Radio Rally will be held at the Rainham School for Girls, Derwent Way, Rainham, Gillingham, Kent. We are told it's very easy to find from junction 4 M2 motorway A278, or from the A2 at Rainham, just follow the RRR arrows. Talk-in will be on S22 GB4RRR. Doors open 10.00am to 3.30pm (9.30am for disabled visitors), admission £1.50, children under 14 free. Featuring a good mix of traders, bring and buy plus many special interest groups. Licensed bar, food and refreshments available. Plenty of off-road parking. For further details contact Martin G7JBO, Tel. 01634 365980 any reasonable time.

February 25th

Barry ARS Annual Radio and Computer Rally, will be held at the Barry Leisure Centre, Barry. Doors open 10.30am (10.00am for disabled visitors). For further details please contact Brian Brown GWOPUP, Tel. 01222 832253

March 2nd

West Wales Amateur Radio and Computer Rally, is run by the Aberystwyth & District ARS, it will be held at Penparcau School, Aberystwyth, near the new Safeway complex, featuring trade stands, special interest and repeater groups, bring and buy, plus lots more for the Amateur Radio and Computer hobbyist. Doors open at 11am, talk in on S22, admission £1. For further details contact Katy GWOSFO, Tel. 01545 580675

March 9/10th

London Amateur Radio and Computer Show, Picketts Lock Leisure Centre, Picketts Lock Lane, Edmonton, London N9. Doors open 10.00am to 5.00pm each day. Featuring large trade presence, free parking, on-site camping (at extra cost), lectures, disabled facilities, priority admission for disabled visitors, bars, restaurants, On-demand Morse tests (2 photos needed), bring and buy, and special interests section, plus lectures on Ham Radio Today ex-PMR conversions and equipment reviews. We're told there will also be a separate hall dedicated to vintage radio, TV, hi-fi, electronic, telecommunication and

mechanical memorabilia, including spare part and repair specialists. Talk-in will be on 2m and 70cm. For further details contact Steve G3ZVW, Tel. 0181 882 5125

March 24th

Bournemouth Radio Society's Annual Sale, Kinson Community Centre, Pelhams Park, Millhams Road, Kinson, Bournemouth. Doors open 10.30am to 4.30pm. Talk-in from G1BRS on 2m, S22. Featuring Amateur Radio and Computer traders, clubs and specialised groups. Refreshments available. Admission £1.00. For further details contact Malcolm G0UCX, Tel. 01252 845900

Pontefract & District Amateur Radio Rally and Components Fair. Further details available from B. Wilkinson G0NQE, Tel. 01977 677006

March 28th

Kings Lynn ARC Bi-monthly Junk and Surplus Sale, will be held at The Scout HQ, Chequers Lane, North Runcton, Nr Kings Lynn, Norfolk. Talk-in on RB4 GB3KL. Tables available. For further details, Tel. 01553 765614, or via packet G0BMS@GB7OPC

April 14th

Bury Radio Society Annual Rally, at the Castle Leisure Centre, Bolton St., Bury. A well lit ground floor venue, with facilities for disabled visitors. Bring and buy stall. Refreshments and licensed bar available. Talk-in on S22. For further details and table bookings, contact Laurence G4KLT, Tel. 0161 762 9308

Launceston Amateur Radio Rally, at Launceston College. Featuring two large halls with well known traders, bring and buy, on-demand Morse tests (2 passport sized photos needed), and hot snacks. Doors open 10.30am, ample parking, talk-in on S22. For further details contact Roy G0IKC, Tel. 01409 221624, or Paul G0UFV, Tel. 01566 776108

April 28th

The Marske-by-the-Sea Radio Rally, in the Marske Leisure Centre, High Street, Marske-by-the-Sea, near Redcar. Doors open 11.00am, featuring traders, bring and buy and refreshments. Talk-in on S22. For further details contact Alistair G4OLK, Tel. 01642 475671

May 6th

Dartmoor Radio Rally, at Yelverton Memorial Village Hall, Meavy Lane, Yelverton, Devon. Parking for 600 cars, access for disabled visitors, playground for children, trade stands, and bring and buy. Doors open 10.30am, refreshments available, talk-in on S22. For further details contact Ron G7LLG, Tel. 01822 852586

May 12th

Drayton Manor Radio and Computer Rally, as usual at Drayton Manor Park, Staffs (a great day out for all the family, the kids will love the roller coasters! - Ed). Further details available from Norman G8BHE, Tel. 0121 422 9787

May 19th

National Amateur Radio Car Boot Sale run by Dunstable Downs RC, at the Stockwood Country Park, Luton, Near junction 10 M1, 10.00am to 5.00pm, talk-in on S22, free entry to the Mossman Collection of Horse Drawn Vehicles and craft museum. For plot details Tel. 01582 613899. Pre-bookings for plots will be taken until May 14th, however plots can be purchased on the day.

12th QRP Convention, Digby Hall, Sherborne. Featuring talks (including one by Ham Radio Today's Tech Ed), competitions, displays, novice advice, on-air QRP stations, selected traders, food etc., open 9.00am to 5.00pm, admission/prize draw £2.00, disabled access, GB2LOW talk-in S22. For details of events special accommodation arrangements at hotels/guest houses or caravan parks, contact G3CQR, Tel. 01935 813 054

June 30th

Longleat Amateur Radio and Electronics Rally, Longleat Park, near Warminster Wilts. Six large marquees are planned to house a total of over 200 different traders. A major feature of the rally will be the bring and buy section. For those not interested in computers or electronics, one marquee is devoted to a major craft fair exhibition and another to refreshments. There is also the Safari Park, House and beautiful lake and grounds to see. Further information from Gordon G0KGL, Tel. 0117 9402950

August 18th

7th Great Eastern Rally, The Cattle Market, Hardwick Narrows, Kings Lynn. Doors open 10.00am (9.45am for disabled visitors), featuring outdoor car boot area, major national exhibitors, bring and buy, refreshments and free parking. Easy access for disabled visitors, talk-in on S22. Good family day out - Sunday car boot nearby and close to Hunstanton beach and Sandringham House. For bookings and information contact G0BMS, Tel. 01553 765614, or via packet @GB7OPC, or Internet Email leo@feline.conqueror.co.uk

Club, Rally and Special Event Station dates and details to be included in the issue published on the 5th April must reach us by the 15th February

**MORE CLUB
NEWS AND
RALLIES
NEXT MONTH**

Free Readers Ads

Readers please note our amended conditions for free private ads. All ads should be submitted on the coupon published in the current magazine, old, out-of-date coupons cannot be accepted. If you do not wish to cut up your magazine, photocopies will be accepted with the original corner flash from the current issue attached. Faxed ad coupons cannot now be accepted. One free ad per reader, per issue, maximum.

HELPLINES

Manual for Heathkit HW12A and HW32A, borrow or buy, all expenses gladly paid. G4RIP, Rose Cottage, 6 House Bank, West Pinchbeck, Spalding, Lincs PE11 3QG

FOR SALE

Cushcraft AP8A eight band vertical, £85. AKD HF wavemeter, £25. Kenwood LF-30A HF LPF, £20. SEM 1kW 2m transmatch, £20. 70cm colinear, £10. Homelab type 10 signal generator, 100kHz-100MHz, five ranges, AF/RF outputs, £20. Postage extra. N. Brown (Gt. Yarmouth), Tel. 01493 853089

Stainless steel mast, extends 27ft to 45ft, freestanding or wall mounted, complete with base and wall brackets, heavy duty rotator, wiring guys etc. £180 the lot. G4ZVK (Wigan), Tel. 01942 255318

Yaesu FT-747GX transceiver with FM, bought new, used receive only, immaculate, £585. Yaesu SP6 speaker with filters, £100. No offers, any trial. Tom Foster (Northants), Tel. 01536 522007

Avo 8 meter. Avo valve tester 45C + Inst. A55 ex-gov radio valve octal. A55, B76, B9G base valves. All valves ex 1155, B19. All valves ex AR88. All valves ex ECT. For sale or exchange. D. Carter (Birmingham), Tel. 0121 415 4847 evenings.

Icom IC-735 HF transceiver, mic, manuals, boxed, mint condition, £600. Icom IC-240 2m FM transceiver, ideal mobile, VGC, mic and manuals, £100. Bremi BRS27 PSU, 13.8V, 3A, VGC, £15. Bert G4HTM (Basingstoke), Tel. 01256 25124

Icom IC-260E 2m all mode transceiver, FM, CW, USB, LSB, ideal mobile or base package with all accessories, mounting bracket, and Icom HM10 remote mic, boxed with instructions, £275. 5-element 2m quad plus coax, £30. £300 for both. G7MZZ (Coventry), Tel. 01203 306651

Icom IC-R7000, VHF, as new, £625. Sony CRF-320 32 band digital SSB, excellent radio, £375. HF-125 general coverage, manual, boxed, £180.

Panasonic DR-28, as new, digital BFO, FM/MW/LW, 1.6-30MHz, box, £150. Wanted - 390A. R.Rai (Middx), Tel. 0181 813 9193

Kenwood TS-850S, with box, manuals and mic, as new, £1,000. Kenwood TL-922 amp, good condition, £1,000. Trio SM-220 monitor scope, £200. Eric GOCGL (Boumemouth), Tel. 01202 524901

Yaesu FT-23R 2m handheld with case, PSU, charger, rubber duck aerial etc., £120. Mobile amp, £20 ono. Realistic PRO-43 scanner, as new, boxed with manuals, £190. Wanted - 2m base aerial, colinear or disccone. A. Thompson (Tiverton), Tel. 01884 257487

Icom IC-729 ten band transceiver, HF plus six metres, little over 12 months old and still like new, offers around £900, or would swap for suitable 486 laptop portable PC. D. Watson G0DEZ (Devon), Tel. 01404 891029

G4MH mini beam, never used, with installation manual, £100 ovno, or exchange for MC60-MC85 desk mic. Derek GMOUEL (Clacks), Tel. 01259 752968

Crystals; six FT243 crystals, 3508 to 3530kHz, plus a socket, £15 the lot. Admiralty Handbook of Wireless Telegraphy Vol 2, 1938, £5. Pair Ross active micro-speakers (Maplin MK51F), built-in amplifiers, £10 plus P/P. Write to: Richard Marris, 35 Kingswood House, Famham Road, Slough, Berks SL2 1DA

Yaesu FT-1 100W HF transceiver, narrow CW filter, FM board and Nevada TM1000 ATU, £750. Lance G0CCU (Bristol), Tel. 0117 9870676

Yaesu FT-290R Mk1, £250. FT-77 with FM and FR-700 20A PSU, £375. FT-23R 2m handheld, £150. All in mint condition, boxed with manuals. D. Rose (Oxon), Tel. 01295 279599 after 6.00pm.

Kenwood R-2000 receiver with VC10 VHF converter, new condition with manual and box, £395 ono. Buyer collects. D. Joseph (W. Glam), Tel. 01369 895484 anytime.

Icom IC-229E 2m FM mobile, twenty memories, four power settings, option for DTMF, mobile mounting bracket (unused), mic, instructions, as new, £200. Tonna four element portable beam for 2m, as new, £15. Chris Knowlson (Cheshire), Tel. 01625 531154

Mini beam; Buttermut HF5B butterfly, five band, 10-20m, 3+dBd gain, span 4m, boom 2m, £150. Two Alinco ALM203E 2m handhelds, fully synthesised, LCD, 150 to 160MHz receive, extras inc., service manual, £75 each. Robin G4YED (Ayrshire), Tel. 01655 883824

MuTek TVVF50C 6m transverter, 2m in, 6m out at 10 Watts, VGC, £110. BNOS LP144-3-50 2m linear amp with receive preamp, £90. Post extra on both. P.

Lawrence (Bradford), Tel. 01274 619333

Kenwood TH-78E 2m/70cm handheld transceiver, boxed with CTCSS, spare nicad, DC lead, charger and earcaller mic, £325 ono. Pete Jenkins (Surrey), Tel. 0181 393 9115

Yaesu FRV-7700 receive converter, covers 50-60MHz, 118-130MHz, 140-150MHz, all modes, built-in preselect, ideal for FRG-7700, £65 inc P/P. PFX 70cm Ham PROMs (as per July '95 HRT conversion - Ed), £10 inc P/P. Tony G4XIV (York), Tel. 01904 330502 evenings (answerphone).

FT-290R 2m multimode, 3W, £210. FT-280R 2m multimode, 30W, £280. Tonna portable nine element 2m aerial, £25. 80m G-Whip, £30. Labtec mic for computer, Hi-Fi etc., 600ohm, AM-22, £10. Mark G4ZUY (Weybridge), Tel. 01932 856369, or 0181 849 7547

Closing down: 25A 13.8V power supply, immaculate condition (Gcomm GC138/25B), £90 ono. Also Kenwood MC80 high quality electret desk mic, boxed, £40 ono. All offers considered, but no time wasters please. Peter Hubberstey (Preston), Tel. 01772 742422

KW E-ZE match ATU, £25 ovno for quick sale. Transmatch TM1000, 0-30MHz, £25. Zetagi RP6 power reducer, £15. Wanted urgently - ATU for TS-50. John Tarton (Derby), Tel. 01283 221870

Yupiter MVT-8000 scanner, mobile or home base, 200 memories, only £225.A. Stulp (Suffolk), Tel. 01449 775395, or 0807 774997

Kenwood TS-790E 2m/70cm multimode base, boxed as new, £995. Cushcraft 17B2 17 element 2m boomer, boxed, new, £90. Wanted - HF Gemquad or similar. J. Harris (W. Mids), Tel. 01384 370695

FT-101B HF transceiver with mic and manual, £150 ono. Kenwood DFC-230 frequency controller, as new, for 530, 130 or 830, £35 ono. Prefer buyer inspects and collects. T. Hartshorn (Chesterfield), Tel. 01246 236496

36 back issues of Ham Radio Today, all good condition, 92/95, £18 ono. F. McNally (Northampton), Tel. 01327 842285 anytime.

Kenwood R1000, £325. VT-225, VHF/UHF, Marine/Air bands, with nicads, charger, leather case and manual, boxed, £200. Signal R-532 VHF, Airband, nicad pack, leather case, £135. John Lockwood (Diss, Norfolk), Tel. 01379 652043 evenings and weekends.

Yaesu FT-727 dual band handheld, all extras, two 12V batteries, stand-in fast charger/base PSU, car adaptor/charger, YH2 headset, speaker mic, soft case, rubber duck and flexy quarter wave aerials, £195 + P/P. Paul G4XTA (Penrith), Tel. 01931 713359 evenings.

Kenwood TS-530S HF, WARC bands, digital readout, boxed with mic and

manual, £375 ono. G0GUL (Coventry), Tel. 01203 450476

Yaesu FT-1 general coverage all mode solid state transceiver, memory board, extra filters, owners and service manuals, excellent condition, £765. K. Michaelson (NW London), Tel. 0181 455 8831 anytime.

AOR 3030 HF receiver fitted with optional VHF board, 108-174MHz, as new, boxed, £545 ovno. C. Martin (Hants), Tel. 01252 21798

AEA Isoloop 10/30MHz USA aerial, LC2 controller, complete FB, £150. Also Isoloop auto tuner for above, £60. G3AOS (Cheshire), Tel. 01260 252287

Oceanfax Radiofax receiver, professional quality, crystal controlled receive, plus coarse and fine VFO. Also external radio selector, automatic phaseing IOC +start, built-in printer. Requires 12V DC and wire aerial to print pictures, call for info., £475 ono. D. Riordan (N. Ireland), Tel. 01396 881303

Sommerkamp FT-307CBM, frequency readout, 160-10m, CW(N), AM, LSB, USB, CW(W), variable power, recently serviced, £600 ovno. Will exchange for larger set but must be in VGC. No time wasters. K. Winward (N. Ireland), Tel. 01232 617793 after 7pm.

Yaesu FT-900, auto ATU, unused separation kit, extra SSB and CW filters fitted, box, manuals, one years warranty, superb radio, £1,095. Carl Kidd (Southampton), Tel. 01489 789960

Yaesu FT-1 transceiver, fitted FM board, excellent condition, £625 ovno. Timewave DSP 59 Plus, £200 ovno. MFJ 948 ATU, £75. All plus postage and packing. Steve G4RVR (Chesterfield), Tel. 01246 455323

Yupiter MVT-7100 multi band receiver with leather case, mains adaptor and nicad charger, as new, all boxed, used one week, £325 (save £85). T. Linfoot (York), Tel. 01904 412487

Yaesu FT-767GX, mic, manual, new front, 70cm, 2m, mint, £1,100 ono, or swap for Kenwood TS-50S and AOR 3000A. Wanted - VHF converter for FRG-8800 receiver. M. Hardy (S.Yorks), Tel. 01226 742971 after 6.30pm.

70cm FM mobile transceiver, 20W output, crystallised RB11 but capable of six channels, with mic and cradle, £50.

G8AKA (Reading), Tel. 01734 701163

ERA Microreader MkII plus MPU and all leads, only used twice, £100. Paul Baker GW6VZW (Gwent), Tel. 01633 860921

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ADVERTISERS INDEX

Amateur Electronics	57
Amateur Radio Communications Ltd	57
Amdat	57
Amstrutt Ltd	25
AOR (UK) Ltd	29
ASK Electronics	13
Bring & Buy Database	56
Central Computers	57
Chelmer Valves Co.	17
Circuit Distribution	25
Coastal Communications	IFC
Datong Electronics	17
ERA	41
Essex Amateur Radio	55
G3RCQ Electronics	57
Grosvenor Software	25
GWM Radio	25
Hateley Antenna	41
Icom (UK)	OBC
Inter-Products	17
Jaycee Products	57
A. Jubb	56
Kanga Products	57
Langrex Supplies	56
Mutek Ltd	25
Radio Bygones	32
Radio & Telecommunications Correspondence School	56
RSGB	32
Skywave Marine	57
SRP Trading	9
Stockport CB & Leisure	57
Syon Trading	32
Yaesu (UK)	IBC

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