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* Analogue Metering
* Ideal base station

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YAESU FT-1000MP
160 - 10m All Mode

Super Discount Phone!

The radio that has stood the test of time and used by the worlds top DXers and DXepeditions. Its excellent receiver combined with its superior transmitted signal makes this a natural choice for the HF enthusiasts. AC and DC versions in stock.

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160 - 70cm All Mode

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The IC-706II G is the latest model of this classic transceiver. Great for mobile, portable or base use. Its got a great pedigree and offers 100 Watts on all bands up to 50MHz with 50 Watts on 2m and 20 Watts on 70cm. CTCSS encode and a lovely display with removeable front panel. It's the tops! Ask for leaflet.

KENWOOD TS-570DG
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Probably one of the most underated rigs. We love its superb receiver and amazing selectivity, particularly for CW. Then look at the price and remember you get a 100 Watts of pure delight. Why not phone for leaflet?

YAESU FT-840
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£659

The FT-840 offers 100 Watts of well engineered RF together with a receiver that can more than hold its own. The large LCD readout makes for easy reading and the low price makes this the perfect first-HF rig buy. We have used this extensively and nobody will know you are running a sub £1,000 radio except your wallet!

ICOM IC-746
160 - 2m All Mode

£1149

This base station transceiver offers wide band capability and includes an automatic ATU. Its 100 Watts output on all bands makes this a very attractive purchase and offers full CTCSS, electronic memory keyer, alphanumeric memories, DSP, Band Scope, VSWR meter etc. Leaflet available.

YAESU FT-100
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~~£1259~~ **Phone**

See Radcom Review

Now available from stock, this rig is now the smallest all-bander available. We have used it extensively and it is absolutely great. Read Radcom's in-depth review and then come to us for the best deal around.

YAESU FT-847
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~~£1500~~ **Phone**

The FT-847 has firmly established itself as a true all-band, all-mode transceiver. Loved by the VHF & UHF operators, and superb for satellite operation, it also offers great HF performance. We have sold more than any other dealer, which says a lot about our reputation and our price. Phone for free leaflet today.

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- 29 Programmable Functions
- DTMF Keypad & AM Airband
- Ni-cads & AC charger

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- Uses 6 x AA cells (not inc.)

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- Auto Repeater Shift
- AM Airband Receive
- Lithiun Cells & Charger

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- CTCSS Encode / 1750Hz tone
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- Built-in Packet Modem
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- Ni-cads & AC charger

ICOM IC-T8E — £279

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- 25 / 12.5kHz Switchable
- 123 Multifunction Memories
- CTCSS & 1750Hz Tone
- Programmable Features
- NI-cads & AC charger

ICOM IC-Q7E — £159

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- CTCSS Encoder
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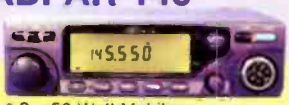

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- Keypad microphone & Mounting Kit

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KENWOOD TM-G707E — £349 Phone

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- Detachable Head with Amber Display

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Waters & Stanton

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MFJ

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Includes VSWR / Power Meter, Ant. Selector, PEP feature, Roller Coaster Tuning

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£115.95

160 - 10m Wire, Coax or Balanced

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MFJ-948 300W ATU

£99.95

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Includes VSWR / Power Meter, Ant. Selector, PEP feature, Built-in Balun, 12v Illumination

MFJ-901B 300W ATU

£59.95

160 - 10m Wire, Coax or Balanced

MFJ-962D 1.5kW ATU

£198.95

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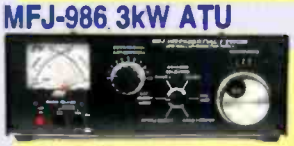

160 - 10m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Roller Coaster Tuning, Differential Tuning.

MFJ-989C 3kW ATU

£269.95

160 - 10m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Roller Coaster Tuning, T-Network

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£249.95

Get on 6m with this 10W SSB & CW Transceiver. Draws just 2 Amps max current. Includes microphone.

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£299.95

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"N" model £39.95

300W max 1.5 - 150MHz

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"N" model £59.95

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Reduces local electrical noise by up to 3 S points

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Professional Bandpass Filters

Guaranteed to cure out of band problems, these filters offer up to 50dB rejection, even just outside the band. 70cm model fitted "N" type sockets. 2m: SO-239 or "N"

DCI-145 2m £89.95 "N" type £99.95 DCI-430 70cm £119.95

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10 - 20m Inc WARC bands
1.2kW 50 Ohm Feed
2 Elements on 10,15, 20m
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Other Models (all with low angle radiator stub)

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W-25AM	25 Amp variable supply	£79.95
W-30AM	30 Amp variable supply	£119.95

Mizuho QRP SSB CW Transceivers

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Beautifully built in Japan, with xtal filter, they can be operated with internal cells or external power source. Models for 80m, 40m or 20m. Send for full details.

JULY 1999
(ON SALE JUNE 10)
VOL. 75 NO 7 ISSUE 1108
NEXT ISSUE (AUGUST 1999)
ON SALE JULY 8 1999

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JULY 1999 CONTENTS

Due to popular demand, the Alinco DX-70TH Special Offer from the May issue has been extended - see the News pages in this issue & the May 1999 PW.

The Editorial Team here at PW would like to apologise for having to hold over a number of articles this month due to a lack of editorial space. Please see Keylines. ***Editor***

REGULARS

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Published on the second Thursday of each month by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: (01202) 659910. Printed in England by Southernprint (Web Offset) Ltd. Distributed by Seymour, 86 Newman Street, London, W1P 3LD. Tel: 0171-396 8000. Fax: 0171-306 8002. Web: http://www.seymour.co.uk. Sole Agents for Australia and New Zealand - Gordon and Gotch (Asia) Ltd.; South Africa - Central News Agency. Subscriptions INLAND £25, EUROPE £30, REST OF WORLD £32 (Airsaver), REST OF WORLD £37 (Airmail), payable to PRACTICAL WIRELESS, Subscription Department, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: (01202) 659930. PRACTICAL WIRELESS is sold subject to the following conditions, namely that it shall not, without written consent of the publishers first having been given, be lent, re-sold, hired out or otherwise disposed of by way of trade at more than the recommended selling price shown on the cover, and that it shall not be lent, re-sold, hired out or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade, or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever. *Practical Wireless* is published monthly for $50 per year by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW, Royal Mail International, c/o Yellowstone International, 87 Burlews Court, Hackensack, NJ 07601, UK Second Class Postage paid at South Hackensack. Send USA address changes to Royal Mail International, c/oYellowstone International, 2375 Pratt Boulevard, Elk Grove Village, IL 60007-5937. The USPS (United States Postal Service) number for Practical Wireless is: 007075.

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PCR 1000
Computer driven receiver.

IC-T8E
Triple bander. 5W output. Military spec.
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IC-T22E
2m handie 5W.
£185

YAESU

FT-920AF
HF & 6m built-in tuner with FM & FREE AM/FM Filter. ~~£1199~~

FT-1000MP AC
Dual Receiver. Digital 100W Competition radio.
~~£2199~~

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VHF/UHF Handie. Micro small.
£199

FT-847
The new mobile-base. DSP HF 2m-70cm 50MHz.
~~£1499~~

FT-100
HF 6m/2m/70cm extra small mobile. Information to follow.

KENWOOD

TS-870
Still the only true DSP radio with TX,EQ N/R.
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TS-570DG
Dedicated HF mobile-base DSP with built-in tuner. **£899**

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Full 5 Watts power. Wide band receive.
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TM-G707
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ALINCO

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£215

DR-140
2M mobile 50W
£220

DR-430
Mobile 70cm
£220

DJ-G5
2M/70CM handie
£237

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SM20 600ohm, 8 pin, deluxe desk mic £108

Speakers - Icom

SP20 base station loudspeaker with audio filter £125
SP21 base station loudspeaker £65

Microphones - Kenwood

C-60A dual impedance desk mic internal pre-amp £106
MC-80 electret desk mic with pre-amp £65
MC-85 electret desk mic with pre-amp & compressor £125
MC-90 desk mic for DSP transceivers £169

Speakers - Kenwood

SP-23 station loudspeaker for TS-450/690S/570D £62
SP-31 station loudspeaker for TS-850/870S £74.50
SP-950 station loudspeaker for TS-950SDX £96

Yaesu FT-847 options

ATAS-100 active tuning ant system £224
FC-20 automatic ant tuner £197
MD-100 A8X desk top mic £99
YF-115C 455kHz/500Hz Collins Mechanical filter £89
YF-1158 02 2.7kHZ SSB filter Collins Mechanical £89

We also stock all makes of antennas:- Cushcraft, Diamond, Sirio, Watson, Pro-Am, etc.

KEYLINES

ROB SAYS THAT COLLECTING CAN BECOME AN OBSESSION!

If you've ever 'collected' anything, whether it be matchbox tops, toy cars, model railways, books, etc., you'll know as well as I do (from personal experience!) that collecting anything can easily become an obsession. Two of my collecting obsessions that have lasted over the years have been maps and language courses, much to my family's annoyance as both collections take up a lot of space!

I consider that I keep my obsessive collector's nature in control - after all, maps are very useful to a Radio Amateur and keen railway enthusiast. And the language courses at least help me **understand other languages** ... even if I can't get my tongue round all the foreign words!

Unfortunately, however, some collectors seem to lose all sense of reality in their obsessive approach to their collection. I say this because over the years I've had some rather disturbing after-effects following 'Silent Key' sales where over-zealous collectors have been in operation.

One 'Silent Key' sale comes into mind very strongly and it was where *PW*'s **Tex Swann G1TEX**, his son **Lars**, my family and **Darren Howe** (then working in our accounts department) gave up a lot of time to organise an extremely large scale equipment sale on behalf of the widow of a late local G2 three letter callsign.

The actual sale was a great success, raising a great deal of money, but the zealous, sometimes very selfish actions of some of the collectors left Tex and I with a very sour taste in our mouths. So much so that I've vowed never to be involved in a 'Silent Key' sale again.

And to cap it all - not long after the sale, my wife Carol confided with me that the widow had made sure that her daughter was positioned **directly behind my wife** who was in charge of the (very carefully regulated with proper receipts and 'bills of sale' being issued) cash box. Carol was very conscious of the fact she was being watched so that she couldn't run off with the money. It was fortunate that with everyone having put so much voluntary effort into the sale with the promise of donations to a special cause (which did not materialise) that I did not hear of the distrust until afterwards!

Apart from the distrust shown - despite the magnificent effort of all the volunteers - I was also very concerned at the antics of various collectors. The over zealous among them did everything but strike each other in their attempts to 'get what they came for'! And although I met - and made - many friends at that 'Silent Key' sale I was still left with some unpleasant memories.

Memories Revived

The somewhat unpleasant memories of the 'Silent Key' sale and the antics of the zealous collectors were revived recently when I advertised two items in 'Bargain Basement' several months ago. The first item - the receiver section of a 'B2' Second World War 'Spy' suitcase transmitter-receiver was sold (for the reasonable asking price) to the first caller. But that was not the end of the matter, no Sir!

I was soon being 'battered around the ears' by another collector demanding the receiver to be sold to him. Despite the fact I'd said it was sold he said he'd at least double the price. His persistence - and that of other similar callers was hard to believe and they just could not understand that I would not go back on my agreement to sell to the original buyer!

Still on the 'collecting theme', I recently had an anonymous letter - in the form of a photocopied issue of the *PW* 'Bargain Basement' pages with comments along the lines of "He's not an ordinary reader - he's a trader ..." referring to an advert. (I've often received comments on the same subject, both anonymously and face-to-face).

Often I find the complaints come from other zealous collectors - doing precisely the same by buying and selling to enlarge their collections. The only difference might be in the volume of activity and the size of the collections. **In answer to the complaints I can tell everyone that all adverts are placed on a 'first come first served' basis and the 'repeated' adverts only go in if there's room**. Everyone gets a 'bite of the cherry' so to speak and 'regular' advertisers are only published with the previously mentioned constraints in other words - only if they don't displace other adverts.

We can only bar those who are trading from shops, or via a known registered business. It's extremely difficult to judge just when a hobby turns into a business or a collector becomes a trader and I can only ask that everyone plays the game with the rules in mind. So, please be a 'conscientious collector' and make our 'Bargain Basement' pages a 'War Free' zone!

Hubert Makin G3FDC

I'm pleased to say that the **Rev. Hubert Makin G3FDC** (author of the letter 'Hearing Problems', page 8 May issue) has been overwhelmed with suggestions, ideas, letters of encouragement, etc. Unfortunately, Hubert's computer had a major 'crash' and when it was returned from repair much of his hard disk had been 'wiped'. Hubert has written to me to apologise to anyone who thinks he's ignored letters, etc., and asks that if you've written, E-mailed, etc., and not had a reply - please write to him again (QTHR) as your letter/reply might have been lost because of the fault. (Computers are okay until they go wrong aren't they folks?).

Happy Birthday David!

David Butler G4ASR celebrates his 'tenth birthday' this month! Well, not quite - David is somewhat older than that - but he is celebrating ten years of writing his v.h.f. column. Congratulations from everyone David ... and you've not (yet) taken up all the magazine have you? Congratulations on a fascinating column and we wish you many more years of writing for *PW*.

Guide Dog Donations

Following **Maurice De Silva G0WMD's** 'Remembering A Friend' letter (page 8 June issue) suggesting donations to raise money for a guide dog to be trained (and possibly named in her memory) I'm delighted to say that many donations have arrived at the *PW* offices. Including G0WMD's donation, there was also an extremely generous amount kindly sent by **Phil Cadman G4JCP**. Thank you all, you're most kind and generous but please make cheques payable to the 'Guide Dogs For The Blind' Association rather than to me. Thanks again and more details next month.

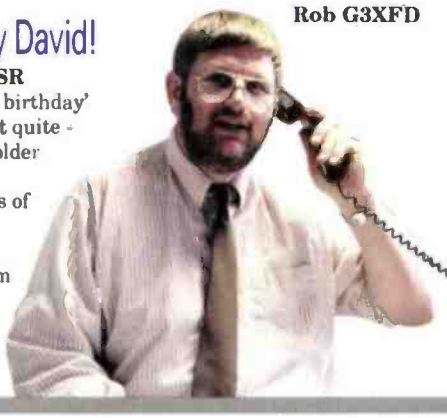
Radio Basics

I'm sorry to say that we've had to 'hold over' this month's edition of 'Radio Basics' because of a combination of factors. There are two reasons for this (very popular so you tell me!) column not appearing: the first is that I was on holiday and when I came back I had two weeks where I was suffering from an unpleasant viral infection so there was just not enough time to prepare my work. My apologies to everyone (but I did enjoy the holiday very much indeed!).

Secondly, we've also had to 'hold over' several articles due to lack of editorial space. This was combined with the fact that the Editorial team did not want to shorten the excellent 'Seeing The Light' article and that I also wanted to ensure that the amazing package which forms the Yaesu FT-100 transceiver received as full a review as possible.

Cheerio for now.

Rob G3XFD



LETTERS

COMPILED BY ROB MANNION

The Star Letter will receive a voucher worth £10 to spend on items from our Book or other services offered by *Practical Wireless*. All other letters will receive a £5 voucher.

Hearing Problems

Dear Sir

The hearing impaired comprise of a large portion of the Radio Amateur fraternity. This disability is non-visible and often misunderstood and maligned. The hearing impaired are usually quiet and unassuming individuals and sometimes hearing loss can be a positive hindrance to their social life. The disability sometimes predisposes them to ridicule and contempt.

Hearing loss for the Radio Amateur means lost contacts, mis-information, broken or garbled messages and misunderstanding. Despite the frustration, they soldier on regardless. It is a serious handicap and needs to be addressed. All that is asked is a level playing field in order to compete with others.

My hearing aid is an indispensable accessory but offers no advantage on today's over-crowded bands. Even in the cloistered atmosphere of QRP lectures at St. Aidans Church, Sudden Rochdale, the hearing aid can offer little comfort. The voice of **Rev. George Dobbs G3RJV** is well-known not to carry too well.

My hearing loss is 60-70%, but I managed to pass my Novice B and Novice A with the help of my Novice tutor and encouragement from the RSGB.

Hearing impairment is a fascinating subject. Quite recently I attended an Open University seminar for the hearing impaired. On show was a vast array of helps and aids and personal back-up for students including signers, note takers, inter-loop systems and transcription services.

To the Radio Amateur there seems to be a void of necessary helps. Considering the market potential, you would think research and development teams would be queuing up to make the radio spectrum more user friendly for the hearing impaired. Hopefully, suggestions by **Derek G3XNX** (*PW* 'Letters' page, May 1999) on experiments with hearing aid 'T' settings bode well for the future. The a.f. and r.f. gain controls offer little help to those with advanced hearing loss. But I'm sure there are exciting proposals ahead.

As we seek to exploit the radio spectrum and its ancillary equipment on their account, we may provide the answer to our greatest enemy. Noise - any advancement in the form of sensitivity and selectivity will compensate hearing loss.

The advent of audio filters. Packet radio, DSP and other digital accessories make life a little more bearable for the hard of hearing. Praiseworthy this may be, but as years advance, hearing loss becomes more acute and, like the **Rev. Hubert Makin G3FDC**, recovery is seldom possible and a determined search for alternative remedies are zealously fought for in order to successfully compete on the radio spectrum.

Competing on c.w. is difficult for those whose hearing is less than perfect. Even with perforated eardrums there is sometimes a hidden advantage because our attention span is much greater and on c.w., this is an advantage to be coveted the most. Granted, s.s.b. becomes a hardship at times, nevertheless, a polite request to speak more clearly usually results in a positive response.

Pile-up conditions are best avoided. Interestingly, one of my first contacts on c.w. on the Novice 28MHz band was **George ZL4SEA** from New Zealand, I worked him using 3W. It just shows you what you can do with the right conditions!

A fair and unhindered access to the radio spectrum is a necessary accompaniment to our hobby to all of whatever disability. The hearing impaired form a sizeable portion of the Amateur Radio fraternity and any suggestions to further the advancement of this group of determined individuals is highly commendable.

Those with perfect hearing, let us say the more fortunate, are sometimes most glaringly inadequate in understanding hearing loss. To advance the cause of the hearing impaired within our fraternity is just. To advance their cause is to advance our own.

Peter Knowles 2E0ARF
Manchester

Editor's comment: I think Peter's achievements deserves our admiration. Well Done!

Dear Sir

The comments in the June issue relating to hearing problems highlights the difficulties encountered by far more people then is generally recognised by the public at large. Especially by TV producers and, to a lesser extent, also by radio and theatrical presenters and producers.

It is a fact of life that the onset of 'anno domini' results in the gradual deterioration of sound sensitivity generally, but not exclusively, characterised by a marked ability to 'decode' the tones in the upper register of the audible spectrum.

I suffer from the problem which is also compounded by Tinnitus, in my case largely accounted for by driving a farm tractor without an efficient silencing system nor being able to obtain ear muffs in those days. I am endeavouring to overcome the problem, at least as far as Amateur Radio is concerned, by trying to adapt a graphic-equaliser to balance the audio by deliberately 'unbalancing' it in favour of the frequencies to which I am lacking in ability to 'decode'.

I should be very interested to learn if others similarly afflicted have experimented in the way I have described.

I believe there is, or was, in existence a 'chip' which is capable of transposing sound, an octave or octaves, higher or lower as required to assist 'readability'.

Perhaps manufacturers could fit this chip into the audio stages of receivers to enhance the enjoyment the listener can derive from the radio?

Peter Neave G4DAN
Essex

Dear Sir

Having read your item on deafness and its associated problems in everyday life and, of course, as it effects operating, I felt as a sufferer of many years, I must get in my 'pennyworth'.

My problem has increased over the years but I don't use a hearing aid and somehow doubt if one would help, unless of course something along the lines suggested by G3FDC were available. Possibly, there may well be a selective hearing aid available but my guess is that it would have to be obtained 'privately' and the cost would be prohibitive.

Reading Rev. Hubert Makin's letter, I can only suggest that he discards the microphone and re-discovers the key if he has not already done so.

With regard to TV, I have found that a stereo receiver has improved things enormously but best of all has been the introduction of subtitles which work for me but, understandably, some people can't get on with them but well worth a try, even if some of the visual is missed whilst reading! I even managed to purchase a VCR which will record subtitles. Surely a 'must' for American programmes and films.

Like G3FDC, I was a Telegraphist during the Second World War and I am sure the earphones of the time contributed to our problems. My job was to listen and record on a pad German Naval Enigma-coded Morse transmissions regardless of conditions. I don't remember any special operators mentioned in the recent TV series on breaking the code!

Incidentally, with regard to illegal activity on the bands mentioned by Dave Peters, AROS Co-ordinator at Potters Bar. There appears to be this kind of activity on the 3.5 and 7MHz c.w. It usually takes the form of indecipherable dots/dashes which seem to indicate that the 'operator' has little or no knowledge of Morse but is quite prepared to follow if a QSY is put into operation! Wonder if you have experienced this sort of annoyance Rob? Can't see any solution to this sort of behaviour except to QRT.

Dave Paine G3ASX
London

Editor's comment: Thanks for the excellent letters Gentleman (See 'Keylines' for further comments). As to the 'Mystery c.w. keyer' Dave, all I can say is that they belong to the 'mike scratching and whistling' brigade. I implore everyone to avoid even acknowledging that they're on frequency because unless we do so ... they can't be sure can they? So, whatever the temptation or provocation ... please IGNORE the interference and deny them a 'signal report'.

Voice Procedures

Dear Sir

In response to F5VBY's letter in the 'Letters' (page 10, March issue). When it comes to 'nit picking', other station's operating manners, I think it would be wise to remember the old adage of: "People in glass houses ...".

If we, the lesser mortals, use 'Roger', 'over and out' or indeed any other of the 'Ozzie' terminologies so objected to by the above mentioned station, are we in contravention of our licenses? No, we're not. Our licence does not stipulate that we must use one certain method of calling or replying or signing off from a station. We are given guidelines only, as long as we do not swear, discuss religion, politics or such like and use common sense and courtesy and we identify our stations every 15 minutes at least, then we are basically given free rein. I mean, if we are going to get down to that level, then what about the c.w. terminology that has crept in to 'phone operating.

We come from all walks of life, all different entrances to Amateur Radio, so what if some (and believe me, a very large amount) of us come from CB radio! We developed an interest in radio full stop. We just happened to gain our experience on 11m first. Another common misconception is that those who operate CB are all idiots. Not true, I know myself of many, many CB stations who could pass the RAE with their eyes shut, but who don't bother because they are either perfectly happy where they are or have been put off by the fact that Amateur Radio has a very elitist reputation.

We are fighting to keep the bands that we have, we are fighting to keep c.w. (even if not as part of the requirements for an. h.f. licence) alive, we are fighting to encourage interest in our wonderful hobby, so why bother moaning about inconsequential little details like certain terms used. If not careful, letters like F5VBY's (and remember, *PW* is read all over the world by Amateurs, s.w.l.s and potential Amateurs alike) could serve as a real deterrent to those thinking of going for their ticket and confirm the opinion that we are all a bunch of 'moaning-minnies' with nothing better to do than sit in front of a radio all day griping about the weather and how things used to be better in the old days ... and writing letters complaining because 'Bob' said 'Roger' on 40m.

Joanna MacLeod GM0WPQ
Aberdeenshire

The Great (Morse) Debate Continues - Perhaps!

Editorial note: Although the majority of corespondents are writing interesting, level headed and sensible letters, **an increasing number of correspondents** are still writing letters and e-mails penned in the form of personal attacks (aimed at other letter writers who don't hold the same views as the writer) and I'm having to withhold them from publication. If common sense does not prevail in future and the situation worsens I shall be forced to close the subject for further discussion. Our hobby deserves a better image than that suggested by the style of some (unpublished) letter writers. **G3XFD**.

What Next?

Dear Sir

I have recently sat and passed the December RAE. I am very keen to progress and obtain my Class 'A' licence. What the heck do I do? I am willing to learn the Morse code but I keep reading arguments for and against the scrapping of the Morse test. This leaves me and other Class 'B' holders in limbo. I could spend maybe 12 months and a considerable amount of money learning Morse only to find it scrapped and replaced with some other form of exam!

I'm sure that everybody is aware of the new RAE format. Surely the new EMC regulations in the present day RAE should count for something. EMC is more important on h.f. and s.s.b. than Morse!

So, will somebody please put us all out of our misery once and for all and make a final decision.

Jim M1DSU
South Wirral

Short Straw For The Novice?

Dear Sir

We, as a pair of keen Novice Licensees write in response to **Leighton Smart GW0LBI's** 'HF Far & Wide' column in the May Issue of *Practical Wireless*. We wholeheartedly agree with Alan Clay MOAXJ that Novices have drawn the short straw regarding power level and band allocation. This is our story: It was with much enthusiasm that we first embarked on the amateur trail. We were fortunate enough to have, in our local radio club, a team of willing and helpful Novice Instructors. The course provided valuable basic radio knowledge which we 'lapped up' and which set us on the path to become 'B' licence holders.

All through this time, we were told over and over again how much our callsigns would be sought after, especially being the 'fairer sex'. We couldn't wait to join our club net and talk to fellow members, but in our excitement of obtaining the licence, it hadn't really sunk in that we were not allowed on 2m, even with 3W.

During our course, a great deal was made of the magic band of 6m, but then we were to discover the 'local' repeater needed 35W to open it, so this also is unobtainable to us. Never mind, we thought, we'll get a novice net started on 70cms but - surprise, surprise - we couldn't hear each other without the use of the repeater and, as was pointed out to us, the repeater is not for net use.

Never mind, we thought, we'll do our Morse, which we thoroughly enjoyed and passed the 12 w.p.m. test quite quickly, again, we were fortunate enough to have brilliant instruction and looked forward to h.f. nets with our nice new 'A' licence callsigns.

Well, we joined the RAIBC only to discover we were not allowed there either, 3W or not. We listen patiently to people calling CQ and having no response, and here we are with 'top notch' Novice licences and we are not allowed to answer, though we can send off for a CB licence with no Exam, no Morse and be allowed 4W on h.f.!

We would be very interested in hearing other Novice opinions, but would have to do this through your magazine, as we can't hear them! But seriously, there does seem to be a need for some sort of survey to establish where on earth are all the other Novices and to this end, we would be happy to be part of such a survey and are prepared to assist in gathering any information we can or help compile a survey questionnaire.

Jan and Linda
North Crawley

Dear Sir

As a Radio Amateur for the last nine years or so, as a G7 variety, I thought I would air my views. The Morse test has served its purpose, now it's time for an alternative to h.f. via a Morse test. Passing a Morse test does not make you a better person. If I can use a Yaesu FT-847 then I can use an FT-101 unaided on h.f.?? All the Morse test does is create class distinction!

On another topic: Why is it that, as amateurs, most of us use surplus gear, i.e. computers '286-'386 some '486 some the odd Pentium. Not many amateurs use common 3.5in floppy disk drive. Why then do magazines for radio people give freebies away on CDROM which require the latest, most expensive gear? Market forces join ranks with the publishers no doubt?

The Internet is the biggest threat to Amateur Radio in years. A cheap PC 386 and modem gives you world-wide access, why bother with Amateur Radio/City & Guilds Examinations?

Would it be possible to see more articles on basic computers, i.e. what's CD drive? How do you use a Watson modem via radio/RS232 to give SSTV Packet , FAX, etc.? Owning a PC '286, '386, '486 is one thing, but how do you use them for Amateur Radio purposes? More basics on computer/radio please. Thanks for reading my letter!

Adrian G7IQJ
Near Bath

Editor's reply: An interesting range of topics Adrian! Your suggestions regarding computers, etc., will be forwarded to Roger Cooke G3LDI our 'Data Scape' (computing, data and internet) column for further action.

COMPILED BY JO WILLIAMS

Headline News

Adur's 'Keyer Kits'

Phil Godbold at **Adur Communications** has been in contact with *Practical Wireless* to tell us all about their brand new 'Keyer Kits' which they now have available. Phil tells *PW* that a complete built unit is already available from various sources "... but the kit offers a considerable saving and is very simple to complete".

The **CMOS Super Keyer III** (as seen in the picture) is a compact, full-features memory keyer which combines a CMOS microprocessor and a non-volatile RAM chip, Phil says. Unlike other advanced keyers, he continues, the CMOS Super Keyer III doesn't need a 'myriad' of switches and knobs or complex keypad sequences. "Instead, commands are simply sent to the keyer in Morse code using your paddles"!

Some of its features include: an iambic keyer with dot and dash memories; six active messages plus 12 'banked' messages; input queue to store multiple message activations; contest serial number; digital and linear analog speed control - 5-60 w.p.m.; built-in adjustable frequency sidetone monitor; timed pauses between messages; message loop capability for

continuous replay; ultra-speed mode allows messages at speeds of up to 990 w.p.m.; ultra low power consumption for battery operation and much, much more.

If you would like to know more about the CMOS Super Keyer, then please contact **Phil Godbold at Adur Communications. Tel: (01903) 879526, FAX: (01903) 879527. E-mail: sales@adurcomms.com**

New Nissei

Haydon Communications have been in touch with the *PW* news desk with news of the new **Nissei DPS-300 30A 12V power supply**. **Mike Haydon** informs *PW* that Nissei are a company who have, in the past, specialised in the design and manufacture of professional power metering equipment and have now, in conjunction with Haydon Communications, designed and built a professional grade power supply.

Some features of the Nissei DSP-300 include: over voltage protection; variable voltage (3-15V) with latching at 13.8V; short circuit current limited; separate voltage and current meters (both illuminated); multiple d.c. outlets on the front plus an additional one on the rear; visual warning indication of overload and much more.

The Nissei DPS-300 will cost £149.95 but at the moment, Haydon Communications are offering them at a **special introductory price** of **£99.95**. If you would like to know more about the new Nissei DPS-300 or any other of products available from Haydon Communications then please contact them on **Tel: 0181-951 5781/2. FAX: 0181-951 5782. 132 High Street, Edgware, Middlesex HA8 7EL**.

Haydon Communications have also told *PW* that they have managed to secure a quantity of **Realistic DX-394 receivers** which they will be selling at a lower price (they claim) than usual. This modern, synthesised, mains powered, dual-conversion receiver, Haydon reports, covers 150kHz-30MHz and features an illuminated display, selectable frequency step sizes, scanning, signal strength meter, built-in clock, telescopic whip antenna and 160 memories.

Previously sold for £300, Haydon Communications say that the DX-394 is available from them for just **£99.95** from the above address.

ML&S' Yaesu Day

Martin Lynch & Son (ML&S) have informed *PW* all about their very special **'Yaesu Day'** which is coming up on the **19 June 1999**. They say that unlike their usual 'Full Monty' open weekends" the 'Yaesu Day' is dedicated to and will feature ONLY Yaesu products.

The statement from ML&S says that there will be representatives from **Yaesu UK** on hand to answer any technical queries which you may have concerning any of Yaesu's products and their complete range, including the **Quadra 1kW linear**, will be on demonstration. The **Yaesu FT-100** will also be on show on the day.

Finally, ML&S state that there will be lots of Yaesu giveaways and refreshments on hand throughout the day. So, why not go along? The day begins at **1000** at **ML&S' London showroom, 140-142 Northfield Ave, Ealing,**

Calling 'Costa Del Retirement'

Dear Sir
Could you include the following apologetic note in your letters column at the earliest possible date.
In response to a 'Silent Key' advert in *PW*. Recently, an elderly gentleman wrote to me from Spain. Subsequently, I have mislaid his name and address and therefore unable to respond. I would like to make amends and if the gentleman reads this, perhaps he could contact me again.
A Hitchcock G3ESB
Derby

Special Extension

Due to the popularity of the **Alinco DX-70TH** & front panel remote control cable **EDS-4 Kit** Special Offer which we ran in the May 1999 *Practical Wireless*, it has been decided that the Special Offer should be extended.

The new closing date for the offer will now be **8 July 1999**. So, why not treat yourself? For further details on the offer please see the May 1999 *PW* or contact **Michael Hurst** on **(01202) 659930**.

London W13 9SB. If you would like more information about the day please feel free to contact ML&S on **Tel: 0181-566 1120. FAX: 0181-566 1207. E-mail: sales@MLandS.co.uk** or visit their **Web site: www.MlandS.co.uk**

Marconi Madness

The past few months have seen various Amateur Radio Clubs and Societies going 'Mad over Marconi'! The *Practical Wireless* news desk has been sent numerous accounts of the different ways in which different clubs have chosen to celebrate these historical events.

First up is an event which took place on the **27 March 1999** to commemorate the

Centenary of Marconi's first ever wireless transmission across the English Channel which took place from South Foreland Lighthouse. (You may have seen the short item I did on this event in last month's *PW*). Here's what **Glyn Jones GW0ANA**, Chairman of **Barry ARS (BARS)** had to say about the event and all the photos seen here were supplied by him and show members of BARS and Princess Elettra at the Lighthouse.

Glyn GW0ANA said that the clubs involved in this Special Event were the themselves "... together with Radio Amateurs from a consortium of Kentish clubs". Taking part on the other side of the Channel, he goes on to say, was the **Wimereux Radio Club** whose Chairman, **Jean-Claud Barreau**, operated as **F5KBM**.

Glyn spoke of the success of the Special Event as, at 12 noon the message "Greetings from France to England through the Ether" was sent in Morse on 144MHz. **Princess Elettra Marconi**, Guglielmo Marconi's daughter, who was present, was invited to pass a greetings message to France to commemorate this historical event, which she did and Glyn said that she was "at ease as she spoke in French to our friends across the channel".

Princess Elettra also spoke, on 7MHz, to various Radio Amateurs around the UK and Glyn says that she was "visibly moved by the experience" and that the whole day was a complete success.

The celebrations of this significant exchange of messages between Wimereux and Dover (in 1899) were continued into April and between 24 April (International Marconi Day) and the 28 April 1999, more historic re-enactments were made which saw messages exchanged between the Chairman of Dover District Council and the Mayor of Wimereux, then Princess Elettra herself and Mme Tournon Branly (the Grand-daughter of Edouard Branly, who worked with Marconi and

developed the coherer detector). You can see Princess Elettra receiving flowers from one of the **Dover Radio Club** Novice students. **Hugh Burton**, of the Dover Radio Club, would like to say a very big thankyou to all who were involved in making the whole event a success.

On the **10 and 11 July 1999**, The **West Wight Radio Society** will be holding their very own Special Event as part of their 'International Marconi Centenary Celebrations 1999'. **GB100RN** will re-enact the "world's first radio signals received by an Admiralty ship from 'The world's first permanent wireless station' - The Marconi Needles Wireless Telegraphy Station (est. 1897) at Alum Bay, Isle of Wight.

Guest of Honour will be The Commander in Chief of the Fleet of the Royal Navy Cincfleet, Commander A Adams RN (C-in-C Fleet) so, if you fancy taking a peek on the day then why not go along. For further details on this Special Event, please contact **R B Clegg, Operations Director of the West Wight Radio Society, Monks Lane, Freshwater, Isle of Wight PO40 9ST**. Or you can **E-mail him on: castle@dial.pipex.com To receive the automatic E-mail updates please request at station E-mail: gb2gmm@dial.pipex.com**

Microsoft Joins WAP

PW was sent a press release from **Microsoft Corp.** this month, in which they announced that it had joined the **Wireless Application Protocol (WAP) Forum** with the aim to "... accelerate the deployment of wireless mobile devices, as well as a broad range of wireless data services based on broadly supported Internet standards from the World Wide Web Consortium (W3C)".

The acronym, WAP, as you may or may not know, represents a consortium of more than 90 firms focused on developing wireless information and telephony services for digital mobile phones and other wireless terminals and **Harel Kodesch, Vice President of the Productivity Appliances Division** at Microsoft says that "We believe Internet standards are key to the success of wireless data on browser-enabled phones ... The WAP members have made significant progress in working with the W3C in establishing an Extensible Markup Language (XML)-compliant microbrowser solution that will enable the next generation of smart phones and hand-held devices. We share that goal and look forward to working with the WAP Forum to jointly make wireless data and wireless products accessible and useful". Watch this space ...

NEWS

COMPILED BY JO WILLIAMS

RA Returns Home

The **Radiocommunications Agency (RA)** have written to tell *PW* that they are finally moving back to the renovated offices (following the severe damage caused by terrorist action) in Docklands on **27-31 May 1999** (Bank Holiday weekend). Their new address as from those dates will be **South Quay 3, 189 Marsh Wall, London E14 9SX**. All telephone numbers will remain unchanged. The RA say that they will be closed from 1700 on Thursday 27 May to 0930 Tuesday 1 June whilst they relocate, so please don't try to get into contact with them between those dates.

Under New Ownership!

Dick Pascoe G0BPS, of **Kanga Products** has announced that the ownership of Kanga Products has changed. The new owner is **John Fletcher G4EDX, Sandford Works, Cobden Street, Long Eaton, Nottingham NG10 1BL. Tel: 0115-967 0918, FAX: (08700) 568608. E-mail: sales@kanga.demon.co.uk**

Dick G0BPS would like to say a big thank you to all customers both past and present and he also says "I know the company is in safe hands with John". *PW* would like to wish John the best of luck with his venture.

Your RAE Courses

Don't forget that I still need information of any RAE, Novice RAE and Morse Courses for our 'RAE Course Listing'. So, if you're a representative of a Club, College examination centre or a course tutor that's running one of the above courses from September this year and you wish to have them publicised in September's *PW*, then please send your details in by **15 July 1999** to **Joanna Williams (*PW* News & Production Editor) *Practical Wireless*, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW**.

Alternatively, you can E-mail me at: **jo@pwpublishing.ltd.uk**

Northern Expedition

Practical Wireless received some news from the **Northern VHF Activity Group** who wanted to let us know what they were planning for this year. First was the news that, due to certain factors, they have had to cancel their planned trip to Shetland. This year, they announce, they will be going to Islay, Jura and Colonsay, I065 and I066.

The callsigns which they will be using on this expedition will be **GS7UEG/P** and **MS0BPG/P** and they will be active from 24-31 July of this year. They will be operating on 144.222MHz, 50.122MHz and WAB and IOTA frequencies on all h.f bands. The operators will be **Peter G7BXA, Manny G7HSP** and **Keith G4YQW**.

The Northern VHF Activity Group's QSL manager, **G7DKX (QTHR)**, says that anyone who wishes to QSL direct then could they please include an s.a.e. or IRC, otherwise all cards will go out via the bureau. For further information please contact **Mr Peter Austin, 24 Fairfield Terrace, Bramley, Leeds, West Yorkshire LS13 3DH. Tel: 0113-256 3462, weekends only**.

New 'Handie' Alinco

Nevada have once again contacted *PW* with news of the arrival of the **Alinco DJ-V5** 144MHz/430MHz dual-band hand-held transceiver. Alinco call it their "Star Performer" and say that it will "... change the way you think about communications".

With 5W of output power and a wide array of operator conveniences, the DJ-V5 also comes with the following features: an alpha-numeric display with up to six characters; 200 memory channels; full v.h.f. and u.h.f. amateur band coverage; wide band receiver (76-999MHz); CTCSS; DTMF and cloning capability.

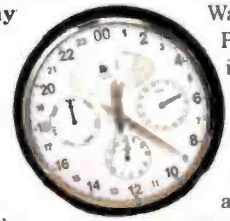
Mike Devereux at Nevada says that the Alinco is available from them for "a stunning price" of **£199.95**. If you would like to know more about this new Alinco then please contact Nevada on **Tel: (01705) 698113. FAX: (01705) 690626. 189 London Rd, North End, Portsmouth P02 9AE**.

International Clocks

Jeff Stanton of **Waters & Stanton PLC (W&S)** has been in touch with *PW* to tell us all about some new clocks which **MFJ** have produced.

The **MFJ-115** is a 24 hour World Clock with a full 24 hour dial format, the main cities from around the world on its trim and a world map on its face. It costs **£29.95** and is available from W&S.

The **MFJ-125** is a 24/12 hour Calendar Clock with full 24 hour dial format, separate day, month and 12 hour movements. All dials are independently set and this second clock costs **£34.95**.



Also available from Waters & Stanton PLC at the moment is the new **Avair AV-20** and **AV-40 v.s.w.r. meters**. W&S say that these two meters are "... compact cross-needle meters ... fitted with SO-239 sockets and have 12V inputs for optional display illumination". The AV-20 covers 1.8-150MHz and ranges from 30-300W (maximum). The AV-40 covers the 140-525MHz and ranges from 15-150W (switched). If you would like to know more about these, or any other products available from W&S, then please contact W&S on **Tel: (01702) 206835. FAX: (01702) 205843. Spa House, 22 Main Rd, Hockley, Essex SS5 4QS**.

Poole's 'Pool' Of Books

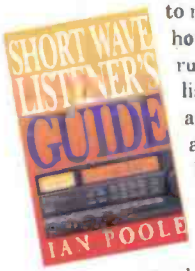
You may recognise **Ian Poole's** name as being the author of our bi-monthly series: 'What Is A ...?' You may not know, though, that he has also written a number of books in and around the subject of Amateur Radio and this month there are two which *PW* would like to bring to your attention: ***Basic Radio*** (Principles & Technology) and ***Short Wave Listeners Guide***.

In *Basic Radio* Ian Poole says that he has assumed that the reader already has a basic knowledge of electronics and "... aims then to provide an introduction for future radio engineers and should be useful to those on BTEC and similar courses as well as radio amateurs wanting to deepen their knowledge of the topic".

With chapters such as: 'Capacitors, inductors and filters'; 'Modulation';

'Receivers'; 'Transmitters'; 'Antenna systems'; 'Broadcasting'; 'Satellites' and 'Personal communications', *Basic Radio* covers a wide range of necessities. This book costs **£14.99** from the *PW* Book Store.

Short Wave Listeners Guide claims to be a "complete practical guide to short wave listening" and covers such issues as what short wave listening is, how radio waves travel, what equipment is needed to receive a signal, how to set up and run a short wave listening station and how to obtain an amateur radio licence. If you're a beginner in the hobby, then this could be a good place to start. It's fairly easy to follow and covers all you'd need to know to grasp just what this hobby has to offer. *Short Wave Listeners Guide* costs **£14.95** from the *PW* Book Store.



Spotlight Reminder

Please, please, please don't forget that we want your Club Spotlight Competition entries by **1 July 1999**! If you would like to pit your Club's magazine against other Club magazines then now's your chance! Entries are on a **Local** and **National** level and we would like to see what individual clubs can do!

Don't forget to send in your three most recent issues with a covering letter stating the section which you would like to enter your magazine under: Local or National to **Joanna Williams, Club Spotlight Competition, Practical Wireless, Arrowsmith Court, Station Approach, Broadstone BH18 8PW. The Editor's decision (as head of the adjudication panel) is final and no correspondence will be entered into.** (For more information please see June PW, p 10.)

Hugh Irvine GI3TLT - Silent Key

A personal tribute by Terry Barnes GI3USS

Hugh Irvine GI3TLT - known to us all as 'Tilt' because of his callsign - passed away on Thursday 1 April 1999 after suffering a heart attack the previous Monday. It happened just hours after visiting the Magnum Rally at Irvine in Scotland with many of his colleagues from the Bangor & District ARS.

Hugh, a dairy farmer, had so many outside interests that the church in his home village of Kircubbin on the Ards Peninsula was packed to overflowing for his funeral. More than 50 Radio Amateurs were among the mourners, including **Paul O'Kane EI5DI**, President of the IRTS and three past Presidents of the RSGB - **Ian Kyle GI0/MI0AYZ**, **Barney Patterson GI3KYP** and myself, **Terry Barnes GI3USS**. Most of the radio clubs in GI were also represented and there was a particularly large turn-out from Hugh's own club, BDARS.

I first met Hugh shortly after he was licensed when he helped me with Morse tuition towards getting my own licence. I well remember sitting opposite Hugh in his farm kitchen on the outskirts of Bangor copying his Morse sent so faultlessly and effortlessly. His patience paid off - I passed!

Hugh was one of life's 'characters' who, over the years, had amassed a vast amount of radio knowledge through reading, experimenting, building and modifying. I remember, too, the G2DAF transmitter and receiver which he built - even doing all the chassis work himself.

However, Hugh is especially well-remembered for his 'home-built' lattice towers. These were constructed to such a high standard that most are still standing today- up to 30 years after being made. The Bangor Club is still using one, complete with a 'TLT-Trailer' for field days and exhibitions.

Hugh was a founder member of the Bangor Society and has been chairman several times throughout its 32 year history. He was also largely responsible for GI's first voice repeater - GB3NI. When the rest of us doubted our capabilities, technically and financially, it was GI3TLT who kept pushing us until it was up and running.

He was also an active 'Packeteer' and established under the callsign GB7HMI (Hugh Miskelly Irvine) several Packet nodes and a BBS.

Hugh is sadly missed and we all extend our sympathy to his wife, Minnie, sons Leslie and Robert and daughters Lorna and Eleanor.

A tribute from Rob Mannion: It seems entirely appropriate that - with their permission - we re-publish TILT's obituary as originally published in the **Bangor & District Amateur Radio Society's Newletter** using Stewart Mackay GI4OCK's photo (thanks Stewart). I feel very privileged to have known Hugh, and even more privileged to say a few words about this marvellous character. I was not so fortunate as Terry and other Members of the BDARS in having known him as long. However, the time available was much enjoyed! Hugh died just before my holiday in EI and GI and although he wasn't physically present at the marvellous dinner enjoyed by the B&DARS on Tuesday 27th April - such was his personality that we all felt his presence. A Radio Amateur to be proud of - and despite adversity he was always smiling. Thanks for the memories Hugh.

G3XFD.

New Licence For The New Millennium

The following announcement from the Radiocommunications Agency and issued jointly via the Radio Society of Great Britain arrived at the *PW* offices in the final 'make up' stages of this issue of *PW*. Published literally in the same form as it was received from the RA via the RSGB the *PW* team think it contains good news for the Amateur Radio hobby in the United Kingdom. Further comment will appear in the August 'Keylines' editorial. Editor.

The press release begins with the statement: "UK Amateur Licensing is about to undergo the most exciting changes seen since the introduction of the Novice Licence in 1991".

Two major initiatives will allow greater access to the full range of facilities that Amateur Radio has to offer and broaden the appeal of the hobby to a wider audience. More amateurs will have the opportunity to experience world-wide communications and newcomers to the hobby will find it possible to make contacts on a wider range of frequencies.

These substantial improvements stem from discussions between the Radio Society of Great Britain and the Radiocommunications Agency, following consultation with the Amateur Radio community carried out by both organisations.

A new class of licence, to be known as the A/B licence and which will use the callsign M5***, is to be introduced in the early autumn. This will provide access to all amateur bands, on passing the Radio Amateurs Examination and a 5 wpm Morse test. 100W p.e.p. output will be allowed on the bands below 30MHz (the h.f. bands) and 400W p.e.p. output above.

The Novice A and Novice B licences will be enhanced in the summer to allow a higher transmitted power than at present. The power output will go up to 10W p.e.p. New frequencies will include the 144MHz band, an s.s.b. allocation on 3.5MHz and the extension of the existing Novice h.f. allocation to include the QRP c.w. calling frequencies.

It is expected that the World Radio Conference to be held in 2002 or 2003 will agree to the removal of mandatory Morse testing for access to frequencies below 30MHz. Following that decision, the existing licence structure will be replaced with an incentive-based system. In the meantime, discussions are under way to ensure that Morse and data sub-bands are safe-guarded by incorporating them into licence schedules.

STOP PRESS NEWS

In summary, the improvements are:

- Access to h.f. bands with a lower Morse test speed;
- The Class A/B Licence to provide access to all h.f. bands at the 100W p.e.p. level;
- Higher output power on all Novice bands;
- Wider allocations on existing Novice bands;
- Access to 144MHz for Novice Licensees;
- Safeguards for Morse and data sub-bands;
- In the longer term, the introduction of an incentive-based licensing system.

The RSGB and the RA are hopeful that these Initiatives will provide a more attractive path into Amateur Radio, at the same time as increasing the facilities available to existing Radio Amateurs. These measures, together with the new licence structure, which will be put into place after a future WRC, will provide a healthy future for Amateur Radio well into the 21st Century". *PW*

FOR A FREE MENTION ON THESE PAGES SEND YOUR NEWS TO THE NEWSDESK TODAY!

RADIO DIARY

June 13: The Elvaston Castle National Mobile Radio Rally are holding their rally at Elvaston Country Park, on the B5010, five miles south east of Derby. Further details from **Brian** on **(01332) 751412** or contact **Stuart** for trader enquiries on **(01283) 537778.**

June 20: The Newbury & District Amateur Radio Society will be holding their 13th Annual Amateur Radio Car Boot Sale at Cold Ash playing field, near Newbury. Sellers/Traders should arrive by 0800 as the sale is open from 0900 till 1500. **Ian Trusson**, Secretary, on **(01635) 826019**, E-mail **g3rvm@compuserve.com**

June 20: The Bangor & District Amateur Radio Rally will be held at the Clandeboye Lodge Hotel (formerly known as The George) just outside Bangor. Doors open between noon and 1600, with disabled access from 1130. All the usual radio and computer dealers will be in attendance, as well as the portable station GI3XRQ/P, should you wish to try equipment before you buy. Full restaurant (may be wise to book as it's Father's Day), bar and bar snack facilities will be available and there is ample car parking. Talk-in will be on S22 and doors open at noon. Further details available from **Keith Stevenson** on **(01247) 884635**, E-mail: **gi0ssa@qsl.net**

June 20: The Mansfield ARS are holding their annual Radio, Computer & Electronics Car Boot Sale at Debdale Lane Sports and Social Club, Debdale Lane, Mansfield Woodhouse, Notts. Open from 0930-1400, bar and refreshments and ample parking available. For more details contact **Angela** on **(01623) 429218**, E-mail: **angela@g6cuk.force9.co.uk** for the latest information, there's a Web site at: **www.g6cuk.force9.co.uk**

June 27: The Tir Conaill ARS (Ireland) are holding their annual Radio & Computer Fair in Jackson's Hotel, Ballybofey, Co. Donegal. Doors open at noon. There will be all the usual trade stands, with some new ones, a Bring & Buy stand and free parking will be available at the Hotel. Refreshments will also be available. **Gerry EI8HO** on **(072) 52598** (home) or mobile on **(086) 8391305.**

***June 27:** This will be the 42nd consecutive Rally at Longleat House. This large trade show, housed in five huge marquees, is a major attraction for all Radio, Computer and Electronics enthusiasts. The Craft Fair will once again be there, and there will be plenty of on-site catering. A major change this year is that the traditional **Bring & Buy will be replaced by** an equally worthwhile **Table-Top Sale.** Hire a table for the day at **£24**, sub-let or share with a friend if you wish. **Tables cannot be booked inadvance.** All enquiries and bookings to **Gordon Lindsay G0KGL** and his wife **Maureen**, with **Ron Ford** dealing with matters not directly affecting Traders. The combined telephone and FAX number is **0117-940 2950.**

July 4: The 10th York Radio Rally will be held in the Knavesmire Building, York Racecourse, York. Doors open 1030 and admission is £2. Children accompanied by adult free. There will be ample free parking. Features include Amateur Radio, electronics and computers, Morse tests and repeater groups. Refreshments will be available and a licensed bar, too. Talk-in on S22. **Pat Trask G0DRF** on **(01904) 628036.**

July 5: The Basingstoke ARC have a number of events going on In July beginning with a Club Night on the July 5 which will include a talk by Frank Heritage M0AEU on the 19th XR3J World Scout jamboree in Chile. The talk takes place at the Gems Sports and Social, Lister Rd, Basingstoke, Hampshire, 1930 for an 2000 start. More details on the talk from **Bob Brown G7PKD on (01256) 461306** or **S20** on the night. On July 25, they will be holding a Fox Hunt, map and further information from **Clive G4ODM on (01256) 325050.**

July 11 The 19th Sussex Amateur Radio and Computer Fair will take place at the Brighton Race Course from 1030-1600. There is free on-site parking and admission is £2. The rally is one of the largest in the South of England with well over 100 trade stands covering Amateur Radio, Computers, Electronics, etc. There will also be a large Bring & Buy display area, refreshments and bars at reasonable prices, a picnic area with views over the South Downs. Further details on **(01323) 485704.**

July 18: The 16th McMichael Amateur Radio Rally and Car Boot Sale is being held at The Haymill Youth & Community Centre, 112 Burnham Lane, Slough. Doors open at 1000 and admission is £1.50, car boot pitches are £10 on the day. There is free parking on-site, food, tea and coffee served and a licensed bar. The Thames Valley Packet BBS Group and the Berkshire Downs Repeater Group will also be in attendance. Talk-in on S22 GB6MMR. **Dave Chislett G4XDU** on **(01628) 625720** or E-mail **g4xdu@amsat.org** Trade enquiries and bookings should be made to **Min Standen G0JMS** on **0118-972 3504**, E-mail: **mins@mstanden.freeserve.co.uk**

July 25: The Rugby Amateur Transmitting Society are holding their Radio & Computer Rally at the BP Truckstop, A5 Watling Street. Details from **M0ASD** on **(01788) 550778.**

July 25: The Colchester Amateur Radio & Computer Rally is to be held at St. Helena School, Sheepen Road, Colchester, adjacent to the Colchester bypass, Avenue of Remembrance. Doors open from 1000-1600. Talk-in on S22. Admission is £1.50. There will be a wide range of Amateur Radio and Computer traders, Bring & Buy and specialist stands inside, a car boot sale and trade sale area outside. RSGB Morse tests on demand (two passport sized photos required). Catering and licensed bar. There will be ample free parking and reserved disabled parking adjacent to the main entrance, with full access for wheelchair users. Details from **Jef G7BKU** on **(01206) 728710.**

***August 8:** The Flight Refuelling ARS Hamfest 1999 will take place at Flight Refuelling Sports Ground, Merley, Wimborne, Dorset. The event will run from 1000-1700 and will include the usual mix of traders, craft exhibitors, car boot sale and field events. Overnight camping facilities available for Saturday 7 August. Talk-In will be on S22. **Note - No Bring & Buy.** Further details from **Richard Hogan G4VCQ** on **(01202) 691021.**

August 8: The annual Derby Radio Rally will take place from 1000 at the Littleover Community School, Pastures Hill, Littleover, Derby. This is on the A5250, just north of its junction with the A38. For further details contact **Martin Shardlow G3SZJ (QTHR)** on **(01332) 556875** or E-mail: **martin@martinshardlow.demon.co.uk**

August 13: The Cockenzie & Port Seton Amateur Radio Club are holding their 6th Annual Radio Junk Night at the Cockenzie & Port Seton Community Centre, South Seton Park, Port Seton, East Lothians, Scotland from 1830 to 2130. Bring along your own junk and sell it yourself. Tables will be provided on a first come first served basis - with no charge for the table. There will be a raffle at approximately 2100 and refreshments will be available. Disabled access. Entry fee is just £1 all persons, with all money donated to the British Heart Foundation. **Bob Glasgow GM4UYZ @ GB7EDN** on **(01875) 811723**, E-mail: **r.glasgow@x400.wins.icl.co.uk** or **bob.gm4uyz@btinternet.com**

If you're travelling a long distance to a rally, it could be worth 'phoning the contact number to check all is well, before setting off.
The Editorial Staff of *PW* cannot be held responsible for information on Rallies, as this is supplied by the organisers and is published in good faith as a service to readers. If you have any queries about a particular event, please contact the organisers direct. - Editor

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IC-W21E's	£419.00	£199.00	Dual Band Handy
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IC-R72E	£799.00	£499.00	HF RX
IC2350H	£479.00	£279.00	Dual Band Mobile
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Alinco EDX-1	£159.00	£75.00	DX70 ATU
Alinco EDX-2	£279.00	£149.00	Auto ATU
Alinco DJ-F4E's	£299.00	£149.00	433MHz Handy
Alinco DJ-X1's	£249.00	£99.00	HF/VHF/UHF R'cvrs
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CR30	£	£219.00	Roof tower kit
CL10	£299.00	£199.00	5el 28MHz
AFA40	£665.00	£499.00	2el 40mts!
AFA75-2	£1850.00	£999.00	Phased Array 80m!
SMC88F 145MHz	£23.00	£5.00!!	5/8+3/8 mobile
	.... and there's more to clear!		

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DC to 1750MHz!
54,000 Memories,
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Digital voice recorder, tape recorder control, 12 volt or mains operation, PC database driven if needed, a host of features too numerous to mention never found in any other receiver!
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This special model is available for **just £299.00!**
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ATS 202 Mini Digital MW/FM Stereo plus Short-wave receiver with memories, fantastic price! **Only £69.00**
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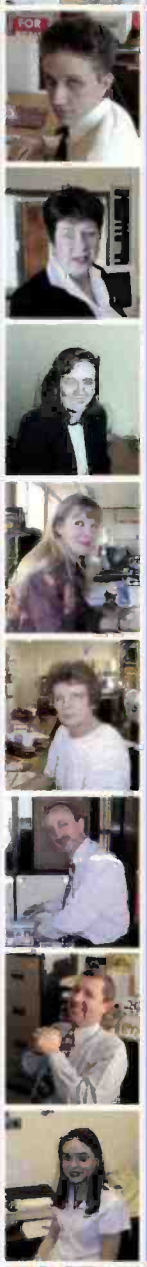

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New Series!

LOOKING AT...

The Local Oscillator

This month sees Gordon King G4UFU's continuation of his new series: 'Looking At'. This time he's 'Looking At' the local oscillator and he has a lot to say on this important subject!

The local oscillator (l.o.) is designed to provide a stable and frequency accurate sinewave of high purity and low noise for application to the mixer or mixers, consistent with the quality of the receiver in which it's employed.

For instance, more attention to design in the important aspects mentioned, is given to the l.o. in communication receivers and transceivers than to basic broadcast receivers. This is because any l.o. distortion and noise is transferred to the i.f. signal, which can encourage spurious responses and impair the receiver's noise performance.

Communications receivers may employ more than one mixer and l.o. system, the first converting the incoming signal to a high i.f. and the second to a lower one - a technique which can help to minimise image (second channel) and other spurious responses, while providing scope for bandpass tailoring and attaining sufficient i.f. gain.

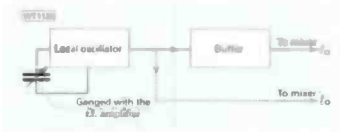

Fig. 1: Block diagram showing the possible presence of a buffer stage between the l.o. and mixer stages

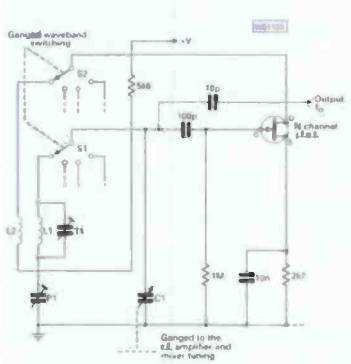

Fig. 2: The l.o. of a four band receiver based on an *n*-junction f.e.t. The tuned circuit and feedback of only one band is shown. The other three are similar except for component values. This v.f.o. is tuned over the selected band by C1.

Host Of Types

A host of different types of l.o. circuits, based on a wide range of classic oscillator configurations, are to be found whose elegance relates to the sophistication and cost of the receiver.

A buffer stage might be present between the oscillator and mixer as shown in **Fig. 1**. The resulting enhanced l.o./mixer isolation not only reduces the mixer's influence on the oscillator frequency, but also helps to attain good spectral purity, while making it possible to optimise both the coupling impedance and the signal voltage of the oscillator over the tuning range for a consistently high mixer performance.

In communications receivers, the l.o. stage is commonly powered from a well smoothed low impedance and regulated supply as a further aid to frequency stability and low noise.

With a modern, solid-state, free-running variable-frequency oscillator (v.f.o.), it's not too difficult to achieve a noise level of some 80dB or more below the output and a harmonic content down to around 70 to 75dB below the fundamental. (Thereby providing for a good dynamic range while minimising at least one aspect of spuriae).

However, performance figures like these are not always attained when the l.o. signal is derived from an inexpensive phase-locked loop (p.l.l.) frequency synthesiser, owing to the possibility of greater phase-noise and jitter.

Phase-Locked Loop

In communications and broadcast receivers, the tuning of the local oscillator's v.f.o. is often ganged to the r.f. amplifier and mixer tuned circuits. While mechanical capacitors are found less often in modern receivers and transceivers (which are still serving very well indeed), nowadays the oscillator signal is often obtained from a phase-locked loop (p.l.l.) system.

A p.l.l. system is a technique where signals from a voltage controlled oscillator (v.c.o.) and an accurate reference frequency are applied to a phase detector. Should the two signals tend to fall out of step, the phase detector produces an error voltage, which represents the 'direction' of error..

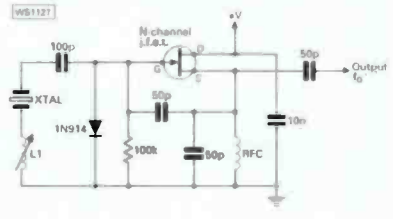

Fig. 3: A simple VXO based on a quartz crystal whose output frequency can be reduced a few kHz below the crystal's fundamental frequency by adjusting the inductance of L1.

This voltage is fed to the v.c.o. as a control, which changes its output frequency until it locks to the reference frequency, whose source may be derived from a crystal oscillator. The voltage constitutes a bias which is applied to a capacitor diode (varicap) in the tuning circuit of the oscillator.

The v.c.o. and p.l.l. form the primary elements of frequency synthesising and receivers and transceivers adopting the technique also boast electronic digital frequency display instead of analogue tuning and dial drive arrangements.

Varicaps

Varicaps have been around for many years and found fancy for automatic frequency correction (a.f.c.) in TV tuners and f.m. receivers several decades ago. Their capacitance decreases as the reverse bias applied to them is increased, which is generally achieved by a potentiometer. Hence the tuning of the oscillator is accomplished by a potentiometer, which adjusts the varicap's bias, thereby eliminating the mechanical tuning capacitor.

Inexpensive broadcast receivers may use a basic wide band (aperiodic) coupling from the antenna to the mixer (no r.f. amplifier), the l.o. then being the only variably tuned circuit. But the more sophisticated narrow band type of receiver generally uses optimised bandpass couplings in the r.f. and mixer stages.

Oscillator Circuits

The variable frequency oscillator (v.f.o.) circuit in **Fig. 2** is built around an *n*-channel junction field effect transistor (f.e.t.) - see Ian Poole's 'What Is A..?' (June 1999 *PW*). It's the l.o. part of a four-band receiver, the bands being selected by switches S1 and S2.

For clarity, the tuned circuit of only one band is shown - the others are identical except for their component values. The tuning inductor L1 connects to the gate circuit. Feedback in correct phase for oscillation is provided by L2, which inductively couples back to L1 from the drain circuit. Variable tuning is provided by C1, which is part of the main tuning gang.

The circuit is trimmed by T1 and padded by P1 trimmer. These are adjusted during alignment to ensure correct tracking of the tuning over the entire band in relation to the r.f. and mixer tuned circuits.

A simple variable frequency crystal controlled oscillator (VXO) is given in **Fig. 3**. Normally, a quartz crystal provides for single frequency working only on the band to which the crystal is cut. However, the variable inductor L1 allows a limited shift in frequency (around 5kHz on the 7MHz band). The diode clamps the gate bias, leading to a reduction in junction capacitance, enhanced frequency shift and signal purity.

In addition to the stability aspects already mentioned, l.o.s should adopt high-Q inductors and thermally stable capacitors, such as silver mica and polystyrene, for critical positions in the tuning and frequency determining parts of the circuit. Mechanical stability is another important factor that must always be considered.

So, that's the local oscillator (l.o.) ... next time I will be 'Looking At' the frequency synthesiser - see you then! *PW*

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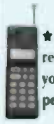

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The Ultra-Compact Communications Package

Review - The FT-100 'Field Commander'

Rob Mannion G3XFD has been evaluating the - long awaited - h.f. to u.h.f. transceiver from Yaesu. And from what he's discovered from the experience, Rob thinks that many operators will also agree it is a 'package' worth waiting for.

The Japanese culture is radically different from what is nowadays referred to as the 'Western Culture'. Their country was consider 'closed' for many centuries and even now the secretive nature and 'invisible personalities' so entrenched in the Japanese Amateur Radio industry still reflects the old attitude to the 'outside' world.

I've only once met a 'top designer' from Japan - from Alinco - and as he spoke very little English and knew no other European language - my attempts at communicating to thank him for his and the Alinco team's efforts were wasted.

Let's hope that one day the self-imposed barriers raised by the Japanese to everything outside of Japan will 'come down'. I say this because if the Yaesu FT-100's anything to go by ... there are some incredibly clever and innovative people working in Japan and it would be good to have some other contact with them other than just through buying their products!

The Yaesu FT-100 - The Ultra-Compact Communications Package

To say that the FT-100 is compact is an understatement! It's really small - especially when you bear in mind it's a full 100W h.f. transceiver - and in my opinion, has reached the point where if it had got smaller, it would have become difficult to operate if you have anything other than small fingers. But with this in mind, I've got to say that even with my extra large set of fingers (five only of course!) the FT-100 was easy-to-operate.

Fig. 1: The front panel of Yaesu FT-100 is completely detachable and uses gold-plated 'wiping' contacts. See text.

In measurement terms - particularly when seen on paper - the dimensions don't look very much smaller than those of the Alinco DX-70. However, when placed side-by-side with my DX-70, the FT-100 looked a great deal smaller!

The actual measurements of the FT-100 are: 160 x 54 x 205mm (width, height and depth) and, for comparison purposes, the Alinco DX-70 measures: 178 x 58 x 228mm (width, height and depth). On paper the differences don't look a great deal different - but when you see the two transceivers side-by-side the FT-100 looks very much smaller. As I said ... it's very cleverly designed.

Incidentally, I shall be comparing the performance of the FT-100 with that of the Alinco DX-70 which readers know I have a high opinion of. The comparison between transceivers on the bands from 1.8 to 50MHz will be useful.

The designers have been very clever indeed, incorporating rounded corners, part recessed front panel display escutcheon, etc., to break up and minimise the effect of the front panel's size on the operator's eye. All in all it's been very cleverly executed -well done Yaesu!

So, with the opening preliminaries taken care of - let's take a look at what's inside. And I can tell you - there's a great deal to be found although I must be honest and say that I've not had the chance to try all the features to be found on the transceiver in a comprehensive fashion. To do that would take at least two to three months!

What's On Offer?

So, what's on offer in the FT-100 package? Well, to start off the transceiver provides full transmit-receive coverage of the 1.8 to 30MHz h.f. bands. The transceiver also provides full transmit-receive coverage of the 50, 144 and 430MHz bands. It also incorporates a full general coverage receiver from 100kHz to 970MHz.

The design is based round a double conversion receiver (triple conversion for f.m.) with a 1st i.f. of 68.985MHz (for a.m., c.w., s.s.b. and f.m.) and 67.980MHz for wideband f.m. The second i.f. 11.705MHz (a.m., c.w., s.s.b. and f.m.) and 10.7MHz for wideband f.m. The 3rd i.f., for use with f.m. is 455kHz.

The transceiver come fitted with audio frequency Digital Signal Processing as standard. However, optional r.f. filters are available for narrow band c.w.

working to provide 450Hz/1.8KHz (reference XF-117C), or 250Hz/1.2KHz (reference XF-117CN).

Transmission modes available as standard are: A1 (c.w.), A3 (a.m.), A3J (s.s.b. with either lower or upper sideband transmission), F1 (9600bps Packet), F2 (1200 bps Packet), and F3 (n.b.f.m).

Transmitter power output on the amateur bands are as follows: 1.8 to 28MHz, plus 50MHz, 100W (25W a.m. carrier). On 144MHz maximum power output is 50W (12.5W a.m. carrier) and on the 430MHz band the maximum power output is 20W (5W a.m. carrier).

The front panel (Menu) control permits power output to be varied from less than 1% to 100% of the power available for the band and mode. (i.e. 100% power on 144MHz would be approximately 50W with 25% approximating to 12.5W. On h.f. (and 50MHz) with the maximum output being 100W the 50% output level would approximate with 50W and so on.

Keeping the transceiver cool must have caused the designers a few headaches - let's face it who would have thought (even five years ago) of a 100W transceiver covering from 1.8 to 430MHz in one small case! However, they've obviously overcome the problems because the two built-in fans work very quietly indeed when the rig is in use although, as you'll see later in the review - I think they must be earning their keep!

The front panel is - bearing in mind the facilities that are provided - remarkably un-cluttered. Three main rotary controls (one is a concentric type) are provided, along with five larger push-buttons and nine smaller versions. The main tuning control is smooth to operate and is of course (as is usual) on the right.

Yaesu have a reputation for providing good clear l.c.d. displays and the FT-100 is no exception. It's in dark blue with a lighter blue background (you can see my comments on this aspect later).

The front panel is completely detachable, and unlike the Alinco DX-70 (which uses an individually wired plug and socket 'loom' arrangement), the FT-100 uses a gold-plated 'wiping' contacts (see **Fig. 1**) to provide the necessary links from the main unit to the front panel. (A remote mounting kit is available as an option).

Audio output on the transceiver is from the internal (top mounted) loudspeaker. It provides good 'communications' quality (more comment later) and although a separate headphone socket is not provided - an extension speaker socket is available (Yaesu provide a simple circuit diagram so that the operator can provide a simple resistive 'dropper' circuit so that headphones can be used).

As the FT-100 is so small the designers have had little choice but to provide 'flying lead' connectors for the h.f. and 50MHz antennas and the v.h.f. and u.h.f. bands (see **Fig. 2**). The power lead and necessary protection fuses are also provided as 'flying leads' although for smaller transceivers this is now becoming common practice.

An extra lead (shown in Fig. 2 with its cable coiled round) is mounted on the far right of the main rear chassis to provide via an 8-pin mini DIN socket for the Yaesu FC-20 external automatic antenna tuner. The same lead is also used for interfacing to a personal computer for control of the FT-100 using the CAT system and for connection to the Yaesu VL-1000 linear amplifier.

Sockets actually mounted on the rear panel of the transceiver include a semi-recessed 6-pin mini jack and the external speaker (3.5mm mono) jack socket (See **Fig. 3**). On the other side of the twin cooling fan output (**Fig. 4**), are the semi-recessed ACC 3-contact (stereo) 3.5mm jack socket which allows an external

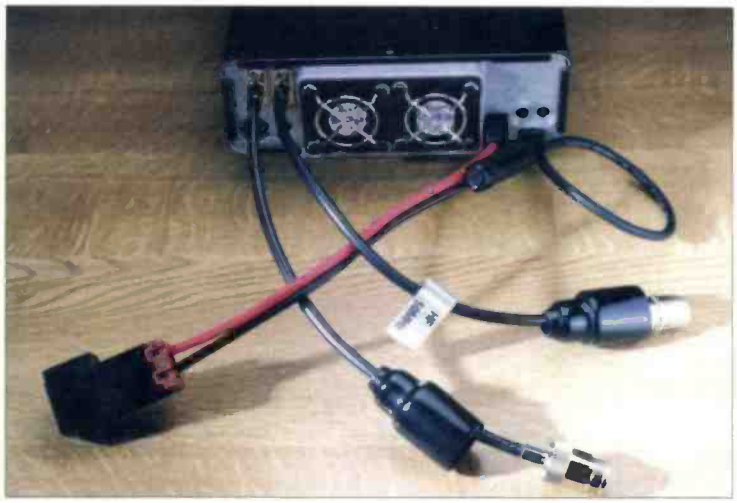

Fig. 2: Back of the Yaesu FT-100 (note the 'flying lead' connectors, see text).

automatic level control (ALC) voltage from a linear amplifier on the 'tip' connection.

The ACC socket also provides for TX/RX control to a linear amplifier (switched to ground to transmit) on the 'ring' connection. The main shaft of the jack plus provides the necessary earth return.

For operation on c.w. the necessary 3.5mm jack socket is mounted alongside the ACC socket, see Fig. 3. A paddle or 'straight' key can be used in conjunction with a 3.5mm stereo jack plug.

Menu Control

For a transceiver of this size and complexity, Menu Control is absolutely essential and that's where I think the designers can usually fall foul of their own complex designs. However, that's not the case (as you'll see) with the FT-100.

The Menu Control is very comprehensive and its use is also very comprehensively covered in the manual. Incidentally, the manual is a very well written and prepared A5-sized booklet, following the long tradition of Yaesu manuals. It's not over complicated and with one minor exception (see comments under the heading 'Active Antenna System') I had no trouble in understanding the instructions.

In the European version of the FT-100 there are no less than 65 menu options! (There's one more for the American market and this enables/disables the Alaskan Emergency Channel of 5.1675MHz).

Feature Overview

As I'm unable - even with five pages - to provide a fully compressive in-depth look at all the features on the FT-100 I thought it best to at least mention them

Fig. 3: Rear panel (left-hand side) of the Yaesu FT-100 which shows a semi-recessed 6-pin mini jack and the external speaker (3.5mm mono) jack socket. See text.

Fig. 5: The Yaesu ATAS-100 antenna unit (right) mounted on G3XFD's car. The antenna on the left is the Pro-AM 14MHz whip. See text for comments regarding 'grounding' techniques.

in a short list. Some of the features (to be honest) come in the category of 'nice to have it available' and some are 'must haves'.

The built-in electronic keyer works well and is an important and very useful feature, the 'memory' message facilities built-in would prove useful to the keen c.w. operator. Another - extremely useful feature is the 'Spectrum Scope'. I found this to be very useful indeed on v.h.f. as it enable you to 'see' what's about. A definite 'must have' I think! Other features include: Weather FAX monitoring (not tried), 'Smart Search' and 'Scanning'.

The memory facilities are very comprehensive indeed and I recommend that anyone considering purchasing an FT-100 visit a dealer and read the manual! It's impossible for me in the space available to provide a full listing of the features available and provide my opinion of how good it is because we all require something different from 'memory' facilities.

General Coverage

The general coverage capabilities of the FT-100 are - quite honestly - phenomenal! Although the lowest coverage is stated to be 100kHz the rig I had still worked below that frequency! Long and medium waveband sensitivity was reasonable but I feel that for broadcast reception an external speaker must be used.

Short wave broadcast reception is also very good, and with the external speaker I made up I found it pleasant listening. 'Air Band' reception was fascinating and I found I could become addicted - especially as I live under the main flight path in and out of Gatwick.

General coverage continues right up to 970MHz! However, apart from listening to the u.h.f. TV transmitters to evaluate conditions on 430MHz, I did not use the wider coverage very much.

Fig. 4: Rear panel (right-hand side) of the Yaesu FT-100 showing the semi-recessed ACC 3-contact (stereo) 3.5mm jack socket. (See text).

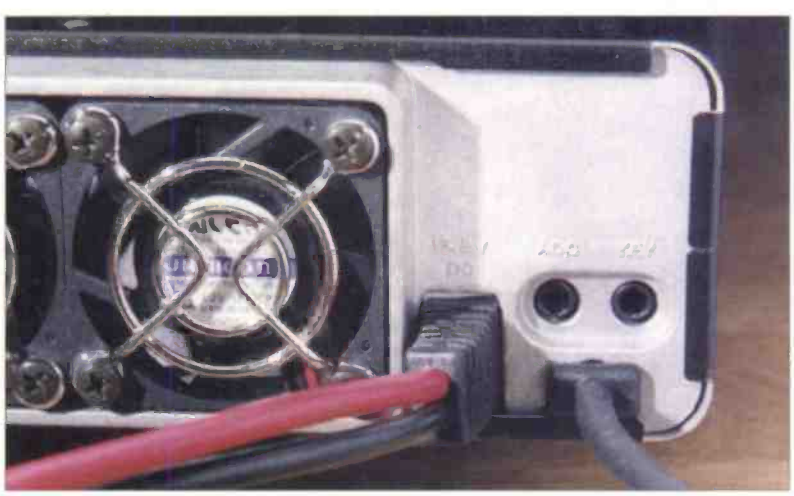

Fig. 6: Close up view of the ATAS-100 automatic tuning antenna system. In use, the motor-driven tuning assembly (within the cylindrical body) is controlled from the FT-100.

On The Air

As you may gather after reading this review of the FT-100 ... I thoroughly enjoyed myself 'on the air'. The rig arrived in time for me to take it to Ireland on holiday with me and although it was not the rig on which I 'launched' my new EI5IW (Echo India Five Irish Whiskey) callsign it was certainly the second!

In fact, due to my hectic schedule I was only able to use the transceiver in Ireland for rather less than six hours. However, despite that I was extremely busy indeed, operating in beautifully bright sunny weather in which, incidentally, the FT-100's main display proved itself to be bright enough to cope with.

My h.f. operations using the FT-100 ranged from 3.5 to 29.7MHz, with the exception of the 24MHz allocation (no activity). I also was unable to have any QSOs on 1.8MHz for the same reasons ... even during the evening unfortunately.

My main airing of the FT-100 in Ireland was in a delightful spot on the County Waterford coast, not so many miles south of Rosslare where I was due to sail for home the very next day (the Saturday of the May Day Bank Holiday weekend. I was right on the coast, just walking distance of the attractive little seaside resort of Fethard which - for some strange reason - seemed to be a regional centre for mobile crane hire!

Next time I go to Ireland, I'll ensure that I make friends with the civil engineering contractor who is based there and borrow one of his giant cranes to mount my antenna on! However, in the meantime I had to make do with my collection of PRO-AM mobile whips for coverage of 3.5 to 28MHz.

Although h.f. DX conditions were not so good I was able to work as far afield as South Africa, South America (PY) and to the USA because of the excellent sea 'take off'. Most of my 'DX' took place on 14 and 18MHz, with several QSOs taking place on 21MHz.

As usual there were quite a few near-European stations up on 28MHz and all stations (on the h.f. bands) expressed an interest in the FT-100 and the majority commented very favourably on the modulation while I was on s.s.b.

Several QSOs were heard on '10' metre n.b.f.m. and

I joined in - but conditions were such that this mode was not used very much and although I heard several (apparently USA based) 28MHz repeaters - I was unable to work through them.

The vast majority of my operating took place on 18MHz - it's my favourite DX band where it's (for the moment anyway) still possible to be competing with other stations using relatively simple antennas. The second most often used DX band was 14MHz which provided some interesting QSOs.

As is usual for me, I listened on the 18.110MHz beacon frequency to see what conditions were like, and once some German and Italian station had moved (of their own volition) off frequencies on either side of 18.110MHz I could tell things were going to be fairly good, although the South American beacon station was much less strong than I'd hoped for bearing in mind the good 'sea path' between us.

Very often, from my home QTH here in Dorset, I find that the 14.100MHz beacon frequency is either almost entirely occupied by h.f. Packet transmissions, or that they are so close as to make reception of the beacons very difficult. I'm sorry to say that the problem was just as bad in Ireland as it was at home, but here the DSP came into play - very effectively indeed (more on this later).

I was running out of time, so as conditions weren't spectacular, I had an enjoyable QSO with a local amateur on 7MHz and also with a GW station (both were *PW* readers!) before emptying the car and repacking everything for my long drive home after an overnight stop in Rosslare and the ferry trip.

Back Home

My most enjoyable holiday had passed so quickly that it seems a pleasant memory now which I hope to share with readers later, but I did have one last 'fling' on the way home - operating as GW3XFD/P on the outskirts of Fishguard on 7MHz. No luck, so I then headed home.

Being the May Day Bank holiday I was able to really go to town with the Yaesu FT-100 on the h.f. bands - and v.h.f - over the rest of the weekend. I wasn't disappointed.

From my 'local' /P h.f. working site - between Wimborne and Ringwood at a place called Holt Heath, I had some excellent h.f. QSOs and some interesting v.h.f. and u.h.f. experiences.

Operation Above 30MHz

As is usual for me when I get on to 50MHz there's nobody to be worked! I heard some f.m. QSOs under way but these were in the Midlands and I was unable to 'break in' on the conversation.

However, on 144MHz I really put the FT-100 through its paces, working from a hilltop near Shaftsbury (but actually just in Wiltshire) I had intended to park the car and operate for an hours or so. In the end I was up there for over five hours!

After I'd sorted out (via the menu) the microphone gain (I tend to shout - forgetting I'm not on h.f. in noisy conditions!) and running mostly at the 5W level I had very many QSOs on 144MHz n.b.f.m. and s.s.b. There was a contest on sat the time but I still managed to have some 'normal' QSOs.

It's many years since I operated using s.s.b. on 144MHz and I was pleased at how easy - and what good reports came my way - using the FT-100. The transceiver casing becomes very warm indeed when the full 100W (h.f.) or 50 (144MHz) or 20W (430MHz). The fans worked continuously and although I could not hear them I could verify they were working by placing my hand in the warm air being expelled from the transceiver.

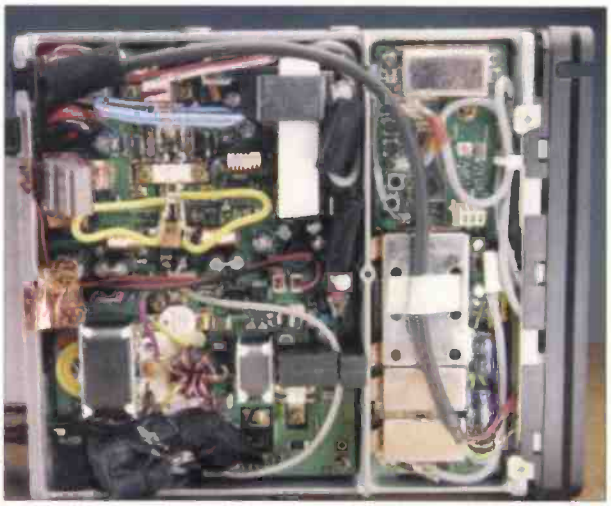

Fig. 7:Inside view of the underside of the FT-100.

The transceiver worked very well on 430MHz and it was good to be on the band again. There wasn't so much activity on '70' but I managed to access several repeaters on the band and worked stations as far away as Bristol and the Midlands.

The Active Antenna

The review transceiver arrived at the *PW* offices complete with an interesting accessory - which Yaesu describe as the ATAS-100 'Active-Tuning Antenna System'. This unusual looking, see Figs. 5 and 6, is in effect a motorised antenna tuner and mobile whip antenna in one.

The antenna will work on the h.f. bands, the lowest being 3.5MHz (although the manual says 7MHz the one I had worked on '80'!) right up to 430MHz. Yaesu don't recommend using it on 10, 18 or 24MHz but I found it tuned up well on these frequencies.

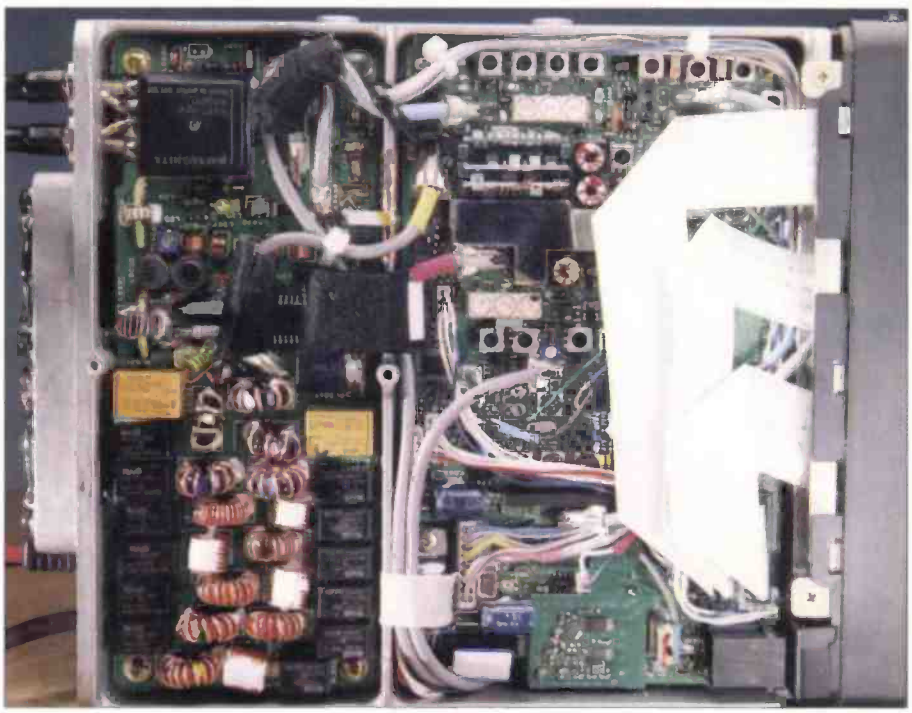

Fig. 8: Inside view of the upper chassis unit of the transceiver illustrating the complex ribbon style internal-wiring assemblies on the right. The twin cooling fan housing can be seen on the far left.

The system will only work with the FT-100 and FT-847 and requires a good 'ground' to the vehicle chassis. Because of this I would not recommend it to be used with a magnetic mount (it screws directly into a standard mount) unless you have arranged a good 'ground' as I have on my vehicle.

On the air I found that on 3.5MHz the ATAS-100 quickly tuned (it sounded quite odd to hear it whirring

Continued on page 27...

...continued from page 25

away up on the roof!) up and provided a good match to the transceiver. Reports on 3.5, 7 and 14MHz bands soon showed that my Pro-AM whips consistently out-performed the ATAS-100 by several S-points, but on the higher bands (18, 21 and 28MHz) the difference became marginal).

However, on 50, 144 and 430MHz I found that the ATAS-100 antenna was quite convenient to use. It would be an ideal antenna for someone who is (wheelchair bound for example) unable to get in and out of the vehicle to change antennas, etc. And although a diplexer would have to be used (to split/ combine the h.f./50MHz and 144 and 430MHz ports - it could prove useful in this respect.

In Rob's Shack?

So, in summing up the review no doubt you're wondering - would you find the FT-100 in my shack? And in reply I would tell you that if I required a multi-band 'take anywhere' transceiver I'd not hesitate to buy the rig.

The FT-100's h.f. performance compares well to that of my Alinco DX-70 'yardstick' transceiver (which has 'narrow' filters fitted as standard, although it does not come with DSP), although as you'll see - for c.w. I still think there's a need for extra filtering.

The concept behind the FT-100 is excellent and it performs very well indeed - even for very long periods. I can say this with confidence because over one weekend at home I operated the rig for over 16 hours continuously (When I wasn't actually in QSO I was monitoring the 18.110MHz beacon frequency) and the transceiver behaved faultlessly.

On h.f. the receiver proved to be very sensitive. The selectivity was good on s.s.b, and the DSP facilities proved to be particularly invaluable on the crowded 7MHz band. However, for c.w. use I would recommended that the optional filters be purchased. With these fitted I feel sure most c.w. operators would be very pleased with the performance.

On v.h.f. and u.h.f. I was impressed with the performance of the FT-100. In the past 'all in one' package transceivers have not provided the performance that's expected of modern equipment. Not so the FT-100 ... as it is (in my opinion) a very good performer. I'm hoping to have it on loan again from Yaesu in time for the *PW* 144MHz QRP contest on June 20th as I enjoyed using it so much and got so many good audio reports.

The FT-100 is a rig you can take anywhere and if you require a complete (and very compact) package covering all bands from 1.8 to 430MHz) I can thoroughly recommend it to you.

My thanks go to **Yaesu UK Ltd., Unit 12, Sun Valley Business Park, Winnall Trading Estate, Winchester, Hampshire SO23 0LB, Tel: (01962) 866667**, for loan of the FT-100 transceiver which is available at **£1249** (including VAT) and the ATAS-100 antenna system which costs **£249** (Including VAT). *PW*

Yaesu FT-100 Specifications

General

Frequency Range:	Receive	100kHz-970MHz (European version). 100kHz-824MHz, 849-864MHz and 894-961MHz (USA version).
	Transmit	1.8-50MHz 144MHz 430MHz (Amateur bands only) 5.1655MHz: (Alaska Emergency Frequency (USA version only).
Emission Modes:		A1 (c.w.), A3 (a.m.), A3J (l.s.b./u.s.b.), F1 (9600bps Packet), F2 (1200bps Packet), F3 (f.m.)
Synthesiser Steps (min.):		1.25Hz (c.w./s.s.b.), 100Hz (a.m.) 100Hz (f.m., 1kHz (f.m.)
Antenna Impedance:		50Ω, Unbalanced
Operating Temp Range:		-10°C to +60°C (14°F to 122°F)
Frequency Stability:		Better than ±4 p.p.m. (-10°C to +50°C) (s.s.b./c.w./a.m.) Better than ± (1kHz +4 p.p.m.) (f.m.)
Power Requirements:		13.8V d.c. ± 10%, Negative Ground
Current Consumption:		Receive (Squelched): 1.2A, Receive (Max Audio): 1.6A Transmit: 22A (@ 100W r.f. output)
Case Size:		160mm (w) × 54mm (h) × 205mm (d)
Weight:		3kg

Transmitter

Power Output:	1.8-50MHz: 100W (25W a.m. carrier)	
	144MHz:	50W (12.5W a.m. carrier)
	430MHz:	20W (5W a.m. carrier)
Modulation Types:	s.s.b.: Balanced Modulator f.m.: Variable Reactance a.m. a.m.: Early Stage (Low Level)	
Maximum Deviation f.m.:	±5kHz (±2.5kHz on n.b.f.m.)	
Spurious Radiation:	Harmonics:	At least 40dB down (1.8-29.7MHz) At least 60dB down (50/144/430MHz)
	Non-Harmonic:	At least 50dB down (1.8-29.7MHz) At least 60dB down (50/144/430MHz)
Carrier Suppression:	At least 40dB	
Opp. Sideband Suppression:	At least 50dB	
Frequency Response (s.s.b.):	400-2600Hz (-6dB)	
Microphone Impedance:	200Ω-10kΩ (supplied microphone: 2kΩ)	

Reciever

Sensitivity:	s.s.b./c.w.	n.a.m.	f.m.
100-150kHz:	-	-	-
150-250kHz:*	5µV	40µV	-
250kHz-1.8MHz:*	4µV	32µV	-
1.8-28MHz:*	0.25µV	2µV	-
28-30MHz:	0.25µV	2µV	0.50µV
50-54MHz:	0.20µV	2µV	0.50µV
144/430MHz:	0.125µV	2µV	0.20µV

Above specifications are worst-case.
*s.s.b./c.w./n.a.m. figures are for 10dB S/N, 12dB SINAD on f.m. *: IPO off.*

Squelch Sensitivity:	s.s.b./c.w./a.m.	f.m.
1.8-28MHz:	2.5µV	-
28-30MHz:	2.5µV	0.32µV
50-54MHz:	1.12µV	0.20µV
144/430MHz:	0.8µV	0.16µV

Intermediate Frequencies:	1st i.f.:	68.985MHz (s.s.b./c.w./f.m./Digital) 67.980MHz (w.f.m.)
	2nd i.f.:	11.705MHz (s.s.b./c.w./f.m./Digital) 10.700MHz (w.f.m.)
	3rd i.f.:	455kHz (f.m.)
Image Rejection:	Better than 70dB (1.8-30MHz, 50-54MHz) Better than 60dB (144-148MHz, 430-440MHz)	
i.f. Rejection:	Better than 70dB (1.8-30MHz) Better than 60dB (50-54, 144-148, 430-440MHz)	
Selectivity (-6/-60dB):	s.s.b./c.w.:	2.2/5.2kHz
	c.w.:	450Hz/1.8kHz (Optional XF-117C installed)
	c.w.-n:	250Hz/1.2kHz (Optional XF-117CN installed)
	a.m.:	5.2/18kHz (Optional XF-117A installed)
	f.m.:	15/25kHz (-6/-50dB)
Audio Output:	At least 1.5W into 8Ω @ 10% t.h.d.	
Audio Output Impedance:	4-8Ω	

Specifications are subject to change without notice and are guaranteed within amateur bands only.

Looking Into Laser Communications

Seeing The Light!

Having researched the subject and experimented thoroughly, Jim Hatton GM4RJX has found that laser communications is an interesting side to Amateur Radio which some of you might like to know more about to join in too!

A year or so ago I became interested in using lasers as a communications medium. Lasers have always fascinated me and, as the price of the equipment fell, experimentation became an option. I first began by trawling the Internet for information and found some useful sites dedicated to amateur laser communications. It was clear, however, that there were just a handful of active experimenters around the world.

Laser communications have several advantages over conventional radio frequency systems. There is no licence needed as the frequency is well above 300GHz and the signal is virtually 'eavesdropper-proof' (if you're not in line with the laser) nothing will be heard and the bandwidth is virtually unlimited.

There are, however, more disadvantages than advantages to laser communications. The signal path must be 'line of sight' and the signal must have clear visibility between transmitter and receiver. Also, atmospheric conditions play a major role in the success of any contact - aiming the laser is like trying to poke someone with a 50km long inertia-free stick!

In this article, it is my intention to show how my experiments progressed from simple hand-held aiming over a few hundred metres to my latest success of a two-way Morse QSO at a distance of just over 40km with a sophisticated mounting and aiming system.

Laser Safety

Before getting into the experimental notes, it's worth spending some time on laser safety. **Lasers are dangerous!** There are no exceptions and no second chances.

But why are lasers dangerous? A cheap laser pointer can produce a beam with a power of 5mW. This can seem insignificant when compared to even the output of a modest 144MHz hand-held transmitter, **but the difference is that all of the 5mW is concentrated into a spot with an area of about 1mm^2.** This works out at a power density of **500mWcm^2 - the NRA safety level for exposure to radiation is only 10mWcm^2.** Thus a laser pointer exceeds this safety limit by a factor of 50!

As I've established then, the power density of a laser beam is already high, but if it's focused on to the retina of an eye, it rises alarmingly. If losses are ignored, all of the 5mW is concentrated onto an area of less than a pinpoint. **There's certainly enough energy to burn the retina and this damage is permanent!**

Believe it or not, many accidents that occur with lasers are from reflections. And although the eye has a natural protective reaction to bright flashes of light - the blink reflex, the problem is that by the time the eyelid has closed, the retina is already damaged.

Furthermore, the blink reflex **only works with visible lasers**. An infrared laser can be etching patterns on the retina without the owner being aware until their eye starts itching sometime later. Having said all of that, here are just a few of the precautions which should be taken whenever lasers are used:

1: NEVER, repeat **NEVER,** point the laser at someone else. There is a significant risk of damaging their sight for good and an even better chance of being arrested for assault;

2: When working indoors, **turn on as many lights as possible**. A contracted pupil makes the eye a harder target.

3: When experimenting, **do not** point the laser at reflective objects. The reflected power from a flat shiny surface can be almost the same as the incident power.

4: When outdoors, be aware of other people in the path of the laser. A 5mW laser beam shone into someone's eyes from 100m will seem as bright to them as a 100W light bulb. It's easy to dazzle a motorist or pilot from several miles away.

5: If possible, **expand the beam**. A 5mW beam with a 50mm diameter is completely eye safe (0.25mWcm^2) and much less likely to dazzle.

Principles Of Lasing?

The principles of lasing is to make 'packets' of light bounce between two reflective surfaces while continuously adding energy to the system, when these packets reach a certain energy threshold, they break free.

The light packets form a continuous beam of very pure wavelength. In **Helium/Neon (HeNe) lasers**, the reflective surfaces are mirrors set at a critical angle and the energy is provided by a high-tension supply.

There's a small hole in one mirror, which is the exit point for the light. Typically a HeNe tube is several inches long and requires a power supply of several kV and the power output for a small tube is in the 2-5mW range.

Semiconductor lasers are similar in principle to the HeNe lasers, but on a much smaller physical scale. Common semiconductor lasers are fitted into a small transistor case with a glass window and produce anything from a few milliwatts to several watts (pulsed).

The semiconductor laser also requires a current controlled power supply and a collimating lens. To enable the power supply to regulate the laser current, most semiconductor laser packages have a PIN diode built into the case, directly behind the lasing element. This is then used to provide feedback to the regulator to maintain a constant light output.

A significant design consideration when working with semiconductor lasers is their inherent sensitivity to over-current. A semiconductor laser is essentially an l.e.d. until the lasing threshold is reached.

As the current is increased, the light output rises proportionally - like an l.e.d. At a certain current, lasing begins and then the light output rises steeply.

If the current continues to rise even a few milliamps above the lasing threshold, the device is destroyed. Laser diodes live their life on the edge of self destruction.

Whereas the light from a HeNe laser is practically parallel when it leaves the tube, a semiconductor laser emits an almost conical beam with a divergence of a few milli-radians. Because of this, a lens is needed to make the beam of a semiconductor laser parallel.

By making the lens position adjustable, the focusing point of the laser can be altered. It's also possible to deliberately diverge the beam a little to assist in aiming from a distance.

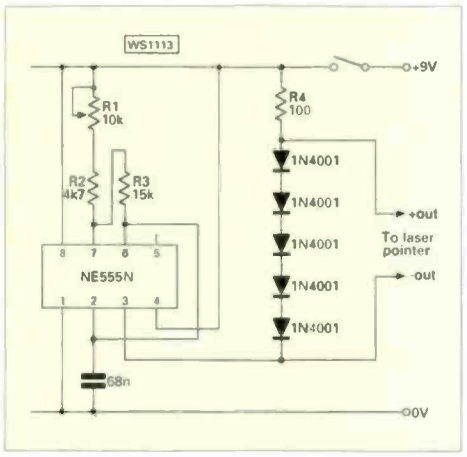

Fig. 1: Circuit diagram of modulated power supply.

Laser pointers, the mainstay of my laser experiments, have the power supply, regulator and collimating lens already built-in. The power supply consists of a small battery, usually around 3V and pressing the switch connects the battery to the regulator and lasing begins. The collimating lens assembly (which is built in to the casing) is also adjustable which enables you to alter the focus.

Basic Transmitter

The basic laser transmitter substitutes a modulated power supply for the battery and switch in a standard laser pointer and an astable multivibrator, running at 800Hz, drives a voltage regulator to generate a series of 3V pulses. A 555 timer chip in astable configuration generates an equal mark:space ratio square wave.

The output pin of the 555, which is capable of sinking a current of over 100mA, is connected to a series of diodes through a low value resistor and the diode/resistor combination limits the output voltage to around 3V. (This precaution was taken because the operating limits of the laser pointer were unknown).

From my experience I think that the pointer was at least designed to manage a range of voltage between a new battery (~4V) and a flat battery (<2.5V). The modulated supply operates from a 9V battery and provides a nominal 3V to the pointer.

The circuit diagram of the power supply is shown in **Fig. 1**. The prototype was constructed on plain perforated board and the layout is not critical.

Testing of the supply can be achieved using an oscilloscope to view the voltage pulses, however, connecting a voltmeter to the output should give a reading of around 1.5V as an average. The supply is then connected to the pointer by soldering the positive wire after the switch and the negative to the negative battery terminal.

When switched on, the laser should look just the same as before - though the brightness of the spot may be slightly lower. Sweeping the spot across a wall quickly should give a dashed line, the light areas are when the laser is on and the dark areas are where the laser is off.

A Basic Receiver

Let's now look at a basic receiver. In order to receive the laser signal, a light sensitive device is connected to an audio amplifier and a photo transistor is connected to the input of an f.e.t. op-amplifier which is configured as a high and low pass filter centred on 800Hz - the frequency of the transmitter.

When the laser beam strikes the photo transistor, the impedance change varies the voltage into the op-amplifier and this signal is amplified by an audio amplifier and is then eventually heard from a loudspeaker.

Remember though that **the receiver is sensitive to all light**, so it's mostly useful for night-time experiments. A block diagram of the receiver is shown in **Fig. 2**. Once again, construction is not critical and the prototype was made on plain perforated board.

First Test

The first test of the system took place in an open area at the back of my house. A friend helped me to set the receiver and transmitter about 100m apart.

The receiver was being affected by some nearby streetlights, which produced a steady 100Hz hum. The laser pointer I used was a hand-held whose hum, when aimed at the receiver, became a loud scream as the 800Hz from the transmitter overcame the street light noise.

I discovered that aiming the laser was particularly difficult, even at the close range adopted for the tests the laser spot was bouncing around the receiver photo transistor. Even my own heart-beat pulse seemed to be echoed in the movement of the beam!

Several experiments were conducted with the laser. The most interesting of these experiments involved me pointing the laser at a plain white card from 100m away.

To my surprise, the spot produced was a lot larger than expected. The laser pointer I used had an output beam diameter of about 1.5mm yet the spot on the card was about 45mm diameter.

I assumed that the collimating lens needed adjusting to bring the beam back to parallel. However, I discovered that no matter how much adjusting was done, the spot would only get bigger.

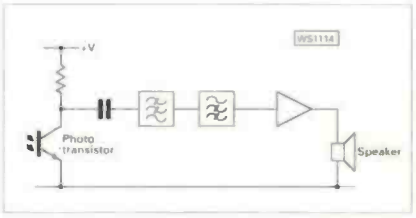

Fig. 2: Block diagram of basic laser receiver.

Spot Size Phenomenon

Judging the previous evening's experiments to be a success, I then considered the spot size phenomenon. Some reading led to the fact that a laser beam, although parallel, will diverge due to diffraction and the amount of divergence can, in fact, be calculated by using Maxwell's equation:

$$\theta = \frac{1.2\lambda}{d}$$

Where: θ is the divergence angle (in radians);
λ is the wavelength of the laser;
d is the diameter of the laser output.

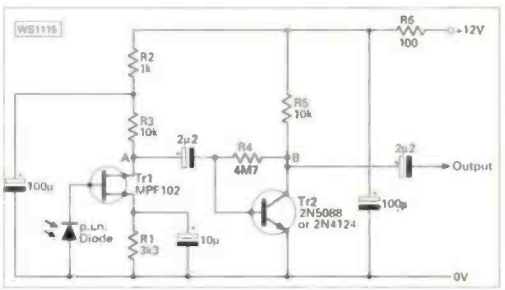

Fig. 3: A low noise laser receiver front end for night-time use, courtesy of John Yurek K3PGP.

The laser wavelength is 650nm or 6.5×10^{-7}m
The output beam diameter is 1.5mm or 1.5×10^{-3}m

$$\theta = \frac{1.2 \times 6.5 \times 10^{-7}}{1.5 \times 10^{-3}}$$

$$= 0.00052 \text{ radian}$$

Using simple geometry it is found that:

$$\text{New diameter} = D \times \text{Tan}(\theta)$$

The small angle approximation for Tangents means that:

$$\text{New diameter} = D \times \theta$$

Where D is the distance from the laser to the target in metres.

At a distance of 100m and using a 650nm laser with a beam diameter of 1.5mm, Maxwell's equation predicts that the beam diameter at the target will be 52mm. This is consistent with the observed diameter on the target card.

Relative Brightness

Knowing the diameter of the beam at a distance allows proof of an earlier statement regarding the relative brightness of a laser and a 100W light bulb.

It's been established that the laser has a beam diameter of 52mm at a distance of 100m. The cross sectional area of the beam at 100m is given by:

$$a = \pi r^2$$
$$a = 3.142 \times 0.026^2$$
$$a = 0.00212 m^2$$

If it is assumed that the atmospheric losses are negligible, the power density of the laser at 100m is:

$$d = \frac{\text{power}}{\text{area}}$$
$$d = \frac{0.005}{0.00212}$$
$$d = 2.359 W/m^2$$

A standard 100W light bulb is about 6% efficient. Only 6W of light is output for 100W of energy consumed. The radiation pattern of a light bulb is approximately spherical. The area of a sphere is:

$$a = 4\pi r^2$$

So, the area required to give a power density the same as the laser is 6/2.359m2. The equation can be rearranged to give an expression for r, the distance from the light bulb.

$$r = \sqrt{\frac{a}{4\pi}}$$

$$= \sqrt{\frac{2.543}{4 \times 3.142}} = \sqrt{0.2021}$$

$$r = 0.45\text{m}$$

This shows that a 5mW laser shone into someone's eyes from 100m will seem as bright to them as a 100W light bulb, 500mm in front of their eyes. **Please remember this important fact!**

Reasonably Sensitive

While the receiver seemed to be reasonably sensitive, I found it was not able to discriminate between the actual laser and a streetlight which was many degrees off the laser axis. To remedy this, I made a wooden box with a fixed front and a movable back.

A lens (which I had salvaged from an old bench magnifier) was then fixed at the front of the box and the back adjusted until the lens' focal point was found.

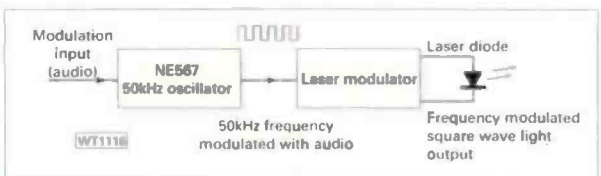

Fig. 4: Block diagram of basic laser receiver.

The receiver photo transistor was mounted on the back plate at the focal point of the lens and the back plate was adjusted slightly to allow for the depth of the receiver. The inside of the box was painted matte black to reduce internal reflections.

The modifications made a significant difference to the operation of the receiver which now needed aiming at the laser as it was had become very directional. Even from over a kilometre away, it was possible to pick out individual streetlights.

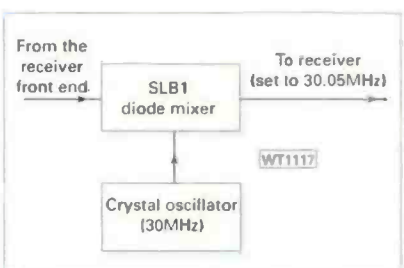

Fig. 5: Block diagram of audio receiver.

John Yurek Helps

Despite the improved directionality of the receiver, it seemed to be lacking in sensitivity. Several designs were tried and I ultimately constructed **John Yurek K3PGP's 'Low noise laser front end'** as described on his Web site: **http://www.qsl.net/k3pgp**

John Yurek K3PGP is an active laser experimenter at the leading edge of the field and his Web site is full of useful and interesting information. John has kindly given me permission to reproduce his design in this article. This design bypasses some of the problems of finding very high value resistors and instability that are common with op-amp circuits.

A PIN photo diode is connected directly into the gate of a low noise f.e.t. (neither the PIN photo diode nor the f.e.t. is biased). This gives a front end that has spectacular sensitivity, low noise and low bandwidth under dark conditions.

The circuit for the receiver is shown in **Fig. 3** with the kind permission of John Yurek K3PGP.

Distance Increased

Gradually, the distance between the transmitter and receiver was increased. The main problem, I then discovered, was aiming the laser.

A hand-held laser is useless over 100m but by mounting the laser on a camera tripod, I went some way in steadying the beam. But actually hitting the target was not made any easier!

Trial and error - and probably desperation - led me to experiment with mounting the laser onto a telescope. (I already had a basic astronomical telescope with fine adjustments for azimuth and elevation). I fixed the laser into the spotting scope holder and began the alignment process.

I then aimed the telescope at a distant wall and carefully adjusted the position of the laser until it was visible in the telescope eyepiece. The wall was about 100m away from me and the spot was getting hard to see. Fine adjustments were made until the visible spot was exactly in the middle of the field of the telescope.

Next Outing

The next outing was to a local loch*. The loch was in between fairly steep hills and from one side to the other was a distance of about 6km.

***Editorial note:** For readers outside the British Isles, in Scotland a loch is the term for a lake, a lochan is a smaller version (both are usually accompanied by hordes of small biting insects called 'midges'!).*

There were several isolated roads on either side of the loch, so it was unlikely that anyone would stray into the path of the laser. My friend, parked on the other side of the loch and pointed his vehicle towards me so that I could see his car headlights.

I then adjusted the telescope until the headlights were centred in the field of view but when the laser was energised, nothing was seen at the other side of the loch. It took several minutes of adjustment were needed before the laser was spotted.

The lights of my friend's car were in the upper right quadrant of the telescope view. This was later explained by the displacement of the laser from the axis of the telescope as the original alignment had been made at a relatively short distance from the telescope.

The displacement from the telescope axis meant that the laser was, in fact, pointing at an angle which, at longer distances, made the beam diverge from the telescope's view centre. This problem, once recognised, was easily rectified by aiming the telescope at a wall and compensating for the displacement by adjusting the position of the visible spot into the lower left quadrant.

Some weeks later, another test was carried out over a slightly longer path of about 10km along the length of the loch. My friend's car was parked up in a lay-by on a very isolated road and I was stood in a viewpoint area on the top of a hill and this time the aiming was much more accurate and within a couple of seconds of acquiring the headlights of my friend's vehicle in the telescope, the laser was seen.

At this distance, the receiver was sensitive enough to pick the laser out of a collection of streetlights. However, the audio distortion was evidence that the front-end was being severely overloaded.

Dot On Horizon

It's interesting to note that the laser appeared to be the brightest object visible to my friend with the dot on the horizon about the same apparent size as a star only very much brighter.

It may seem odd that a point of light, only 1.5mm diameter is visible at all at any range (this is due to a function of the smallest resolution of the human eye). Imagine that the eye's sensitive area is made up of pixels, somewhat like a CCD camera element.

The spacing between pixels is in the order of 3µm at the area of sharpest focus and any light falling on any part of this area will raise the average light level for the whole pixel. Thus the object being viewed appears to be the size of the pixel. This is why all stars seem to be the same size to the human eye as only one pixel is being excited.

Long Path

Several weeks followed when the only activity was the search for a long path for another test. It may seem contradictory that in such mountainous country as Scotland, finding two dark

places accessible by vehicle with a clear view to each other turned out to be such a difficult job.

But, eventually, after pouring over Ordinance Survey maps for weeks, a pair of sites were found that were 20km apart with a clear view to each other and no streetlights for miles. (The owners of the land were contacted and permission was given for access).

One particularly clear day arrived and we set off for the hills. Arriving about 30 minutes before sunset, it immediately became apparent that seeing the other site was much more difficult than I had ever imagined - there was a slight haze and the distant hills looked a uniform shade of grey.

The maps do not give any real impression of the actual layout of the land and, unfortunately, the ground is not coloured in various shades as it is on the maps. I had no idea where the other end of the path was relative to my site!

I had a compass heading to look along and I'm fairly comfortable with reading maps and extracting shapes from the contour lines. However, the haze and sheer distance involved made the task seem impossible!

The telescope was set up and roughly pointed in the direction where I thought the other site was. As darkness fell, the mist, combined with the lack of light, made the distant hills seem to be a continuous band of black against a black sky over a black landscape.

The car headlights were then used and by aiming them in the approximate direction of the other sites my friend's vehicle was spotted some degrees away from the direction which I had calculated. I aligned the telescope and powered up the laser.

I was immediately greeted by a yell over the 144MHz talk back that the laser had been spotted. The receiver was set up and immediately sprang to life with an 800Hz tone.

The tone itself was somewhat distorted again and I had a distinct impression of the sort of distortion experienced during aurora activity, feeling lucky, I sent my callsign in Morse code to confirm the contact.

I decided to fine-tune the laser's position by using the slow motion adjustments on the telescope. With the first movement of the elevation control, my friend lost sight of the laser and interestingly enough, the receiver output did not change (more on this later).

It took nearly half an hour to get the laser pointed in the right direction again and it had become painfully evident that the adjustments on the telescope were not fine enough for long distance work. It would take some major work to overcome this problem.

New Mounting

Work began on a new mounting for the laser which consisted of large chunks of steel and slow motion servo-motors. In the meantime, however, I began experimenting with other modulation modes. It's all very well working a 20km path but it is a bit boring if all that can be sent is an 800Hz tone.

As I mentioned towards the beginning of this article, the bandwidth available on a laser is huge and the limiting factors are the modulator and receiver bandwidths - there is virtually no limit to the laser itself.

So, I decided to build a modulator to send speech over the laser and the modulation method used was to generate a square wave and frequency modulate it with speech or music or whatever. This sub-carrier system is very useful and it's possible to send several sub carriers at the same time, effectively giving simultaneous channels.

For the audio channel I decided on a sub-carrier of 50kHz which would give an audio bandwidth of 25kHz - perfectly adequate for high quality music. I used an NE567 function generator chip to generate a 50kz square wave - this chip has a frequency modulation input, which varies the output frequency of the chip proportionally with modulation input.

Receiving the sub-carrier is also quite simple - a crystal oscillator, running at 30MHz, was connected to one input of a balanced mixer and the output from the receiver front-end was connected to the other port of the mixer. A scanner receiver was then connected to the output of the mixer and tuned to 30.05MHz.

Instead of building a microphone pre-amplifier, I connected the output of my wife's personal stereo to the modulation input of the NE567. I turned the laser and receiver on and realised that the 800Hz signal was still connected to the modulator internally. But this mistake proved to be beneficial because the 50kHz signal is inaudible and the 800Hz is still needed to aim the laser.

Switching on the scanner gave a fully quieting carrier on 30.05MHz, as expected and the 800Hz was also audible from the laser receiver audio amplifier. When the tape was played, the music was clearly heard from the receiver. This proved to be quite a successful experiment and block diagrams for the modulator and receive mixer are given in **Fig. 4** and **Fig. 5** respectively.

Fig. 6 & 7: Jim's rugged mounting system.

Further experiments showed that the range of the music system was significantly reduced - the reason for this was the bandwidth of the front-end circuitry. This is due to the configuration of the PIN photo diode into the f.e.t. with no bias.

Adding bias does increase the bandwidth but also raises the noise floor. Experiments are now underway with avalanche photo diodes, which should give comparable noise figures to the dark PIN circuit, but with significantly increased bandwidth.

All other signals superimposed on the laser have used the sub-carrier system apart from some experiments with **Binary Phase Shift Keying (BPSK)**. Instead of modulating the frequency of a superimposed tone, BPSK shifts the phase of the tone by 180°.

The base tone is a very accurate, crystal generated 800Hz. And, depending on the data rates used, the phase of the tone is switched to alternate states for binary 1s and 0s.

The Method

The method of receiving BPSK is to use a coherent software filter in a computer. An interface unit digitises the incoming signal from the laser receiver front-end and feeds the digital equivalent into a serial port and the software decodes the data and displays it on the screen.

The technique described is a very slow method of transmitting data because each byte can last three seconds or more. The reason for this is that the software integrates the signal over a period of time to enable sub noise floor reception.

In other words, BPSK will get through even when the received signal is 20 or 30dB below the noise. Information on this system is available on the Internet from various ham sites. One of these Web sites is:
http://www.itec.ca/home/bill/bbs/htm

Rugged Mount

Following the problems found with aiming the laser with the telescope on previous expeditions, work commenced on a more rugged mount. Two one metre lengths of metal 'C' channel, pivoted at one end, made up the elevation adjustment.
A servomotor was then used to drive a threaded rod, which pushed the two channels apart - one revolution of the rod moves the top channel 1mm. (This is 1/1000 of a radius). The servo speed can be adjusted to give one revolution in ten seconds. Another servo was added to move the pair of channels across a

Continued on page 33...

Seeing The Light!

...continued from page 31

frame to give azimuth adjustment. (See **Fig. 6** and **Fig. 7** for the mounting system).

I won't bother with the maths here, but 1/1000 of a radius movement of the channel is the same as 1/1000 of the distance to target movement of the laser beam. In other words, at a distance of 20km the laser would move 20m at the target for one revolution of the servo.

The telescope was then mounted onto the top channel and the laser was fixed to the telescope and aligned. The whole mechanism was then mounted on a surveyor's tripod for rigidity.

Aiming was the same as before - aligning the distant target in the centre of the field of view of the telescope, however, when the azimuth or elevation was adjusted, the movement was slow and smooth.

Some experiments are now being conducted on micro-servos, acting directly on the laser module. Small Piezo elements are fixed to a short beam - one in the vertical axis and one in the horizontal. By applying a voltage to the element, small deflections in the beam relative to the telescope are possible.

I then calculated that at a range of 50km, it should be possible to move the beam by a couple of metres at the target. This is for a future project, which will involve automatic target acquisition with computer control of the laser position.

Momentous May

In early May, **Mark GM4ISM** and I held a two-way Morse QSO over a distance of 44.2km and using the new mount, I managed to visually acquire Mark's position, which fortunately was at the base of a well-illuminated TV tower on the outskirts of Glasgow.

My location was completely dark with no landmarks or features for Mark to aim at. So it was necessary for me to sight on Mark's location first and hope that he could spot my laser on the hillside.

After a few minutes of very slow adjustment, Mark called out over the 144MHz talk back that he had seen my laser and was about to aim his in my direction. Within a few minutes, we had each other's laser in our sights and set up the receivers.

Mark was using a similar receiver set-up to me but with an 800Hz bandpass op-amplifier stage to cut out street light noise. Mark's signal was strong and clear in the receiver and the same aurora type distortion (which I talked about earlier in the article) was present but at a much greater level.

We were in fact shooting over the top of Glasgow (taking due notice of aircraft flight paths, etc.) and the heat haze was clearly visible even at night. When I spotted Mark's laser it was far brighter than any other single object in my field of view. From Mark's end, my laser was just about the only thing in his field of view. Even my camera managed to capture the laser spot from the base of the tower. (See **Fig. 8**).

Mark was using a slightly different design of laser - instead of a standard laser pointer, he had taken a red laser diode and removed the collimating lens. The laser was focused using a 25mm diameter lens which gives a beam that will spread far less than my 1.5mm diameter beam. This way more power is concentrated at the receiver end but aiming is far more critical.

In the future, any extremely long distance experiments will use a beam of 50mm diameter along with the micro-servo automatic aiming system described earlier - at a range of 100km the beam diameter will be only about two metres.

Ideal Transmissions?

So far, only ideal transmissions have been considered. The atmosphere does in fact absorb a significant portion of the power of the laser and the transmissivity of air at 650nm over a distance of 2km is in the order of 85%. At 4km it would be 85% of 85% and so on. There comes a point when there is not enough energy left to make a contact.

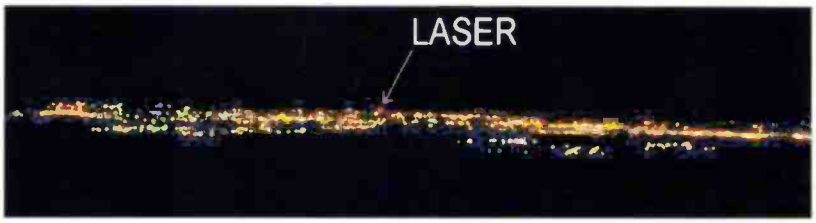

Fig. 8: "Even my camera managed to capture the laser spot from the base of the tower". Jim Hatton's photographic evidence of his two-way Morse QSO.

Fortunately this boundary has not yet been achieved.

One way of extending the range of your laser is to use a lower frequency laser. Infrared lasers, working at 780nm are fairly common, being components of CD players and other such devices. The transmissivity of air at these wavelengths is in excess of 90% over 2km. Salvaging the infrared lasers from CD players can be a tricky business and this will need a whole article of its own.

In all the experiments so far, the laser has easily been the brightest source of light visible. The range increase from 20km to 44km seemed to make little difference to the visible brightness and it seems that there's a significant increase in range yet to be gained.

Suitable Sites

As previously discussed, finding suitable sites for a long distance laser path **is very difficult**. There is, however, another way of making a contact over a considerable distance, which has proven to be very interesting. Since laser light acts like any other light when it strikes an object, it's possible to receive reflected laser light.

Clouds seem to make good reflectors and all that is required is to aim the laser at the base of a good fluffy cloud and to point the receiver at the same place - the aiming is not so critical because the cloud will scatter the laser in various directions.

Unfortunately, the clouds over cities seem to have a high level of street lighting below them and this leads to significant interference to the received signal and a reduction in the sensitivity of the receiver.

The Future?

Experiments continue with modulation of the laser with audio, video and digital data, all at the same time. Future systems will make use of infrared lasers for better propagation and Avalanche photo diodes for wider bandwidth.

A more sensitive receiver is planned using a photo-multiplier tube (PMT). The problem here is that most PMTs are somewhat 'blind' (insensitive) to red and infrared and another factor in considering this modification is the cost.

So far, the total spent on the various systems is in the order of £150. A significant portion of which was spent on the tripod and original laser pointer.

Most of the parts for the modulators and receivers were culled from the junk-box but the purchase of a single PMT and associated power supply would easily double the cost of the project!

At the time of writing this article, the recognised record for a similar contact is in the order of 150km. Mark and I are searching for a 'line of sight' path to beat this record during the coming winter. We would be grateful for ideas but remember, the sites must be accessible by car, fairly remote and dark at night.

Real Dangers

Despite all the fun we have had experimenting with lasers, it must be stressed that **there are real dangers** when using lasers. It's not possible to over-stress the importance of safe practices when using lasers outside.

In every experiment we carefully studied the land, took account of roads, flight paths and many other criteria and many sites were rejected because of the risk of dazzling a motorist or passer-by.

Before setting foot on the proposed site, the permission of the landowner was sought and, once again, several sites were also rejected because the landowner could not be traced to gain their permission. **Remember, damaged eyes cannot be replaced.** Be safe and have fun! *PW*

Counting *Up* From The Millennium!

Most of us are somewhat tired of the various 'count downs' to the coming 'Millennium'. However, from this issue of *PW* Rob Mannion G3XFD is doing something quite different by 'counting *up*' from the Millennium! Rob is letting his imagination run wild with 'cuttings' of imaginary Amateur Radio 'news' items which (might) appear in the magazine in future years. They're intended to be thought provoking, sometimes controversial and interesting but above all ... totally imaginary!

European Union Aids Amateur Radio

The help provided by the European Union to help fund Amateur Radio (still the only hobby sanctioned by a Geneva Convention) is finding its mark and making an impression from Iceland to Bulgaria. Now that funds are flowing freely to each Member State's officially nominated national society – membership to that society is guaranteed to be free for every radio enthusiast. No longer do the national societies have to struggle for funds - any need for commercialism has gone and they can concentrate on looking after their members.

Throughout the EU Radio Amateurs have a choice - they can belong to their national society if they so wish. It won't cost them a Euro-cent! However, no-one is forced to join and the freedom of choice is there to be a 'non member' if that's the desire. But remember - The EU pays up according to the number of Radio Amateurs (and registered listeners) in each country so don't let the payment made on your behalf go to waste!

(EU sponsored announcement published in *PW* August 2007).

Climbing Above The Pollution

The problems involving Amateur Radio operation in the 'polluted' h.f. radio spectrum has forced one Amateur Radio group to adopt a novel way to overcome interference from mains-borne sources. The South West Shires Group (SWG), who operate in the new English Regional Government Area (ERG) of Wessex (the new Regional Government based in Winchester, responsible for that part of the English countryside from the old Hampshire border down to the edge of Dartmoor) operate with the full knowledge and co-operation of the Ministry of the Interior and Tourism and Environment (MITE).

The SWG has so impressed the ERG that the regional MITE has allowed them to operate away from their home stations without the (usually a requirement) accompanying MITE uniformed guide. The reason why the SWG have been so successful is that they have bought a hill-top site from the original foreign-based landowner, so they can erect a permanent Amateur Radio station situated well above the electrical pollution caused by the widespread use of digital networks distribution via the 'mains'. In fact, the site chosen has no 'mains' and the group operate from solar panel and wind-driven energy sources.

Using antennas mounted between trees, the SWG have avoided the use of masts and towers except for their v.h.f. and u.h.f. stations. They also operate laser links (via reflectors) to member's homes so that all the stations can be operated from remotely sited consoles. The system is proving so popular that other clubs (with full permission of the MITE security services) are to follow suit.

When *PW* telephoned SWG Chairman **Mike Kurtzwell-Blatt** WESSE952 (his old callsign was the re-allocated G3SWM) he said "It's so popular that other groups are copying the idea. The next stage is for our 'drive-In' station to be set-up. All you do then is supply the rig in the car, drive up to the antennas and plug-In and get the use of good antennas on an excellent site"!

Good news is rare in the fiercely competitive 'EMC World' and it's cheering to hear from successful groups such as SWG. So, let's be hearing from you - wherever you are in the Confederated English States, The Welsh Principality, Independent Scotland or the European Community!

(News items from *PW* dated 2009).

Irish & Welsh Laser Record Claim

Radio Amateurs based in Dublin and Wales have claimed a new Amateur Radio Laser record - but other Laser operators claim that the EI/W record was achieved by cheating! Record claimant **Dermot O'Callagain EI9LASER** said "Just because we used the shiny inside walls of the just completed Holyhead to Dublin Irish Sea Railway Tunnel does not mean we cheated - it's still a marvellous achievement".

Agreeing with his Irish colleague, **Carl Marthen W29ABER** said "It's no different from using the Earth Orbiting Space Stations as reflectors - which we all do every day".

Although the *PW* Editorial team congratulate the joint Irish/Welsh record - as we go to press we understand the claim has gone to the International Guinness Record Committee for verification. Watch this space for further news!

(News item in *PW* January 2004).

Operating North Of The Border

At long last *PW* is able to bring good news. English Radio Amateurs can now operate their station again while 'North of The Border'! After much negotiation, the Independent Scottish Government - which removed English Radio Amateurs from the CEPT agreement when they seceded from the United Kingdom - has agreed that English Radio Amateurs can apply for a temporary licence to operate in Scotland.

The new agreement - available only by individual application and agreement - limits operation to specific addresses. Mobile operation is not permitted and all equipment has to be declared at Scottish Customs barriers. Special concessions (such as mobile and 'portable' facilities) are possible if applicants can provide evidence of Scottish ancestry or the ability to speak Gaelic. More news of this breakthrough when it comes. In the meantime Scottish Radio Amateurs visiting England and Wales can still operate under the regulations which were in existence before the fragmentation of the original United Kingdom.

(News Items from *PW*, September 2016).

Please direct any correspondence or comments to the *PW* office in the correct year – remembering to add the relevant space-time-warp code.

This month, in his own inimitable style - the Rev. George Dobbs G3RJV takes a look at 'inductors in the round' ... a short guide to help you use toroids. But first (of course) George has found his usual appropriate quotation!

Carrying on the Practical Way

Recently, whilst looking at some of the Amateur Radio kits available in the USA, I noticed a description of a kit that had the selling feature of "no coils to wind". My suspicions were confirmed ... I have always guessed that winding one's own coils for projects has been a pet hate for many radio constructors! Coil winding is certainly a pet hate for the writers of Amateur Radio articles. Experience has taught me that a lot of the problems which readers report, when attempting to build projects I have described, have been with home wound coils.

I've also learned that home wound inductances can be difficult to reproduce with accuracy. But for some projects there's simply no alternative to winding the necessary coils/inductances yourself.

In more recent years, hand coil winding has moved away from the use of conventional cylindrical formers to the use of toroidal formers. (Those little black things that look like 'Polo' mints).

"He came to ask what he had found...
that was too large and smooth and round"

Robert Southery 1774-1843 The Battle of Blenheim

I was always fond of cylindrical coil formers with powdered iron cores. They are forgiving components in that a poorly wound coil can be brought to the desired inductance by using the adjustable core - often lovingly called 'slugs'.

Now, however, I am almost completely converted to using toroidal cores and this article describes some of their merits and how to grow to love them. So, you too may be 'converted'!

Main Advantages

There are two main advantages in using toroids. The first is the high 'Q' available when using a small number of turns on a toroid.

The second is the self-shielding property of toroidal cores. Their shape is such that a coil or transformer produces a very self-contained field.

A screening can, or metal enclosure, is not required to keep the toroid's field to a confined area. This is very useful when dealing with modest or large radio frequency signals.

It's also possible to vary the inductance of a toroid inductor by opening or compressing the turns, remembering to leave a sufficient gap between the beginning and end of the winding.

Common Cores

The most common toroid cores used in Amateur Radio work are the Amidon cores made by Micrometals in the USA. These are broadly divided into ferrite and powdered iron cores.

Powdered iron cores are used in applications that require high 'Q' tuned circuits. These would include oscillators, r.f. filters, i.f. amplifiers, mixers and circuits that require frequency selection or rejection. Ferrite cores, on the other hand, are used for broadband inductors and transformers. These would include matching transformers, baluns and r.f. chokes.

Three Section Code

The Amidon cores use a three section code for identification (see **Table 1**). The first section is either 'FT', to show a ferrite core, or 'T' to show a powdered iron core.

The second section indicates the physical size of the core by describing the outer diameter of the core in

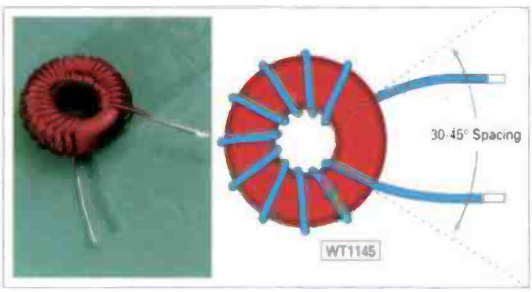

Fig. 1: Winding a toroid - spacing of the wire endings is important (see text).

hundredths of an inch. A 'T-50' core is a powdered iron core with an outer diameter of half an inch. So the first two parts of the code describe the core material and state its size.

The third part of the code refers to the electrical characteristics of the core. This describes the material

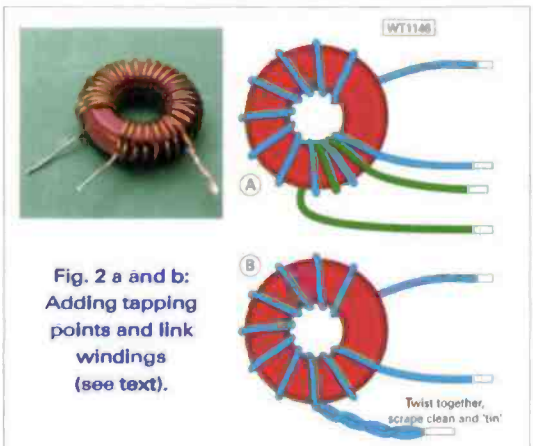

Fig. 2 a and b: Adding tapping points and link windings (see text).

mixture or the permeability of the core. Powdered iron cores have coloured paint on one side to show the material mix but ferrite cores are all black. Usually the average constructor normally relies on the given circuit or design for choosing the core material and the designer simply tells us what to use.

The formulation of the core establishes the permeability, useful frequency range, the '*Q*' and the temperature coefficient for particular applications. At the risk of saying, "just do what the man says", this article is too short to deal with the details of core selection and I can only refer the reader to the manufacturer's data.

Identifying Amidon cores		
FT	37	43
'FT' = Ferrite core 'T' = Powdered Iron	Core size code '37' = 0.37in '50' = 0.50in etc.	Core material (permeability) Ferrite cores are all black, Powdered Iron are colour coded as below
Common Core materials are:		
Mix -2 Coded Red Mix -6 Coded Yellow Mix -7 Coded White The coding is formed by painting one side of the toroidal core only. Ferrite cores are commonly Mix 43 or Mix 61.		

Table 1: Explaining the 'three code' reference system.

Winding Toroids

Winding toroid inductors is simple, albeit fiddly with the smaller sized cores. You only have to remember that **each time the wire passes through the centre hole it counts as one turn**.

The turns should be arranged neatly, side-by-side, with an aim to make the winding occupy about three-quarters of the core. Try to allow for a 30 to 45° gap between the beginning and ending of the winding (see **Fig. 1**). **Remember: a very small gap between the beginning and ending of the winding will result in unwanted added capacitance**.

Inductance values (µH) given by a 10-turn coil							
Mix Type	Colour	T37	T44	T50	T68	T80	Range (MHz)
-2	Red	0.40	0.52	0.49	0.57	0.55	1-7
-6	Yellow	0.30	0.42	0.40	0.47	0.45	7-
-7	White	0.32	0.46	0.43	0.52	0.50	4-8
-10	Black	0.25	0.33	0.31	0.32	0.32	14-25
These inductance figures are based on an evenly wound single layer winding covering 75% of the core circumference. But the equations rarely gives a complete number of turns and the answer should be rounded up or down accordingly.							

Table 2: Values of inductance given by a 10-turn coil.

The correct wire size is really that which will fill the core, leaving the appropriate gap between the beginning and ending of the winding. If some adjustment is required, it's an advantage to use a smaller gauge of wire. (This allows for some opening and closing of the spacing between the turns to produce a small inductance variation).

Threading the wire through the toroid's hole does mean having to unreel (or even cut off) a length of wire prior to making the winding. Because of this it's helpful to know how much wire will be required to make the winding.

My method for estimating what's required is to make (say) five turns on the core and then unwind them and measure the length. From the total number of turns required, it's then possible to calculate what length of wire is required for the full winding.

Since the windings will usually be made using enamelled copper wire, I suggest you leave at least 20mm at each end to scrape off the enamel and tin the copper wire.

In practice, it's easy to make link windings and tapped winding on a toroid (see **Fig. 2, a and b**). The link winding can either occupy the same area as the main winding or it can be close wound at one end of the main winding.

In either method, the link turns are added **over the main winding**. My preferred method for making a tapped winding is to wind on the turns until the tapping point is reached and then pull out a loop (say about 10mm in diameter) and twist it to hold it in place. Then I complete the rest of the winding.

The loop is then twisted a little more tightly, the enamel is scraped from the wire of the loop and the bare copper is tinned with a hot soldering iron. Make sure you allow solder to run between both twisted wires so they become (electrically) a single wire.

Band (MHz)	Turns	Core type	C_{tune} (pF)
1.8	55t	T50-2	470
3.5	45	T50-2	200
7.0	36	T37-2	100
10.1	35	T37-6	68
14.0	30	T37-6	47
18.07	26	T37-6	39
21.0	24	T37-6	33
24.89	25	T37-6	22
28.0	24	T37.6	18

Table 3: Winding details for the h.f. bands.

Measuring Resonant Frequency

It's possible to set about measuring the resonant frequency of a tuned circuit using a toroid inductor with a dip meter. Usually dip meters are aligned with the field of a conventional coil to obtain the dip at the resonant frequency.

However, because of the very restricted field around a toroidal inductor the usual dip meter technique is not possible. Instead the easiest way is to make an external link winding to fit over the dip meter coil (two or three turns is enough).

The external link is connected to another link winding, of one, two or three turns, wound through the toroidal winding (see **Fig. 3**). You should use the least number of turns required to ensure a clear dip of the meter needle.

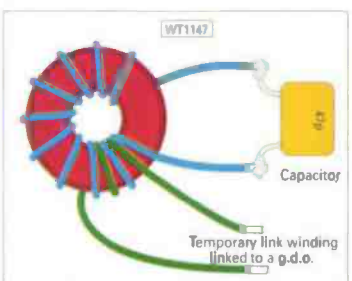

Fig. 3: The G3RJV method for checking the resonant frequency of a toroidial inductance usIng a dip meter (see text).

Easy To Calculate

One of the blessings of the toroidal inductor using Amidon cores is that it's very easy to calculate the number of turns required for a particular inductance. To this end, **Table 2** shows how to work out the number of turns for a given inductance over a range of Amidon powdered iron cores.

All you need to use it is to know the required inductance, a value called L_{10} (inductance for 10 turns) for the chosen core and a few button pushes on a pocket calculator. Just follow through the stages in Table 2 to obtain the required number of turns - try it and see!.

I hope this short article helps to demystify the winding of inductors on toroid cores. To further help you on your way, **Table 3** gives a set of windings to 'hit' the h.f. amateur bands using toroids. Maybe you'll also be converted now? *PW*

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Ideal For The Keyboard Operator?

Patcomm PC-16000 Review

Roger Cooke G3LDI, our data mode specialist, takes a look at an interesting new transceiver aimed at the keyboard operator.

Another new product hits the market, another 'goodie' to tempt us to part with our hard-earned cash! This one, the **Patcomm PC-16000 h.f. transceiver** has been targeted at the Data enthusiast. With that in mind, I have been given the pleasure of trying it on the h.f. bands, to see how it performs. So, here goes! I visited Picketts Lock earlier this year and was fortunate to find a PC-16000 on display, tucked in a corner on the Nevada stand. I spent some time talking with the Dutch representative from Patcomm who was trying to demonstrate the receive capabilities and DSP but, unfortunately, rallies such as this are not the ideal place to try out equipment.

The Patcomm PC-16000 h.f. transceiver comes complete with a keyboard as standard.

The high noise level, obvious ambient noise from the crowd and a lack of a decent antenna all add up to possible disaster! However, some success was achieved and there was some interest from people passing by.

There's a saying in the 'cooking world' that says a customer always eats with his eyes first. The same can be applied to Amateur Radio equipment. Watching potential customers (and I am exactly the same), the first thing anybody does is look at the front panel and twiddle the tuning control. It's much like sitting in the driving seat of a new car to judge the 'appeal' factor. Once this has been achieved, selling the item becomes much easier. Unfortunately, this particular transceiver does not possess that appeal, I'm sorry to say. This is only my opinion, some may disagree so I shall now go on to explain my opinions.

At First Glance

At first glance, the Patcomm PC-16000 looks like a piece of test equipment. It's virtually square and I feel that more thought could've been given to the overall appearance, i.e. the types of control knobs and push buttons used and perhaps a more professional display and S-meter could have been used.

The push buttons seem unfinished, with quite sharp edges to them and are relatively close together with very small labelling. (See **Fig. 1**). The main tuning control is small - it matches the other controls on the front panel, but does not exude quality. The same can be said of the meter, an edge type meter from several years back! (See **Fig. 2**).

The display, probably quite adequate, is a standard display i.c. but, again, it is also unattractive. Bear in mind that this is all being said without having switched the transceiver on, so the performance might make all this sound irrelevant. However, I was told in my youth that you don't get a second chance to make a first impression and impressions, I feel, are what help sell transceivers.

Fig. 1: "The push buttons seem unfinished, with quite sharp edges to them and are relatively close together with very small labelling".

Sophisticated Communications

The transceiver utilises two 8-bit microcomputers with 32k of EPROM and 32k of RAM to implement sophisticated digital communications functions. An IBM AT keyboard is supplied with the transceiver to allow full control in conjunction with inputting of information from the push buttons on the front panel.

An internal TNC digitises c.w. and f.s.k. signals, allowing the internal microprocessor to decode and display the received data on the front panel l.c.d. Baudot RTTY is supported in selectable rates of 60, 67, 75 and 100 w.p.m. in normal and reverse polarity as well as narrow (170Hz) and wide (850Hz) shifts. These options can be selected via menus displayed on the front panel l.c.d. 110Baud ASCII is also supported with selectable normal/reverse polarity, wide and narrow shift and even, odd or no parity.

Advanced Direct Digital Synthesis techniques are combined with phase locked loop (p.l.l.) technology to allow precise generation of v.f.o. carriers. The c.w. and f.s.k. signals are directly generated by the DDS v.f.o. system.

The c.w. and f.s.k. transmit/receive offsets are directly controlled by the microprocessor. This is possible because of the extremely fast settling time of the DDS v.f.o. This allows smooth and accurate operation even under c.w. QSK conditions.

A dual up-conversion receiver is used to provide continuous receiver coverage from 1.5 to 29.9Mhz and transmit coverage on all amateur bands. Receiver performance is enhanced by the use of **Rockwell Collins Mechanical filters** in the i.f. stage in conjunction with audio DSP filters.

Using DSP filters gives a sharper cut-off without ringing and more intelligent filtering, such as auto-notching tones and heterodynes and reducing background noise level without impairing the desired signal. However, using auto-notch is not a good idea if using RTTY, as it cannot differentiate between the unwanted QRM and an RTTY tone. Manual notch filtering has to be employed when using this mode!

Standard Keyboard

The transceiver is possibly the first to be produced with the ability to connect a standard IBM keyboard to it. This produces problems for the operator if he thinks he can plug and play! I tried it, became very frustrated and, as I have said in previous reviews, it pays to read the manual first.

The PC-16000 comes with a 30 page manual and one page of addendum which gives updated information on the software and notes of any changes that this may produce. It also gave information on a mis-print in the manual!

Switching the transceiver on produces a two-line display, the transmit frequency is the top line and the receive frequency on the bottom line. The time is shown to the right of the transmit frequency and this is something which I've always thought all rigs should have. Under this is the memory channel display and bands are selected from the front panel or from the keyboard and each band has ten memories, each of which is capable of storing mode, frequency and so on. This last item seems to be standard practice in most modern transceivers.

I made notes on a separate piece of paper with the F key selections and operation of the other keys. Without this, a good deal of practice prior to putting the rig on the air is necessary. As the rig is a data rig, I tuned in some RTTY first.

The received text is displayed in the top line, but as there's space for only sixteen characters, it does require constant viewing to avoid missing anything. Two miniature l.e.d.s to the left of the tuning control enables the operator to tune a signal. I have no problem with that as I tune according to pitch, being a musician helps here!

There's provision for plugging in a tuning 'scope. With the RTTY filter in, it's possible to eliminate a lot of the QRM and with careful adjustment of the sensitivity control, good copy is obtained. I had several good RTTY contacts - the only drawback being my inability to remember which of the keys on the keyboard to use.

I did get in a fix during one QSO and had several attempts to get back to normal, which I did eventually! Parameters are adjustable and are displayed on the l.c.d. It's also possible to plug in a dumb terminal for a larger display, or even a PC running a terminal program.

Fig. 2: "The main tuning control is small - it matches the other controls on the front panel, but does not exude quality. The same can be said of the meter, an edge type meter from several years back"!

However, the transceiver as it stands is ideal for running RTTY on a DXpedition. It's good practice to reduce the power level on RTTY with the 100% duty cycle and even with about 70W, I worked several USA stations with adequate ease.

Transceiver On CW

Using the transceiver on c.w. via the keyboard was interesting. In the past, I've found that the best c.w. decoder available is the grey matter between the ears. This applies also in this case - the c.w. being received has to be very well sent, with well-spaced characters, good and consistent signal strength with low QRM.

However, there is also a useful practice mode, with decoding and display facilities - which could prove very helpful for the novice. The built-in memory features are useful for the contest operator and QSK works very well. I used this on a few occasions on 14MHz. Again, I worked several stations from the USA and had no problems, reducing the power to 5W at one stage, with a 569 report.

Fig. 3: The inside of the Patcomm PC-16000, showing the heatsink on the right-hand side.

I received good audio reports using the transceiver on s.s.b., which I think is slightly unusual when using the supplied hand microphone. The microphone supplied with this transceiver has a high-level ceramic insert and, I think, is better than the average microphone supplied with most other transceivers.

The DSP Filtering

The addition of DSP filtering is becoming a standard feature on modern transceivers and this one is certainly no exception. Selectable audio bandpass positions are available at 2.4kHz, 1.8kHz, 500Hz, 250Hz and a special for RTTY tones, including an offset.

The DSP filtering is also used for noise reduction and an automatic notch filter for suppressing up to four heterodynes is also used. I found that this worked very well and a manual position is also available for use on c.w., otherwise the required signal would also be suppressed.

I was not too happy about the received audio, it sounded very restricted, I was, however, only using the built-in speaker and this might be improved with the use of an external speaker. There's a noise blanker, r.f. attenuator and i.f. shift control to help with the QRM problems and sensitivity is adequate for h.f. working.

Fig. 4: Rear panel of the Patcomm PC-16000.

Although the figures are not as good as some other transceivers, the PC-16000 behaved well beside my Yaesu FT-1000MP.

A built-in power/s.w.r. meter is built-in to facilitate tuning, but an external antenna tuning unit (a.t.u.) has to be used as there is no internal a.t.u. There are three antenna sockets on the rear apron of this rig, expanding the choice for the operator regarding separate receiver/transceiver antennas.

Software Driven

The PC-16000 is software driven and is programmed into Programmable Read Only Memories (PROMs). This software will be upgraded from time to time and the PROMs will be replaced with newer versions.

It's possible to use a linear amplifier - the necessary switching and ALC connections are on the rear apron. I, however, did not try this. It's also possible to use the transceiver on a.m., but again, I didn't try this either.

New Thinking

I really feel that this transceiver represents new thinking in its operation but I also feel that there's some way to go in its development.

I hope my comments will be accepted as constructive, they're certainly intended that way. The Patcomm PC-16000 has definite advantages over some modern transceivers in that data decoding is built-in and this would be a boon to DXpeditions. The transceiver costs **£1595.00** and, at that price, it's in the ball-park of some of the top range rigs available.

My thanks go to Mike Devereux at Nevada for the loan of the Patcomm PC-16000 for review. Nevada can be contacted at 189 London Rd, North End, Portsmouth PO2 9AE. (01705) 662145. *PW*

PC-16000 Specifications

Receiver:

Frequency Coverage:	1.5-30MHz
Circuit Type:	Upconversion design - Dual Conversion: 1st i.f.: 45MHz 2nd i.f. 455kHz Sideband elimination using Phasing Techniques with Digitally Generated Quadrature carriers and Image Reject Mixers preceded by Collins Mechanical Filters.
r.f. Range:	Anywhere within selected band
Sensitivity:	.25uV for 10db S+N/N
Dynamic Range Figures:	Noise Floor (MDS) = -128dbm (.09uV) Blocking Level= -17dbm (approx 30 000uV) Blocking Dynamic Range = 111dB IMD Level = -33dBm (20kHz spacing) IMD Dynamic Range = 95dB
Selectivity:	5 'Brick Wall' DSP filters available in the following Bandwidths: 2.4 kHz 1.8 kHz 500 Hz 250 Hz 200 Hz RTTY Ultimate attenuation of filters is better than 60dB 45MHz i.f. stage uses a 7.5kHz crystal filter - 455kHz i.f. stage uses 2.4kHz and 500Hz Collins Mechanical Filters (in s.s.b., c.w. and RTTY) or a 4.5kHz Ceramic Filter for a.m.
De-noiser:	Ultimate attenuation 20dB
Auto-notch:	Ultimate attenuation of 50dB for one to four tones. Lock time approximately 4mS
a.m. mode:	Fixed 4.5kHz Ceramic Filter in i.f. stage. DSP Functions not available in these modes.
Manual Notch Filter:	500Hz to 3kHz - 30db minimum
i.f.Shift:	+/- 2.5 kHz
Maximum Audio Output:	Minimum of 2.5W into an 8Ω load with 10% t.h.d.

Data Controller:

Keyboard Interface:	Standard AT
Morse:	Decode and Transmit 5 to 75 w.p.m. Adjust via the Main Tuning Knob when in the 'Keyspeed' Mode. Direct Readout of w.p.m. on Display.
RTTY:	Decode and Transmit Baudot - 60/67/75/100 w.p.m. normal/reverse 170Hz or 850Hz Shift ASCII - 110 Baud normal/reverse 170Hz or 850Hz Shift

All Data Modes

There is a 16-character active type ahead buffer. As characters are entered they appear on the display and scroll off to the left as they are sent. Entered text may be edited before it is sent by backspacing. A 'buffer-full' beep will sound if the buffer overflows during the text entry. In addition to the active buffer, there are (9) 256 character non-volatile message buffers. Text may be entered and edited in these buffers from the keyboard. Any buffer may be sent with a single keystroke or appended to an already outgoing message. These buffers are active for both c.w. and RTTY modes.

Transmitter:

Frequency Coverage:	1.8-28MHz - MARS and CAP coverage is also available upon proof of eligibility.
Output Power:	s.s.b.: 100W p.e.p. c.w., FSK & f.m.: 100W a.m.: 25W Carrier
Spurious Radiation:	Better than -50dBc for harmonic and better than -45dBc for non-harmonic spurious
3rd Order IMD:	-28dBc Minimum @ 100 watts PEP

r.f. Speech Compressor: Provides approximately 10dB of Compression

Signal Generation Techniques:
s.s.b.: Passive Double Balanced Modulator using Digitally generated Quadrature carriers for phased SSB Generation
c.w.: Direct generation with DDS controlling transceiver offset
f.s.k.: Direct generation via computer control of DDS
a.m.: Unbalance d.b.m. with in phase audio applied

General Specifications:

VFO/Step Size:

VFO signals are generated with DDS (Direct Digital Synthesis) driven p.l.l.s. The Minimum step size available is 1Hz in the Variable Speed Tuning Mode (VST). In this mode the faster the tuning knob is turned, the larger the step size becomes. Step size change is 1, 10, 100Hz, 1 and 10kHz. The Fixed rate tuning mode provides 10Hz steps regardless of tuning speed.

Memories:

90 Memories are available plus one Scratchpad. They are arranged as ten per Amateur Band.

Supply Voltage:
13.8 VDC +10%/-5% (Negative Ground)
25A Maximum current consumption @ 100Ws output
2.5A In receive mode

Dimensions/Weight:

14.25 in (w) x 13.5 in (d) x 3.5 in (h) not including knobs and feet. Weight is approximately 7kg

antennas in action

welcome to AiA!

Hello and welcome to Antennas-in-Action for July. In this month's column, I've got a cheap change over switch for you to make. And two readers have sent in antenna designs using 300Ω flat twin feeder, but on the very different bands of 1.8 and 430MHz. I've a few books for you to consider for your libraries, and a question about improving an antenna for use on 'Top-band'.

G7TEX

Let me start this month with a request for advice to help improve his antenna setup. "My back garden is about 60ft (19.5m) in length, but I have managed to get a G5RV up by taking one leg on supports over the roof of my bungalow" says **Kenneth Hutley G0DPV**. Ken then goes on to say that, although it works well with his rig and a.t.u., he also likes to work on 'Top-band' (1.8MHz) with the antenna by strapping the two 'legs' together and tuning them against ground.

Ken says "I am sure that the G5RV could be used as a more effective radiator with more efficient coupling, etc. I shall be awaiting with interest comments from readers". (So will I Kenneth, my own comment is that a start point is to consider putting in the most effective 'earthing' system that you can for 1.8MHz. It's not going to be easy on this lower band as a full set of quarter-wave buried counterpoise elements would be several times the size of your present garden).

I have just re-read **John Heys G3BDQ's** article 'Going to Ground' in the November 1998 issue of *PW*, and I think this would offer a good starting point for anyone trying to use a G5RV antenna on 1.8MHz, by using it as a 'capacity hat' loaded short vertical antenna. When used in this mode the quality of the r.f. earth connection is of paramount importance as it is part of the antenna system. I wonder what advice you can offer Kenneth, for ways of improving his set up for 'Top-band'?

Some Doodling

Although life can be hectic these days, **Steve Farrow GM0PCD**, has recently had '.. a couple of hours free this morning so, I did some doodling that readers of *PW* may be interested in. The attached sketches are, I hope, self explanatory'. Of the several sketches, Steve put in with the letter, I liked the one which is shown in the illustration of **Fig. 1**. This is one of the simplest, not to mention cheapest, antenna changeover switches I've seen.

Using a cheap mains power switch as an antenna (or coaxial changeover switch is rather a neat idea, though it's only going to be really effective at h.f., as crosstalk could become a problem, depending on the exact makeup of the actual switch. I've done a few idle calculations an 'doodlings' of my own Steve, and I believe that the most commonly available switches should work with around 50-100W of r.f. on most bands up to at least 14MHz, but with reducing crosstalk at the higher frequencies. I think the crosstalk may possibly be as high as -10dB at 28MHz.

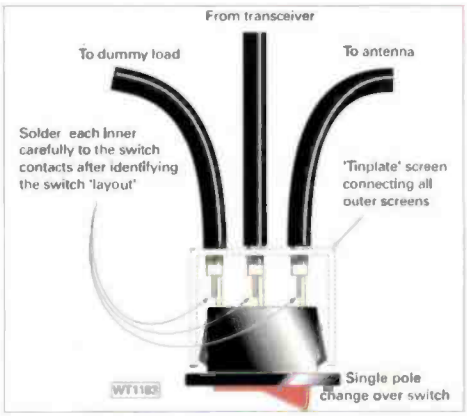


Fig. 1: A simply made changeover switch design, 'doodled' by Steve GM0PCD.

Another Option

Another letter that contains a possible antenna solution for Ken G0DPV, was from **John Stacey G4XGM**, who described a loop antenna that covers the the 1.8 and 3.5MHz bands. John's loop, shown in **Fig. 2**, is made up of 300Ω ribbon cable and, although it's fairly big it most certainly works well. The design, like all loop antennas has quite sharp tuning, but this has the added advantage of noise and out-of-band signal rejection on both receive and transmit. The very sharp tuning is why John has suggested that a smaller, 'fine tune' capacitor is used in parallel with the 500pF main one.

Although the loop antennas was designed to work best on 1.8 and 3.5MHz, John reports that if the larger 500pF capacitor is taken out of circuit, leaving only the smaller 50pF capacitor in circuit, then the loop should tune up and work on 7MHz too.

The only limitation is that the 300Ω line to the tuning capacitors is the tuning range limiter. As this length increases, the tuning range reduces. The actual shape of the loop matters less, and should tend towards the 'letter-box' format says John.

Word Of Warning

A word of warning to those of you who have not played with

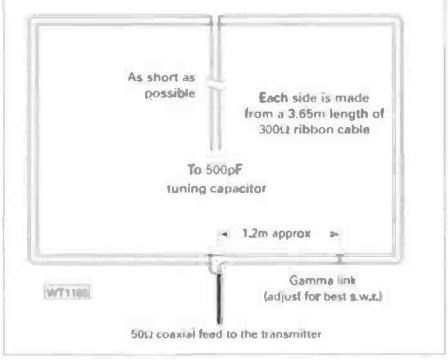


Fig. 2: A tuned loop antenna that is suitable for 1.8 and 3.5MHz operation from John G4XGM, might also cover 7MHz when built with care. See text for more details.

antennas in action

G4XGM's form of capacitively tuned loop before, is to exercise caution in the choice of capacitor for such an antenna. Even at very modest QRP power levels a high value of voltage is created across the plates of the capacitor as the '*Q*' of the antenna is high. A capacitor from an old valved radio should be adequate for power levels up to about 50W r.f. input if the antenna is used indoors. But for higher power levels, or for use outside, a capacitor with a much wider plate spacing is required.

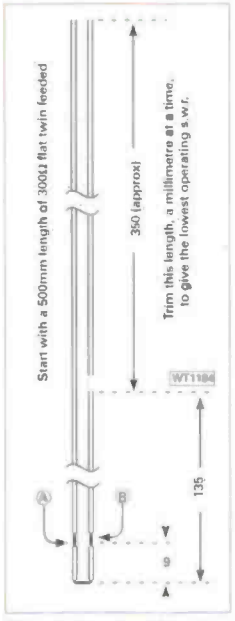


Fig. 3: Charles Ward MW1CLS cured a Novice's problems on reception with an antenna like this. See text for more details.

Now let me turn to an antenna design for the 430MHz band.

Charles Ward MW1CLS began his letter relating a problem that most users of the v.h.f./u.h.f. bands experience at some time or other. That problem is the breakthrough of wide area paging transmissions. But I'll let Charles explain! "A newly licenced Novice came to me with a complaint of excessive pager problems on his (budget) 70cm handie when coupled to his dual-band (144/430MHz) base antenna that's about 1.5m long.

"I explained that his dual-band antenna was obviously going to receive v.h.f. as well as u.h.f. and that his handie was unable to filter out the very strong transmissions being presented to it. I offered him a solution in the form of a 'home-brew' 430MHz 'J-Pole'. The matching section of this antenna is so small should appear as a short circuit at 145MHz".

The antenna is shown in the diagram of **Fig. 3** and should be easily constructed as well as being cheap to make. The dimensions of the section below the notch must be adhered to, but the overall length should be carefully adjusted whilst checking the s.w.r. A small length of no more than a few millimetres should be trimmed off the top until the lowest v.s.w.r. readings are obtained.

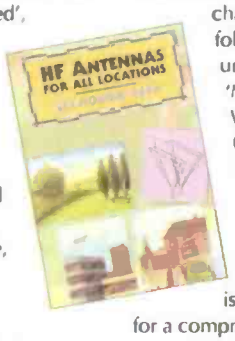
As Charles says, all that is needed, other than the coaxial cable feeder, is a 500mm length of 300Ω flat twin ribbon feeder a sharp knife, wire snips and the capability to solder quickly and neatly. An optional extra for external mounting is a length (about 700-800mm) of plastic conduit pipe and end caps. This makes make the antenna look quite professional when mounted at the top of a short mast.

Thanks for that tip Charles. I like simple antennas that are cheap to make and after you've made one, especially when helping others, it gives a sense of purpose to the hobby. Now, to finish off, let me mention a few books that I found while 'sneaking around' in the Book Service department.

Covers Most Bands

A book that covers most bands and areas of the radio hobby, is by **Paul Danzer N1II**, whose book ***Your Ham Antenna Companion*** from the ARRL is packed full, throughout its 220+ pages, and seven chapters, with photographs and illustrations of antennas from h.f. to u.h.f. The chapters have such titles as: 'Your Rig's Windows On The World', 'At VHF & UHF It's Mostly Line Of Sight', 'HF Antennas - From Around The Corner To Around The World', 'No Pets Or Antennas Allowed', 'Feedlines And Connections', Holding Your Antenna In The Air' and 'Stay Safe And On The Air'. To round the book of there's a glossary - called 'An Antenna-Speak Guide' a resources guide, and a comprehensive index.

This is an excellent book for antenna 'tinkerers' of all capabilities, small enough (A5) to sit near the rig in the smallest shack, but bursting with ideas for almost any situation. I'm sure that you'd find new ideas in it however many you have tried before. Very good value for money at **£7.50**, and even better value, as Michael in the Book department has said you can all have **post free when you order any of the books this month.**



A book from the RSGB's 'stable' is ***HF Antennas For All Locations*** (second edition) by **Les Moxon G6XN**. In many ways this book is complementary to Paul Danzer's *Antenna Companion* by being physically bigger and with some hundred pages more, topics can be dealt with in more detail. In many respects this book is both a practical guide 'tagged' onto the end of a well written theoretical tome (textbook).

Not Put Off

But please don't let yourselves be put of by the use of the word textbook, as the nine chapters dealing with the more theoretical side are well written and illustrated, giving a better and deeper understanding of the principles involved with getting a signal in, and out of, your antenna. In the second section of the book, labelled 'Theory Into Practice' different types of antennas are dealt with individually.

In the second section are chapters on single element, horizontal beam, vertical beam, large array, invisible, small, portable and mobile antennas. After these chapters, there then follows three chapters under the titles of: 'Making The Antenna Work', 'Antenna Construction And Erection' and 'What Kind Of Antenna?'. The price of *HF Antennas For All Locations* at **£14.65** is a small price to pay for a comprehensive book on the many ideas for antenna to improve your h.f. operation (P&P again is free this month)

A particularly 'organically-grown' offering now from the **G-QRP Club**, whose ***Antenna Handbook*** is a distillation of many of the ideas that have been presented in *Sprat*, the club's quarterly magazine. With over 150 A4 sized pages you are going to find something that 'will work for you' in there. Bearing in mind that in a QRP station the antenna is the single most important part of the station, then an efficient antenna is a must.

The G-QRP Club *Antenna Handbook* is full of antenna ideas, but it also contains projects for antenna matching units and s.w.r. meters as well. The G-QRP *Antenna Handbook* is produced in the same general format as *Sprat*. For those who are not members of the G-QRP club, this means that the ideas in it are very concentrated on the page, but extremely easily read nonetheless. Excellently priced at **£7.25** and of course even better with free P&P this month.

Final Book

My final book for this month would appear at first sight, from the title at least, to be an electronic projects book. Published by CQ Publications Inc., ***33 Simple Weekend Projects*** *(for the Ham, the Student and the Experimenter)* written by **Dave Ingram K4TWJ**, covers many parts of our hobby. A quick estimation is of almost half of the projects being 'antennery' in nature. There are antennas for h.f. as well as v.h.f./u.h.f., with a smaller foray into mobile antennas. I'm not sure about 'winking' (miniature neon bulb) lights on antennas though.

Leaving aside the winking light antennas, but staying with mobile operation, there is a good explanation of how to improve your mobile station by using two antennas and feeders at the same time. The book makes for interesting reading and well worth the asking price of **£6.95.**

Well, that's all I have room for in this issue, I'll see you in the next issue of Antennas-in-Action.

G7TEX

Antenna Workshop

Elevation Drive Systems

David Butler G4ASR deals with one of the problems experienced when moving upwards in frequency and pointing the antenna correctly. This time David discusses elevation drive systems.

When I was last in the Antenna Workshop, (January 1999) I described some practical 10GHz feed designs for use with parabolic dishes. I also mentioned that to exploit certain propagation modes, which occur on this and other microwave bands, some form of elevation control for the dish would be beneficial. Other areas of our hobby such as amateur satellite or e.m.e. (earth-moon-earth) communications also require the antenna system to be elevated at varying angles above the local horizon.

One of the easiest ways of providing elevation is to buy yourself a commercial two-axis drive such as the system shown in the photograph, **Fig. 1**. This arrangement is suitable for most applications but may be no match for the very large 4-Yagi systems used for 144MHz e.m.e. (where boom lengths may be in excess of 10m). Some commercial elevation rotors can be very expensive indeed, so instead of buying an off-the-shelf solution why not consider making your own elevation drive system using a satellite television actuator drive. They are inexpensive, very strong and will perform just as well.

Fig. 1: A bi-axial (azimuth and elevation) rotary systems is ideal, if perhaps a little expensive, for most systems involving antennas for u.h.f. and above where antenna sizes are very much smaller.

Whether you want to use your elevator drive for a parabolic dish (to make use of rain scatter DX on the 10GHz band perhaps), or amateur satellite communications (maybe Phase-3D when it gets launched). But whatever function you need the elevator for, the basic principles are exactly the same whatever the size of antennas.

The photograph of **Fig. 2** shows an 'H' frame (so called because of it's shape!) which I constructed for an e.m.e. array. It comprises of an horizontal boom with a central bearing system, another horizontal boom, which in my particular case is used for strengthening the 'H' frame and two vertical poles onto which four Yagi antennas are fixed.

Satellite Or Microwave

Please note that for satellite or microwave usage, where you might have one or two small antennas, the frame can be very small indeed with only a single horizontal boom slightly wider than the central bearing. This central assembly should be constructed in such a manner that it avoids any sideways sway of the array and there are a number of ways in which this can be achieved.

Fig. 2: An 'H' frame makes stacking and baying of antennas very much easier. A six-element antenna sits in the background.

The diagram of two such systems, **Fig. 3a** and **Fig. 3b**, show simple bearings both consisting of the horizontal boom, which is a sliding fit inside a fixed section of thick-walled steel pipe. Pack the space between the two pipes with grease, then place large washers at each end. Fix these grease-retaining washers in place with hose clamps and the whole assembly will last a lifetime.

In Fig. 3a an elevation rotator turns the horizontal boom through chain and toothed wheel systems. Mechanically this can be a difficult thing to set up, getting hold of good quality toothed wheels to fit the horizontal boom may not be easy. An easier way, is to make the version as shown in Fig. 3b. Here the elevation drive actuator arm (see later) is mounted between a 'U'-shaped frame 'behind' the vertical stub mast. As the actuator arm extends it slowly pushes the top of the frame away from the vertical mast and thus rotates the elevator boom.

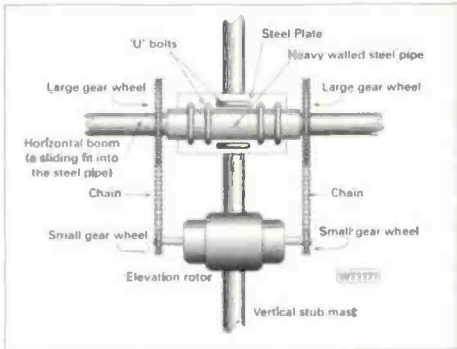


Fig. 3a: Utilising a simple sliding-fit bearing (as explained in text) and chain wheel reduction gearing a small elevation rotator can elevate quite a large antenna array such as the 'H' frame of Fig. 2.

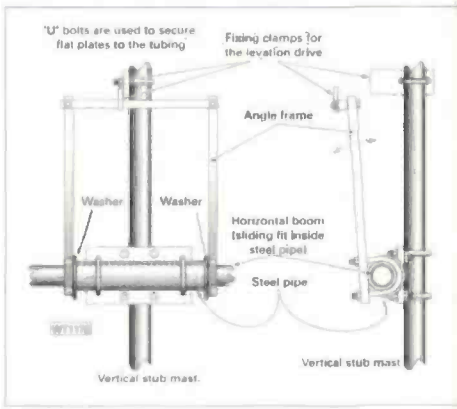


Fig. 3b: This system again uses a simple sliding-fit pivot, but this time driven by an extension arm drive, which may be cheaper and easier to set up than the system of Fig. 3a.

For a very large array you could use the more robust system, such as the one I constructed, which is shown in **Fig. 4**. This system comprises of a steel plate onto which two rotary bearings are bolted. As an alternative to a

rotary bearing, you could make an elevation hinge plate from large solid brass ball bearing door hinges. Two (or four) pieces will be sufficient for most lightweight purposes. One side of both hinges being clamped to the horizontal boom and the other side being bolted onto a plate which is then fixed onto the stub mast by the use of U-bolts or exhaust clamps.

Actuator Arms

Satellite television actuator arms (or screwjacks) are available in a variety of lengths. The dimension represents the approximate length of stroke between fully in and fully out. However you don't need to use the full length as most units come with fully adjustable limit switches for each end of the travel. For most purposes an arm with a 450mm (18in) stroke will be suitable.

For elevating a small 10GHz microwave dish I used a 200mm (8in) actuator and for the e.m.e. array I used one with a 600mm (24in) stroke as shown in the photograph, **Fig. 5**. You should be able to see that this elevation bearing mechanism is a variation of the type shown in Fig. 3b. The actuator arm used for the elevation drive is very easy to mount as all fixings are fully adjustable. The attachment point fixed to the body of the actuator can be slid up and down to obtain the correct travel and then clamped into position.

All attachment points are swivelling ball-joints which will take up any minor misalignment. You can also slide the pivot plate up and down the stub mast to get the exact geometry you require. For the 10GHz reflector I required a maximum elevation of around 40° and for the Yagi array I needed to elevate the system up to 65°. For OSCAR satellite use you will have to go even higher on some of the overhead passes but it very much depends on the beamwidth of the antenna you are using.

Screwjack Reversible

Screwjacks require 36V d.c. to drive them and are reversible by swapping the polarity of the two-wires. Some operators have mentioned that the actuators still work at 12V d.c., only much slower. As I mentioned earlier, all arms have limit switches so you won't need to worry about driving the shaft out of the end of the unit!

With the elevation drive working, you now need to determine the angle of elevation. And for this you'll need to provide some form of electronic read-out. Some older types of actuator arms have a built-in potentiometer which, at a pinch, could be used as a basis for building your own elevation angle indicator. The only problem being that the output is not directly proportional to the elevation angle.

You may find similar non-linearity problems with modern actuator arms which utilise a reed relay pulse circuit. A simple alternative is to use an external potentiometer, bolted onto the H-frame, with a 'plumb-bob' weight attached to the pot shaft and then make a simple bridge circuit with an indicating meter.

I simply went out and bought an inexpensive surplus satellite television positioner unit. These not only provide a digital readout, which can be calibrated to show the elevation angle, but also contains a switchable 36V d.c. power supply for driving the actuator up and down. These units are very versatile, many including memory functions (allowing a number of pre-set elevation angles) as well as allowing full variable control.

With some positioner units, all these functions are available using a hand-held, infra-red remote control unit. The only point to be aware of is that the positioner must match the type of actuator feedback mechanism used, i.e. either potentiometer or reed-relay.

Calibration

Calibration is really straight forward. I literally placed an inclinometer on the Yagi boom and drove the array to 0° (horizontal) taking note of the digital read-out figure. I then elevated the array in 5° increments noting the read-out on the digital display.

If you don't have access to an inclinometer you can use a plumb line and protractor. After taking the readings a simple conversion chart was then produced showing digital display against elevation angle. Subsequent measurements using sun noise and moon echoes confirmed that this method was accurate enough for my purposes.

Fig. 4: A robust pivot bearing may be needed in some circumstances. See text for a slightly cheaper alternative that may be adequate for your needs.

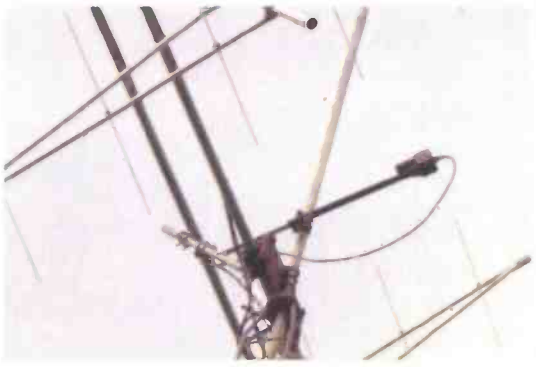


Fig. 5: A satellite 'screw-jack' positioner elevation system up aloft, using a combination of the techniques describe in this article.

Specialist Retailers

Actuator arms and positioner units are readily available from specialist satellite television retailers but one of the best sources I've found is **Satellite Surplus (Telford)** who sell brand new actuators arms from £35 to £50 depending on the size. They can also provide positioners, satellite receivers, dishes and a whole host of other useful sub-systems. **Telephone: (01952) 598173**

If you have access to the Internet and want to find out more about elevation drive systems take a look at the **GM4JJJ** page at **http://www.braeside.demon.co.uk/eme.html** or at the **G4ZHI** page at **http://home.clara.net/bhp/elevation.html**

So, that's it until next time.

73 David G4ASR

QRP From A Bicycle

Ed Chicken G3BIK stages a comeback to the pages of Practical Wireless. This time round he recounts an amusing Amateur Radio incident from his past involving a "non-functional" receiver and a bicycle lamp!

Operating QRP from a bicycle, you ask? Well, not quite from or on the bike, but it was with many thanks to a bicycle lamp that my very first Amateur Radio contact was made - and yes, it was definitely low-power to the point of QRP/P before that extra /P had even been invented! What's more, there wasn't a transmitter in sight within the garden shed, let alone electric or gas power!

That was some half-century ago, having just acquired my very first 'real' receiver, albeit non-functional, as distinct from home-made crystal sets. The receiver was a Marconi Marine, ex-trawler, battery-operated, two valved t.r.f. reciever with reaction, chassis and front panel only - and minus valves. However, the newly arrived Amateur Radio licence did allow shared use of the 1.8MHz trawler band, so this receiver had possibilities!

My only antenna was a short length of cotton-covered wire hanging from a bedroom window above and a piece of similar wire which was twisted around an old fire-poker and hammered into the soil as an earth. These, together with a pair of headphones from my Colwyn Bay Marine-Radio College days, had stood me in good stead with the earlier broadcast-band crystal sets. But the purchase of a PM2HL detector triode valve and a PM2 audio valve, plus a 120V h.t. battery, had left me desperately short of funds, hence unable to afford a 2V accumulator for a while. A frustrating cross for youthful exuberance to bear!

"The lamp did seem a bit on the dim side ... I threw caution to the wind ..."

Nearest Approximation

The nearest approximation to an available filament battery was the 3V twin-cell inside the front lamp of my bicycle which, at the time, was being used as the only light source in the shed. But, not being able to afford an ex-government Avominor, I couldn't be sure of its actual voltage.

The lamp did seem a bit on the dim side, so I threw caution to the wind and connected the battery to the 2V filament terminals of the receiver, with only one valve in its socket of course! Sure enough, the filament glowed and seemed to be not overly bright in the darkness.

Using the rear-lamp from the bike as the shed-light, with two valves inserted, I connected antenna and earth and the headphones were plugged in and clamped to my ears. The h.t. and bias wander-plugs were put in place and the pseudo 3V front-lamp dry-battery was reconnected to the receiver. I was pleasantly surprised to hear a plop and a hiss in the headphones as the reaction knob was twiddled but, alas, I didn't hear any trawlers whilst tuning the uncalibrated dial through its 180°.

But then, with the tuning condenser plates near full mesh, to my unbounded astonishment and joy, there came the unmistakable "thumpity-thump" rhythm of the Morse code in the headphone diaphragms, definitely Morse but not yet with a musical tone to it! This was soon remedied by careful adjustment of the reaction knob and there it was, my very first reception of an Amateur Radio transmission on 1.8MHz, calling "CQ, CQ, CQ, de G6UP".

But how frustrating could life get? Here I was without even a Morse key, let alone a transmitter with which to answer his call! It was then that I remembered the warnings we'd been given during my previous wartime days as Radio Officer in the Merchant Navy.

We were told that the 'reaction' from the ship's receiver on 500kHz could be heard over long distances to be used as a radio direction-finding beacon by the U-boats who were hunting us. Now was the chance to prove that theory so I removed the h.t. positive wander-plug and used it as a makeshift Morse key by tapping it on and off the 120V battery terminal: "G6UP, G6UP, G6UP, de G3BIK, G3BIK, G3BIK, AR K".

There it came ... my very own callsign being sent over the airwaves by some distant operator ... "G3BIK de G6UP UR RST 579"! Talk about knock me over with a feather! It turned out that he was some eight kilometres or so across town, running the full legal power of 10W to a decent end-fed antenna and there he was, receiving the signal from my flea-power receiver's reaction signal!

That very first Amateur Radio QSO of mine lasted but a short while until the bicycle lamp's filament battery went flat, but it left within me a lasting impression that remains to this very day. One rarely hears a 'side-swiper' mechanical 'Bug' key being expertly handled as by G6UP, these days, but when I do, it really seems like music to the ear.

Repeated Experiment

The experiment was to be repeated a few years later, albeit in a slightly questionable manner, while sailing across the North Atlantic on a ship whose radio room had just been upgraded. It sported a modern superhet communications receiver, but they had left the original battery t.r.f. set as the emergency receiver.

The receiver still had an additional metal box bolted to it, which contained a battery, VP2 screen-grid valve and a full set of plug-in coils plus tuning condenser. This had been a wartime provision to act as a buffer between the t.r.f. receiver and main antenna to minimise the risk of 'reaction' signals being heard by the U-boats. But it had now been bypassed and was redundant.

In between watches, I'd taken to listening on the amateur bands using the radio room's new superhet main receiver, so my mind understandably turned to amateur transmission - looking at that unused buffer amplifier got me to thinking that its tuneable 8-16MHz coil embraced the amateur 14MHz band. In which case, couldn't that VP2 r.f. amplifier valve be made to oscillate by the simple addition of feedback winding the coil?

So it came to pass that with some very slight modification, the buffer-cum-v.f.o. could now be monitored on 14MHz via the main superhet receiver - and wasn't it coincidental that a ZC callsign from the British Army in Palestine was heard calling CQ?

This time, though, a spare Morse key was to hand and so his call was answered and with the suffix /MM for good measure. A QSO was established with healthy reports two ways but, unfortunately, the ship's rolling reflected on to the between-masts main antenna, hence onto the frequency of the simple oscillator/QRP/P transceiver, so the ZC operator had more to contend with than the rolling sand dunes.

No QRP tale could end without mention of a certain Radio Amateur from Oswestry, whose 1W, ex-government, whip antenna, 'walkie-talkie' activities on 56MHz were well known! His incredible DX contacts with distant places such as South Africa made enviable reading in the short wave magazines of those days!

To my shame, I cannot recall his actual callsign! I am, however, tempted to extend this discussion on to the exploits of 432MHz/mobile/QRP/P from the baby's pram, but enough's enough! PW

Transistors In Infancy

When transistors were in their infancy and a small-signal r.f. p.n.p. came individually boxed and cost a week's wages, some manufacturer's surplus transistors came onto the market but at only a few (old) pence each. There was a snag, of course - they had no identification code or specification, being known only as white-spot or blue-spot, according to the blob of paint on the can.

Experiment proved that the white spot version could be made to oscillate up to a few megahertz, so a simple 'Top Band' v.f.o. was constructed. It was powered by a 6V dry battery and took little more than 1mA, making a total d.c. power input of circa 6mW. By this time, the antenna had been improved to 12m of end-fed wire, the station receiver was now an ex-government CR100.

Feeding this simple keyed v.f.o. into the 12m wire on 1.8MHz brought a 569 QSO with a station some 20km distant in daylight. The operator at the other end couldn't believe his ears when the QRP/P transceiver was described, so he jumped into his car and 'hot-footed' it over to see for himself. Having done so, he noted down the full technological details and stopped off at the white-spot transistor supply shop on his way home. A two-way QRP/P contact was made the next day and he was soon to become the transistorised/mobile pundit of that area!

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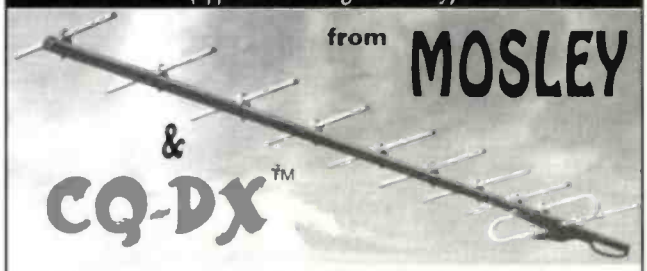

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VALVE & VINTAGE

It's Charles Miller's stint in the *Practical Wireless* vintage 'wireless shop' this month. This time around he casts his mind back to the Second World War when the British radio industry created their very own 'Unwanted War Baby' - a standard receiver for civilian use.

Around the time when the Allies were planning to send ground forces into Germany to conquer the Nazi menace, nearly five years of incessant aerial bombing having failed to do the trick, the British radio industry was making plans for the imminent birth of a new baby - a standard receiver for civilian use. The gestation period had been long, about the same as that for an elephant, and, as things turned out it was a white one at that!

Among the many shortages of wartime life in Britain was that of new radio receivers. While production had not ceased, at least in theory, in practice the resources of the radio industry had been channelled principally into making military equipment and domestic receiver production had to take very much of a back seat.

Fig. 1: An unwanted 'War Baby'? Charles Miller takes a look into the history and difficult 'gestation' of the Second World War 'Utility' receiver. The version shown was made by A. C. Cossor Ltd.

Domestic Production

In April of 1942, 125 000 domestic sets were in course of production. But the restrictions on the use of valves and components meant that by the end of the year, only about half of those had actually been completed and delivered to customers.

At that time, it was reckoned that about 10% of the existing receivers in Britain were unserviceable with half lacking one or more vital parts. These were unlikely to become available in the foreseeable future, and the rest were simply waiting their turns in the dealers' workshops. (This wasn't surprising, with nearly a quarter of a million sets being taken in for repair each month).

Large numbers of service engineers had gone into the forces, leaving just over 3000 skilled personnel to deal with the repairs, aided by just over 2000 unskilled assistants. This sort of workload wouldn't have been too excessive if the spares situation had been normal, but as it was, lots of time had to be expended on devising modifications to get around shortages.

The Government had been monitoring the situation closely and because it was well aware of how valuable broadcasting was in keeping the civilian population informed and amused, it was keen to alleviate the famine. At the same time it didn't want to divert precious materials and production time away from the needs of the military.

The 'famine' meant that, by January 1943, the total of uncompleted sets was back up to 125 000, with the prospect of only half of them being completed in the next 12 months.

Reports & Rumours

In the early months of 1943, reports (which were really nothing more than rumours) began to appear in the newspapers. The rumours said that a 'utility' receiver costing only £7 was about to be put into production.

For the record, the term 'utility' had been coined back in 1941 for any goods - from underpants to furniture - that were made to standard Government specifications.

In March, 1943 the Radio Manufacturers Association discounted the stories saying, in effect, that there was a 'fat chance' of its members producing such a receiver while they had all those existing sets hanging about waiting for parts.

The then President of the Board of Trade (BoT), Hugh Dalton, took the gentle hint and announced that component manufacturers had been informed that parts for the uncompleted sets and for repair work must be given equal priority with the normal requirements of the Armed Forces.

Connoisseurs of official double talk will appreciate the crafty rider - this didn't, of course, place such components as high in the priority schedule as those for special productions for the Government and Forces. By such subtle differences are Government ministers 'got off' 'the proverbial hooks'!

As regards the RMA's denial of the utility set rumours, such statements apparently had about the same validity as they have nowadays!

Provisional Circuit

A month later, the Association announced that, in consultation with the BBC, it had already produced provisional circuit diagrams for mains and battery utility receivers. It then put the ball firmly in the Government's court by saying that it alone could decide if the project should go ahead.

In July, Hugh Dalton said that the utility sets would be authorised once the existing backlog of part-completed sets had been cleared. That there was little chance of this happening quickly was demonstrated by the fact that Mr. Dalton also announced that arrangements had been made to buy receivers in from America. In fact, these sets didn't start to arrive until towards the end of the year.

Meanwhile, one of the popular radio magazines had been asking a panel of experts to cook up what it considered to be the most suitable circuit for a mains utility set. (The circuits announced by the RMA apparently being kept secret).

After dismissing a British version of the **German Kleinempfanger** as useless, the panel plumped for a three-valve 'short' superhet using a frequency-changer, i.f. amplifier and double-diode pentode as detector, a.v.c. rectifier and output. To save copper, an

a.c./d.c. power supply was suggested and how close this idea came to the RMA's design we'll see in a moment.

In November of 1943 Hugh Dalton was asked in the House of Commons whether the utility sets were being made. He was also asked if and when they would be on sale to the public.

Mr. Dalton replied that designs had been agreed and the delivery of the necessary materials was in the planning stage, but no sets would be available until the following year. He also revealed that only 14 000 domestic receivers had been delivered to dealers between June 1st and September 30th of 1943, to which were added about 8000 imported American sets.

Supreme Optimist

Around this same time, C. O. Stanley, the boss of Pye, was clearly making a bid for the title of supreme optimist of the year by forecasting that 250 000 utility sets would be available by March, 1944. In fact, not a single one was ready by that time.

However, a total of 10 000 American sets had now arrived and were in the process of being checked over ready for distribution to dealers, hopefully in the same month. Additionally, and all being well, another 20 000 would arrive in the next three months.

It's interesting to look a little closer at what was being imported. There were 15 American manufacturers who, between them, were going to provide no fewer than 140 different models, the common factor being that they all had to work on either a.c. or d.c. mains (although some a.c./d.c./battery types were included) and that they had to be supplied ready for use on UK voltages.

About 75% of the imported sets were to be distributed via British manufacturers and their dealer networks and the rest through established importers and wholesalers and independent retailers. Dealers in d.c. mains districts were to be given priority.

The buying of the American sets was to be financed by the Treasury (which means, of course, the poor old British tax-payer) and it was laid down that this money had to be recovered in full, since it would ultimately come from the buying public anyone who bought a set would end up effectively paying out twice for it.

Different Classes

Four different classes of receivers were brought over. The first was made up of the smallest midgets with up to five valves, covering medium waves only and housed in moulded cabinets.

The maximum price charged to the wholesaler or radio manufacturer £5.17s.0d, the price to the retailer was £6.16s.0d and the customer paid £11.14s.2d. In other words just over twice the dockside price.

The sets in the second class were similar to those in the first but they had wooden cabinets and some might have short wave coverage as well. The three respective prices were £6.15s.0d., £7.17s.0d., and £13.10s.0d.

The third class consisted of mostly a.c./d.c./battery types with up to six valves, two wavebands and in moulded cabinets. Prices were £7.13s.0d., £8.18s.0d. and £15.15s.10d.

The fourth class had similar specifications to the third but most had wooden cabinets and some had simple push-button tuning. The prices were £8.11s.0d., £9.19s.0d and £17.1s.8d.

Taking into account the fact that the dockside prices included the original manufacturers' profit and transport costs, the factory prices must have been minuscule.

Incidentally, the sets were to be sold without any guarantee whatsoever.

Fig. 2: Close up view of the very simple tuning dial used on the 'Utility' receiver.

Mixed Reception

The American sets met with a mixed reception in this country. There's nothing to suggest that the public disliked them, but the comments from dealers, especially those with the 'posher' agencies, were disparaging in no uncertain terms.

Looking back, it's likely that - to a large extent - sheer blind prejudice prompted the dealer disapproval. And it would be nice to be able to observe their reactions could they see what high prices those despised American 'midgets' fetch nowadays.

In June of 1944, by which time C. O. Stanley was doubtless wishing that he'd kept his big mouth shut, the utility sets actually seemed to be on the way. The Government announced that (rather surprisingly) the manufacture and supply of valve operated broadcast receivers was to be brought under control for the first time by the issuing of the Musical Instruments and Wireless Receivers Order, 1944.

Radio firms would have to obtain licences permitting them to continue manufacturing and supplying sets after 1st July and would also be required to place a transfer bearing the words "Wartime Civilian Receiver" on sets made in accordance with the specifications agreed by the RMA and the BoT. These words must not be removed or defaced by anyone or applied to any other type of receiver.

Fig. 3: Inside view of the 'Utility' receiver.

Specifications The Same?

Next time I'm looking after the 'shop' I'm planning to take a detailed look at those specifications. However, whether or not they remained the same in 1944 as those announced a year before is unclear!

There's a traditional scepticism as to the designing powers of committees which is justified to a certain extent by the utility set, especially in its mains version. Technically, a great deal of thought had gone into them but some basic common sense appears to have been lacking.

A remarkable amount of time must have been spent on drawing the specifications up, because they were both detailed and stringent. They covered sensitivity, selectivity, overall response, a.v.c. operation and i.f. rejection.

The specifications making the utility sets unique as being the only British domestic radios whose performance can be checked against standard criteria. All this - and more - will be explained in Part 2, when I'm on duty next time. Until then - cheerio for now.

PW

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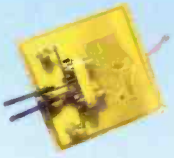

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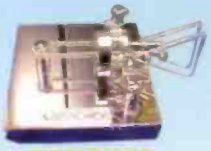

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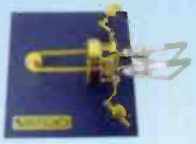

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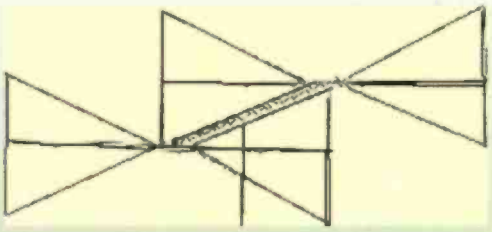

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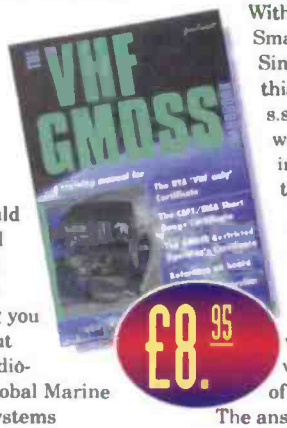
Getting into the holiday spirit this month, the Practical Wireless Editorial team have arranged a shipment of books covering GMDSS, Marine s.s.b. operation, electronic navigation and GPS. So, if your heading for the seaside this summer and planning a boating trip, these following titles could be just what you need.

TELEPHONE, FAX, E-MAIL OR USE THE ORDER FORM ON PAGE 74

Book PROFILES

The VHF GMDSS Handbook
J Michael Gale

First up this month is ***The VHF GMDSS Handbook***, written by **J Michael Gale** - the author runs the Radio school on Hayling Island off the south coast of England and has trained thousands of yachtsman and merchant seamen for their radio operators certificates. In fact, this book claims to be a training manual for: the RYA 'VHF Only' Certificate; the CEPT/MSA Short Range Certificate and the GMDSS Restricted Operator's Certificate.



This book would also make a useful onboard reference book and it covers virtually anything you need to know about the use of v.h.f. radio-telephones and Global Marine Distress Safety Systems (GMDSS). The book has chapters on how to make a distress call from your v.h.f. radio-telephone, to call another boat, the coastguard, a marina or your family (via the telephone system).

Here is an example of some of the chapters: 'Certificates and Licenses'; 'The Phonetic Alphabet'; 'Who Can You Talk To'; 'To Call Coastguards'; 'Ship-to-Ship Communication'; 'Ship-to-Shore Telephone Calls' and 'Distress Signal (MAYDAY)'. The last few chapters deal mainly with GMDSS and these include: 'The GMDSS - Introduction'; 'The DSC Controller'; 'and 'NAVTEX, EPIRBs and SARTs'.

So, if you're a new recruit and are planning to study for any of these certificates, or would just like to know more about radio operations on the sea, then this could be the book for you. Clearly and concisely written - **Highly Recommended**.

Marine SSB Operation - GMDSS Edition
J Michael Gale

With the sub-title of 'A Small Boat Guide To Single Sideband Radio', this book "explains how s.s.b. [single sideband] works, how to choose and install your set and how to get the best out of it".

Every boat should have a radio-telephone, this book states, but what happens when you sail out of its 48km range?

The answer to the problem, says the book's author, is to fit a Marine Single Sideband (s.s.b.) radio-telephone which has a far longer range - even world-wide under the right conditions.

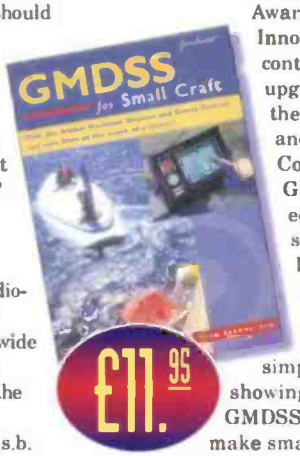
Claiming to cover **all** the topics needed to gain the internationally-required s.s.b. operator's qualification, ***Marine SSB Operation*** is the new GMDSS Edition which contains all the latest changes and amount to 120 updates from the 1992 first edition. Some of its chapters include: 'Why SSB?'; 'What Is SSB?'; 'The Radio Spectrum'; 'Short Wave Propagation'; 'Licensing and Installation'; 'The VHF Band and its relationship With SSB'; 'Routine Procedure'; 'GMDSS'; 'Satellites' and much more.

If you're looking to go that little bit further afield and would like to know more about marine s.s.b. operation, or are aiming to study for the s.s.b. operator's certificate then this book is a definite must. **Highly Recommended**.

GMDSS For Small Craft
Alan Clemmetsen

GMDSS For Small Craft follows a similar format to the first two books on this page, carrying the sub-title: 'How the Global Maritime Distress and Safety System can save lives at the touch of a button', this book focuses on how changes in modern technology will affect maritime communications - and not only on large boats, your everyday small boat will also be affected.

The book states that the author, **Alan Clemmetsen** is Managing Director of ICS Electronics Ltd, which has won four DTI SMART Awards for Innovation and contracts to upgrade both the Royal Navy and HM Coastguards to GMDSS equipment so, who better to discuss "... the concepts in simple terms, showing that GMDSS really will make small craft activities immensely safer".



On to its chapters now, which include: 'An Overview Of GMDSS'; 'GMDSS Communication Links' (including a part on 'What to do if a DSC distress alert is sent accidentally') and subsequent chapters on NAVTEX, EPIRB and SART. If you would like to know more about GMDSS in relation to how it will affect small craft then this book would be worth a read. **Recommended**.

r form in this issue or telephone Michael or Shelagh on (01202) 659930.

You may have read, in last month's PW, about a group of Radio Amateur's Radio & SSTV holiday in Cornwall. Well, this month, we've decided to approach the idea of Radio Amateur holidays from a different angle - this time from 'Ship-to-Shore'! No radio and boating enthusiast should be without at least one of the following titles and to help you make up your mind which one, please feel free to sail through the following Book Profiles.

Simple Electronic Navigation

Mik Chinery

£6.95

This book is being offered to *PW* readers at a **special price of £6.95** (normally £8.95). The book claims that: "Every boat owner can now afford a simple electronic navigation system: indeed electronic navigators are fast becoming an essential you can't afford to be without".

This book claims to "... explain in simple terms how to get the best from your equipment: how to install and program the system, how to use it to the best advantage on a trip and how to use the additional features incorporated within your set". Systems covered in this book are the **Decca, Loran C, Transit** and **GPS**.

Once again, the author of this book, **Mik Chinery**, is an RYA Yachtmaster instructor and has been using electronic navigation systems for the last two decades and the book states that he, "... has logged over 50 000 sea miles for pleasure and business in small boats all over the world ..." so is well qualified to inform on the uses of electrical navigation systems. This book comes **Recommended**.

Electronics Afloat

Tim Bartlett

£8.95

This book is also being offered to *PW* readers at a **special price of £8.95** (usually £11.95) and its complete title is *A Small Boat Guide To Electronics Afloat*. The book claims to cover issues relevant to the use of electronics on board boats: "... how accurate are these [electronic] systems? How do they work, and what do you need to know to get the best out of them?"

Many more questions on electrical devices are asked and answered in this book and, as an ex-officer in the Royal Navy, a practising yachtsman and a navigation instructor, **Tim Bartlett** (the author of this book) "... has had ample opportunity to get to grips with all manner of electronic devices aboard all types of vessels".

This book claims to cover the following: Electronic navigators: GPS, Transit, Loran, Decca; Chart Plotters; Depth Sounders; Flux-gate compasses; Logs and wind indicators; Autopilots; Interfacing; Performance computers and Power supplies and installation. This book also comes **Recommended**.

Simple GPS Navigation

Mik Chinery

£8.95

Another book at a **special price** to *PW* readers, ***Simple GPS Navigation*** is only **£8.95** (usual price £10.95). This book claims that it "... explains the [GPS] system and its features in language everyone can understand". Written by **Mik Chinery** (the same author who wrote one of the other books in these profiles, *Simple Electronic Navigation*) this book is easy to read and easy to follow. Some of the chapters include: 'Choosing A Set'; 'Installation'; 'Simple Outputs'; 'Waypoint Navigation'; 'Navigation On Land'; 'GPS In The Air'; 'GPS Errors' and much more.

If you would like to understand GPS navigation better and that technical manual just isn't making any sense, then why not give this book a try? **Recommended**.

Radar For Small Craft

Tim Bartlett

£11.95

Another book from **Tim Bartlett**, this time about Radar - how to understand it, how to interpret it, how to navigate by radar, how to avoid a collision, blind pilotage and installation and maintenance.

Radar For Small Craft claims that "All the major techniques are explained in simple terms and shown in use - on the screen and on the chart - providing an ideal introduction to one of the best investments you may ever make in your boat".

Some of the chapters include: 'Why Radar?'; 'First Principles'; 'Interpreting The Picture'; 'North-up Radar' and many more. There's a fascinating introduction in the chapter 'Why Radar', where Tim Bartlett recounts a story of how his radar abilities helped him to navigate his boat through various obstacles on a journey from Southern Ireland to Cornwall.

All in all, this is another good book and if you feel that you would benefit from knowing more about radar and how to use it successfully, then this is worth considering. **Highly recommended**.

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6m (50MHz) 100W microwave modules amplifier, 10W in, 100W out. £100. Tel: Andy on Essex 0181-500 6298.

171 copies *Practical Wireless* January 1984-March 1999 **FREE** to collector or deliver 50 miles of GW4KGD QTHR, for modest donation to RNLI. Hurry before waste paper skip gets them! Tel: Roy GW4KGD (01758) 712108.

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A quantity of magazines from 1948-1958 including *Wireless World, PW,* and *Practical TV.* Telephone for list of months available. Tel: Dave G1NSV (01579) 345740.

A quantity of magazines from 1948-1958 including *Wireless World, PW, Practical TV.* Telephone for a list of months available. Tel: Dave G1NSV (01579) 345740.

AD-YU Electronics wide-band phase vector volt meter, type 248A, v.g.c. Also, Marconi signal generator, type 16728/RC oscillator TF1101, in v.g.c., offers for both or exchange Amateur Radio equipment. Tel: Peter (01771) 623654.

AEA PK12 TNC, boxed with manual and software, £75. Pye MX294 16 channel, 70MHz f.m., approximately 10W. Nova MR225, 144MHz f.m., approximately 10-15W. Storno 6000 70cm (430MHz), approximately 10-15W, sensible offers please. Tel: Colin (01475) 786831.

Alinco DJ-G5 2/70cm (144/430MHz) hand-held, manual, case, boxed, £170 o.n.o. Want: 23cm (1296MHz) radio or any 23cm beams verticals info. Also want an RC-400 rotator or square SM-20 desk microphone and PS-85 Icom p.s.u. Tel: Mike 2E1FCG (01226) 742971, after 6pm.

Alinco DR-510T/E f.m. transceiver, 45W-2m (144MHz), 35W-70cm (430MHz), £200. Auto noise filter, JPS NRF-7, £90. Tel: G3PTN (QTHR) on Leeds 0113-265 4644.

Alinco DX-77 100W h.f. transceiver, transceives: 1.6-35MHz, all modes, under 12 months old, boxed and in mint condition, £495, no offers please. Tel: Joe on Rossendale (01706) 215164.

Altron 35ft galvanised steel mast, minimum height 13 ft, v.g.c., buyer to collect, £200 o.v.n.o. Tel: Swansea (01792) 818100.

AOR 3030, £250. Fairhaven RD500VX, £500. Yupiteru 9000, £275. Tandy 2042, £150. All boxed, like new and little used. Dewsbury DM1000 Easyreader and manual, £125. FM CB radio, £25. Tel: Vic on Stoke-on-Trent (0973) 538502.

AOR AR8000 hand-held with a.m./u.s.b./l.s.b./c.w./n.f.m./w.f.m., 500kHz-1900MHz with three antennas, manual, scanner directory, charger, NiCads, Dot Matrix display, only £190. Tel: (01608) 662488.

AR88, £75. HRO+9 coils, £45. Eddystone 840C, £60. Buyer to collect. Contact A Couchman, 3 Manor Grove, Sittingbourne, Kent ME10 1LT.

AVO CT-160 valve tester, g.w.o., £50. Can deliver up to 50 miles from Norwich, manuals included. *PW* magazine Volume I, No.21, 1933, with original blueprint, offers? Tel: G3WBX (01603) 812129.

Brenell four speed, four track, open reel tape deck with valve stereo pre-amplifier. Also two Tanberg four track tape decks with transistor pre-amplifiers, offers or might exchange for test gear or amateur equipment. Tel: North Wales (01678) 521066.

Classic vintage ensemble. KW200A transceiver, value £60. Matching p.s.u./extension speaker unit, value £50. Matching (Decca) KW107 combined a.t.u./s.w.r./p.w.r. metre(s)/dummy load, value £100, all for £150. Tel: Nottingham 0115-970 4184.

Collins Quartz crystals, crystal frequency 3220kHz, output frequency 6440kHz, type IC base UX5. Collins filters F455 F15, please write giving offers. Contact: Peter Fernando, 67 Church Rd, Kandana, Sri Lanka.

Create 318B five-ele Tri-band Yagi, £250. Heathkit HD-1422A antenna noise bridge, £35. 4CX 1000A, £90. Microset 100W, 2m (144MHz) linear amplifier, new, £120. Tel: (01974) 251420.

Drake TR7 transceiver, heavy duty Drake p.s.u., extension speaker and full service manual, fitted with noise blanker Aux 7 board, etc., £450. Tel: Tony G4EUL on Kent (01304) 614997.

DX-70TH, latest model, mint condition, in original packing, used one month only as receiver, surplus to requirements, £500. Still in warranty. Tel: M1BWA (QTHR) (01229) 465691.

ERA microreader MkI, c.w. auto-fast slow tutor, etc., works on 12Vd.c., power supply included, £45 plus P&P (insured). Or swap DX-100 TV converter with auto bandwidth. Tel: Mr Soli 0181-549 2612.

FT-290R MkI with 25W linear, £160. Kenpro KT22 hand-held, 2m (144MHz), £55. Tel: Dave Logan on Chesire (01457) 762799.

FWR KW Loudenboomer amplifier for sale, £300 o.n.o. Tel: Mr K Stewart (01670) 545261.

G3TDZ transceiver/receiver kit, 90% complete, TR-9000 Kokusai filters, 455-10kHz and 15kHz. *Radcom* Handbooks, third and fifth editions. QQV06-40s QY4-400 G2DAF transceiver coils Eddystone 6-pin coils and base, WW2 Jones plugs/sockets?? Tel: G3ESB (01332) 735896.

Grundig Satellite 2000 with s.s.b. unit, £135. Sony Earth Orbiter, nine band, £60. Panasonic DR49 full coverage with s.s.b., etc. £120. Century 2ID s.s.b., great radio, £150. All in g.w.o., all prices include carriage. Tel: Jones (01239) 682523.

Grundig Yacht Boy 400 multi-band radio, very little used, boxed, as new, £95. Or exchange for 70cm (430MHz) gear or WHY? Rising Master, 16 transistor, short wave, portable radio, £6 o.n.o. Tel: Chester (01244) 310267.

Have about 15 valve radios dating from late 1920s-1970s, some battery and some mains sets. Tel: Fred (01843) 867425.

Heathkit equipment for sale, some assembled but not used, others need slight attention, electronic organ with Rytem unit, weather station, oscilloscope, barometer, ring for details. Tel: Roberts (01248) 370355, 30 Trefonwys, Bangor, Gwynedd, N Wales LL57 2HU.

Henry 2k linear, excellent condition, g.w.o., try before you buy, in shack of GW0DXO, be quick or you'll miss it, £775 o.n.o., or deals. Tel: E Barnes on North Wales (01248) 372200.

HF antenna, Sloper, 80-10m (10-28MHz), hardly used, £40. Tel: Dave 0121-552 7560.

Howes h.f. transceiver, 21/28MHz, c.w./s.s.b., 10W, XIT, ALC semi professional built, g.w.o., £50 o.v.n.o., collect or postage extra. Tel: Keith G0RSL (01524) 418323.

Icom dual-band mobile, as new, £360. Also Kenwood TH-G71E, as new, £190. Both radios still under warranty and Kenwood '79E hand-held, dual-band, including case, big NiCad, £140. Tel: North Wales (01745) 730148 or mobile (07803) 054448.

Icom IC-701 transceiver, six bands, 100W s.s.b./c.w., c/w matching p.s.u. and speaker, RM3 remote c.u., microphone, leads, all handbooks and circuits, v.g.c., £265 o.v.n.o. Tel: G3PXV (QTHR) (01733) 844231.

Icom IC-706, v.g.c., boxed, g.c., £550. Psion Series 3C 2Mb, backlit plus modem with serial and parallel leads, most boxed with manuals and p.s.u.s, £120 o.n.o. Tel: Robin M1DXM on Boston (01205) 290650, evenings only.

Icom IC-735 0-30MHz, all h.f. bands, v.g.c., £325. Wanted: one rotator medium weight. Tel: Jim 0181-355 6143.

Icom IC-751 h.f. transceiver, all amateur band coverage, g.c. receiver, integral p.s.u., just realigned by Icom, receipts, fitted FL232 c.w. filter, boxed with manual and circuits, immaculate, £325 o.n.o. Tel: Ken on London 0181-455 8831, anytime.

Icom IC-756 transceiver, desk microphone, extra s.s.b. filters, £1200. Also, Icom AT-500 and IC-2KL linear, £1300. Tel: G3PTN (QTHR) on Leeds 0113-265 4644.

Icom IC-775 d.s.p. transceiver, 1.8MHz-30MHz, top of range 200W output, s.s.b. filter, manual, boxed, genuine reason for sale, mint condition, £1800. Tel: Roger M0ADQ (01977) 649418.

Icom IC-R2, only four months old, 500kHz-1300MHz, a.m./f.m./w.f.m./v.g.c., £90. Tel: Liam on Renfrewshire (01505) 613273.

Icom T-42E?? 70cm (430MHz), hand-held case, speaker, microphone and manual, boxed, £125. TS-450/690 service manual, £10. Wanted: FT-690R MkII, 6m (50MHz), portable any reasonable price paid. Tel: Terry G4OXD on Hitchin (01462) 435248, after 6pm.

JRC NRD-525G, mint condition, boxed with manuals, £425 o.n.o. Tel: Manchester 0161-224 8437. E-mail: j.willcox@mmu.ac.uk

Kenwood R-5000 receiver, boxed, with manual, in mint condition, £495. HRO receiver with manual and p.s.u., £100 plus ten coils. Tel: (01507) 588392.

Kenwood TH-D75E dual-band hand-held, speaker, microphone, antennas, leads, charger, spare battery, CTCSS fitted, £120 o.n.o. Tel: Cambridge (01223) 242427.

Kenwood TS-140S, boxed with manual, £400 o.n.o., would consider v.h.f./u.h.f. equipment, WHY? Tel: David (01495) 244148, after 4pm.

Kenwood TS-850S good condition, box and manual, £600. Tel: Barry G0ONH on Halesowen, West Midlands 0121-559 9734.

Lake NRF2 noise reduction filter, new, unused, £10. RSGB Prefix Guide, Third Edition, £1. Roller Coaster inductor as used in Ten-Tec 2kW a.t.u., new, unused, £18 plus P&P. Tel: G2KHU on Kent (01795) 873100.

Linear Amp UK 6m (50MHz) Hunter Six amplifier, 600W for great DX, eight months old, £600. Tel: Dave M0CFA on Littleborough (01706) 371352 and leave message on machine.

Lowe HF-150 PR-150 SP-150 (original Lowe manufactured receiver), with manuals, v.g.c., £400. Tel: 0181-384 9199, evenings.

MFJ 1786 magnetic loop antenna, boxed, never used, still under warranty, offers. Tel: Kent (01795) 873545.

MFJ a.t.u., new and boxed, £40. MFJ ECNO keyer and p.s.u., £10. RS lead-acid charger, 12V IA, £5. Internal data FAX modem, new and boxed, £25. Tel: G3BPE (01373) 826939.

MFJ multi reader 462B, as new, £90. MFJ Morse Tutor, as new, £30. MFJ Deluxe Code Practice oscillator, as new, £20 plus P&P, all items have instruction manuals. Tel: (01487) 823879.

Mirage D3010N?? 100W, 70cm (430MHz) linear, never used, £200. G3RKH 9k6 modem, £50 plus P&P. Tel: (01508) 570278.

New blower suitable for high power amplifier made by Dayton, model 2C610, 115V r.p.m., 3020 never been used, £25. Also small fan, 4in, no funnel, new, £5, postage paid. Tel: Peter (01771) 623654.

Quad AM3 valve radio tuner, three waveband l.w./m.w./s.w. with free a.t.u., excellent condition, £80. Tel: David Gibbs on Rochdale (01706) 341942.

R6000 Cushcraft 20/17/15/12/10/6m (14/18/21/24/28/50MHz), £190. Tel: (0836) 664150.

Realistic DX-200 five band receiver, 150-400kHz, 30-520MHz, v.g.c., £75. Also, Realistic PRO-2006 scanner, 25-520MHz, 760-1300MHz, 400 channels, £110. Tel: Mid Glamorgan (01443) 436655. E-mail: stuckeyj@tesco.net

Sandpiper 7.1MHz traps, new, £12. J-Beam, 70cm (430MHz), 18-element parabeam, good condition, £12. Dentron a.t.u. 3kW, built-in balun and 200W dummy load, excellent condition, £160. Sandpiper mobile antenna, 3.5-50MHz (new), £45. Tel: (01740) 651938.

SB200 h.f. linear, excellent condition, manual, £300. Semtran Z-match, latest model, £50. Wall-mounted Tennamast, 25ft extended, good condition, £150. Tel: Paignton (01803) 665772.

Scanner, Realistic PRO-2006, 400 channels, 25-520MHz/760-1300MHz coverage, mint condition, book, £120, no offers. Tel: Southport (01704) 538192.

Shack clearance: FT-102, Yaesu h.f. transceiver, £150. KW a.t.u., £50. Altai grid dip meter, £30. Hicock precision frequency measuring set, £500. Noise bridge, £10. Tel: G4KJN 0191-252 8908.

Shack clearance: Shure desk microphone type 444D, as new; Eddystone 770R receiver, 20/165MHz a.m./f.m.; German field strength/direction finder receiver, 10kHz/30MHz with three large frame antennas, offers please. Tel: Crawley (01293) 885701.

Sony ICF-PRO80, frequency converter, outdoor cover and shoulder strap, power adapter, excellent working order, all for only £85. Tel: Roderick Gregg (01282) 693573.

Super QRP Trio TS-130V all band transceiver/receiver plus Trio TL-120 linear, 12V, ideal mobile, 100W, £200 for the pair Vectronic VE300DLP a.t.u., £50. Eddystone RX846C, hardly used, £50. TS-930 a.t.u., what offers? Tel: Geoff G3AOS (01260) 252289.

Ten-Tec Century 22 QRP transceiver, £70. HW8 QRP transceiver, £47. Vibroplex single paddle keyer, £30. ETMS Iambic keyer, £30. Yaesu FT-736 6m/2m/70cm (50/144/430MHz), £550. All goods include delivery costs. Tel: Reg GJ3XZE (01534) 852093.

Ten-Tec Paragon, model 585, all band, h.f. transceiver, complete with all filters, microphone, 700c, p.s.u./speaker 961, electronic keyer 604, matching a.t.u. with dummy load, manuals, all excellent condition, £600. Tel: George GM4NSL (01505) 842229.

Three bed bungalow, three miles north Norfolk coast, about half an acre. Versatower with h.f. and 50MHz beams, roof space, shack 16x18ft, around £100 000. Tel: G3RZ (QTHR) (01263) 588729. E-mail: tomappleby@clara.net

Trio TR-20 R1000, g.w.o., ideal for beginner, £150. AOR AR1500 scanner

with b.f.o./s.s.b., g.w.o., £150. Tel: (01278) 652558.

Trio TR-310 amateur bands communication receiver, 3.5-29.7MHz, £85. Yaesu FTDX-401 500W output transceiver, mint, £375. Eddystone 740 receiver, 550kHz-28MHz (circa 1950), £135. Eddystone 730-4 receiver, 500kHz-28MHz, £130. Command receiver BC-455B, 6-9MHz, plus spare coils, £35. Advance E2 signal generator, 100kHz-100MHz, £20. Tel: Yorkshire (01482) 887938.

Trio TR-9130 2m (144MHz) multi-mode, g.w.o. with microphone, bracket, back-up battery and charger, instruction manual, £195 or will consider part exchange for MX296. Tel: Tony G0MQG (01603) 744197.

Trio TS-520 with AT-230, speaker, key, microphone, manuals, G5RV, offers, transverter, 2m (144MHz) Scorpion for FT-101ZD, £40. Tel: Burton (01283) 559331.

Trio TS-530S h.f. transceiver, boxed with handbook, narrow band filters fitted, £275 o.n.o. Tel: Mike G0IMG (QTHR) on (01799) 527155.

Trio TS-820 plus external v.f.o. and power meter, excellent condition. Tel: Jeff on West London 0181-578 5311.

TS-530S transceiver, £250. FC-908 a.t.u., £50. Tel: Ampthill (01525) 840798.

TS-850S a.a.t.u., £750. FT-736R, 2m/70cm (144/430MHz) base, £695. Both mint, boxed. IC-251E v.h.f. base with desk microphone, £250. TS-79DE 2m/70cm base, as new, boxed, £850. TS-180 h.f., excellent condition, £195. FC-757 a.a.t.u., £160. Tel: (01953) 884305.

Tuner MFJ-901B, new cost, £65, £40. Slim Jim antenna, 2m (144MHz), never used, £8. Yaesu FRG-9600 all band v.h.f./u.h.f., £200. Tel: John (01332) 221870.

Type CT439 oscilloscope, 10Hz-100kHz, four ranges, calibrated output, 1mV?? to 3V r.m.s. into 600Ω metered with high resolution scale. a.c. mains. 8x10x8. Contact Richard O Marris, 35 Kingswood House, Farnham Rd, Slough SL2 1DA.

Universal M-1200 receiver only, decoder card, ISA PC slot, c.w. RTTY, AX25, ARQ SITOR and more, boxed with disks and manual, £100. Kenwood HMC-3 VOX p.t.t. headset for TH-G71E, £25. Tel: Richard Perzyna G8ITB on Bromley, Kent (01689) 602948.

Valve amplifier, 25W mono, signal generators: Marconi TF-2016A with TF-2173 synchroniser, as new. US Navy SG117/URM-26B, antique Wheatstone bridge, ebonite base, HRO spares, tube for CT-436 oscilloscope, offers please. Tel: (01293) 885701.

Vectronics VC-300DLP a.t.u., covers coaxial, end-fed wire, balanced output, etc., includes dummy load, twin meters, range 30-300W, as brand new, boxed with manual, £75 including P&P. Tel: Ken on London 0181-455 8831, anytime.

Wire recorder. Hallicrafters S36, AR8503 receiver, VLF National, NC81X receiver, TR-100 transceiver, a.m./c.w., TCS12 transceiver, TCS Rotary converter, Mullard oscilloscope. Marine transceiver/receiver, Danish, offers or exchange any one for T1154. Tel: (01803) 712505.

Yaesu FRG-7700 h.f. receiver, excellent condition, manual, £185. Tel: Adrian G7HSA on Ludlow, Shropshire (01584) 872618.

Yaesu FRG-7700 receiver, FRT-7700 a.t.u. and dead FRV-7700 v.h.f., £180. FRDX-500 with 2m (144MHz), £75. Both with manuals or swap for Yaesu 9600 or Yupiteru MVT-8000 or similar. Tel: Roy on Saffron Walden (01799) 500412.

Yaesu FRG-9600 v.h.f./u.h.f. receiver, 60-900MHz, excellent condition, £230. Also, MFJ-259 h.f./v.h.f./s.w.r. analyser, brand new and boxed with manual, £145. Tel: Harold on Southampton (01703) 737715, anytime.

Yaesu FT-1000MP with matching p.s.u., three months old, all still with boxes and warranties, all in pristine condition, £1300 o.v.n.o., reason for sale - emigrating. Tel: (01257) 273107, after 2.30pm.

Yaesu FT-101 h.f. transceiver, good condition, £170. Heathkit RA-1 amateur bands receiver, £35. Mk123 spy set canvas case, £18. Mk123 mains testers, £20. Have German Torn B for exchange/swap. Tel: Ben (01562) 743253, E-mail: 106312.1035@compuserve.com

Yaesu FT-230R 2m (144MHz) f.m. transceiver. SMC 8A p.s.u., SMC power/s.w.r. meter, Altai grid/Dip, meter, mobile antenna with gutter mount, £170. Tel: Tim Curry on West Glamorgan (01792) 526759.

Yaesu FT-270R, good condition, 2m (144MHz) f.m., 25W with manual, £120 o.n.o. Tel: (01477) 544716, evenings and weekends.

Yaesu FT-290 MkII 2m (144MHz) multi-mode with charger NiCads, boxed, £235. Tel: Burton on Trent (01283) 716634.

Yaesu FT-290R MkI, NiCads, leather case, QRP set charger, two antennas, DX394 h.f. receiver, Ranger RCI2950, 10m (28MHz) multi-mode, brackets, leads, microphone B, manuals, receiver/transceiver, further 2m receive converter, B300P mobile linear, ideal for h.f. mobile work. Tel: (01706) 620793 or (0976) 299867, after 6pm.

Yaesu FT-50 2m/70cm (144/430MHz) transceiver with car charger and Watson frequency counter, excellent condition, £265. Tel: 0181-767 5150, evenings.

Yaesu FT-530 dual-band hand-held, excellent condition, £165. Yaesu FT-470 dual-band hand-held, good condition, £135. Panasonic WV-CM1000 ten inch colour video monitor, PAL/NTSC, built-in speaker, manual, excellent condition, £90. Tel: Dave on Swindon (01793) 695265, evenings.

Yaesu FT-690R, 6m (50MHz), 2.5W multi-mode transportable, in perfect working order and hardly used., £150 o.n.o. Tel: (01978) 720058.

Yaesu FT-707 h.f. transceiver/receiver, serviced, new microphone, FG-707, FP-707, may split, first £360. R5000 receiver with v.h.f. and a.m. filters, £400. Sony SW77 receiver, used two weeks only, £180. Tel: the Cotswolds (01608) 659487.

Yaesu FT-726 6/2m/70cm (50/144/430MHz) and satellite board fitted, £500. Tel: Paul (01604) 601218 or (0802) 655066.

Yaesu FT-736R Tri-band base transceiver, 6/2m/70cm (50/144/430MHz) with CTCSS, £750. Alinco DR-M06TH 6m f.m. mobile, boxed, as new, £155. Tel: Ian on Sheffield 0114-239 4428.

Yaesu FT-757 h.f. transceiver, 0-30MHz, boxed, £350. Kenwood R5000 communications receiver, £400. IC-320 dual-band hand-held, boxed, £150. Contact: John G4XYY QTHR.

Yaesu FT-890 all mode, h.f. bands, 100W transceiver with microphone, £500. Yaesu FRG-7700 g.c. receiver including memory unit and FRG-7700 active antenna, £190, all in v.g.c. Tel: Mike (01226) 700149.

Please note: Double question marks (??) in adverts appear where the Editorial staff were unable to read the advert or where they weren't sure what was meant.

Exchange

180 *RadCom* magazines, full years from 1981-1995, £1 per copy or exchange for Eddystone receivers 770V and 770R or FT-200 transceivers and receivers plus FP-200 p.s.u. or FTDX-401 transceiver and v.f.o. or WHY? radio related. Tel: (01493) 700162. 8 New Rd, Reedham Village, Norfolk NR13 3TR.

Admiralty Handbook W/T Volume One x 2, Volume Two x 3. Scott Taggart Manuals of Modern Radio 1934 x 2. Book of Practical Radio, swap for R820 or similar amateur band receiver. Tel: Ron on Swindon (01793) 331585.

Alinco DR-130T 45W v.h.f. transceiver with CTCSS encode and decode for 2m/70cm (144/430MHz) portable. Tel: Victor 0181-525 5809.

Drake SPR4 needs tidying but works OK, has noise blanker board fitted. Also crystal calibrator board. Want portable radio with b.f.o., e.g., ICF-2001. Tel: Dunstable (07979) 083295 (mobile number but will ring back).

Icom filter FL52A (500Hz), swap for FL53A (250Hz), 455kHz or purchase FL53A needed for my IC-751A. Also for sale G4ZPY iambic paddle, black base, £40 o.n.o., plus carriage. Tel: Ken G3RFH on Blackpool (01253) 407952.

Kenwood TS-680S h.f and 6m (50MHz) 12V base radio, excellent condition, boxed, manual, all leads, etc. Exchange for mobile h.f. + 6, in excellent condition. Tel: Gordon (01745) 354578.

Kenwood TS-850S, mint condition, only used on receive, £650, offers. Compaq Persario 2255, 15in monitor, 56k modem, 300MHz processor, AMDK6 at 300MHz, diskette drive, 1.44Mb, 3.5in hard drive, 3201Mb 1142Mb free, three months old due to Internet bills, £500, offers. Or exchange for Kenwood 950SD or 950S, must be mint - no marks plus cash. Tel: Lee on Belfast (01232) 672336.

Pentium PC for rig? offered 18m PC300GL PI66MMX 32MbRAM 2.1Gb *Windows 98* 2Mb graphics, 12 CDROMs soundblaster Pro2 x USB PS/2, mouse, keyboard. Wanted: 2m (144MHz) multi-mode base or dual/triple-band hand-held with accessories. Tel: Salisbury (01722) 330306. E-mail: stephen.hobbs@tesco.net (collected at weekends).

Racal 1792 late backfit receiver in new condition with all filters for Collins 75A4 receiver, also sell mint Racal 1795 v.h.f./u.h.f., Drake TR-4310 and Harris RF601, KVG filters wanted. Tel: G3YFK (01743) 884858, home, (01743) 260243, work.

Racal RA17L 1976 model, v.g.c. with manual, swap for Lowe HF-150, AKD, HF3E or WHY?, h.f. receiver, Racal must be collected, Durham area. Tel: Alan (01207) 544342, after 6pm.

Realistic PRO-2042 base scanner, mint condition including manual, £150 or swap for HF-225 or DX394 in mint condition WHY? Your offer of .h.f. 12V receiver considered. Tel: (01558) 640972. 3 West Rd, Newcastle upon Clun, Craven Arms, Shrops SY7 8QW.

SGC-230 Smartuner, 160-10m (1.8-28MHz), v.g.c. for Icom PS-85 power supply. Tel: Victor 0181-525 5809.

Six berth frame tent, as new, value: £300. In exchange for h.f. transceiver Yeasu FT-747GX or similar. Tel: West Midlands (01384) 866112.

Wanted

0-200MHz or 0-500+MHz meter plus power h.f. + 6m (50MHz) a.t.u., 6m beam, selector preference, rotator and controller, multi-band mobile like CAHF plus 6m laptop PC486 HD, etc. Four-way switcherbox not 'N' type. Tel: (01706) 620793 or (0976) 299867, after 6pm.

23cm (1296MHz!/10GHz radios or any information, also 40ft tower and mast head bearing for Yaesu rotator and rotator cage. Tel: Mike 2E1FCG (01226) 742971.

30ft Tennamast telescopic mast, also wanted complete Timestep geostationary weather satellite set-up. Tel: David (01902) 785150.

All early wireless gear wanted, crystal sets, horn speakers, early valves, Morse keys, spy sets, keen collector pays well. Tel: Jim Taylor G4ERU Tel/FAX: (01202) 510400, No.5 Luther Rd, Winton, Bournemouth BH9 1LH.

All Spy/clandestine radio sets from WWII and since wanted for my own collection, good price and a good home for that item lying in your attic. Send details and price wanted to Bill McDonald, 40 Latchett Rd, London E18 1DJ. Tel: 0181-505 0838.

Butternut vertical antenna HF2V for 80 and 40m (3.5 and 7MHz) including 160m (1.8MHz) resonator kit, telephone with details. Tel: Mel on Newport, Shrops (01952) 825983.

Capacitor: ROE, Elko DIN 41238, 2200 µfD -10/+50% 16V for power supply unit stud mount. Expenses paid with valves or money. Contact: Peter, 67 Church Rd, Kandana, Sri Lanka.

Circuit diagram Marconi MF-DF receiver type AD7092D manufactured in 1960s? Tel: Michael on Redhill (01737) 766356.

Codar PR30 pre-selector and RQ10, Q Multiplier. Tel: Les G8AHE 0121-458 2406.

CW filter for Icom IC-720A. Tel: (01628) 541472, evenings, (01753) 827126, work. E-mail huw@technocom.com

Delco 5300, US 1960/70s Spy Set wanted by private collector, also any other similar sets from this period, have some duplicate items for possible swaps. Tel: Bill on London 0181-505 0838.

Ex-RAF T1154, T1083 and R1082 plus groundbase receivers. Tel: Douglas Byrne G3KPO (01983) 567665, 52 West Hill Rd, Ryde, Isle of Wight.

For Yaesu (Sommerkamp) FR-DX500 receiver: any information, service manuals, operator manuals, circuit diagram, all costs reimbursed, please help! Urgent requirement, loan or photocopy will do. Tel: Erich (01229) 812474, most times, 24 hour answer service available.

FT-243 crystals for c.w. end of 40/80m, also circuit diagram only for KW Vespa MkII (6LQ6 PA) Also, circuit diagram for Ex-army 128 transceiver/receiver. Tel: Alastair MW0CFL on Rhyl (01745) 331464.

Hallicrafters loudspeaker type R46 for SX73 (R274) manual or drawing for 'Eagle' TE188 signal generator. Tel: Don Vosper on Bristol area (01761) 453214.

Heathkit Mohican g.c. receiver or any old valve communications receivers, working or not, part receivers for spares. Tel: Peter Howell (01282) 439275.

Heathkit RG1 communications receiver in good working order. Tel: John 0113-256 4183.

Hi-gain antenna for 160-170MHz and one for 430-470MHz. Tel: Tony on Armagh, Ulster (01861) 511257 or 0797-907 4098.

Icom RC-12 remote control system and EX-310 voice synthesiser for IC-R7000 receiver, also UT-31 CTCSS board (Icom) for U-200T transceiver/receiver. Tel: Richard Perzyna G8ITB on Bromley, Kent (01689) 602948.

Mobile trailer mast, must be tilt over type and lattice construction, extended height not important, collection no problem. Tel: Stuart (01386) 852928.

Mounting bracket for Kenwood TR-7600 or TR-7625 or any other spare parts, microphones, etc. Tel: Matthew MM1DPC on Fife (01592) 869683.

Old loudspeaker cabinet with RAF fretwork front, good price plus P&P paid. Tel: Peter (01287) 634397, 9am-5pm.

Past enthusiast wishes to purchase receiver for amateur air marine Icom ICR-70 or similar with antenna if possible, reasonable price please. Tel: Dave on Glasgow 0141-440 0702.

Tired or scrap Yaesu FT-902DM for spares. Tel: (01904) 794680, most times.

Trio 2300 in g.w.o. and charger with manual if possible, up to £75 waiting for good model, carriage at cost. Tel: Colin G4SXR (01980) 626354.

Trio Kenwood AT120 a.t.u. Tel: Phil (01495) 302430.

Two 6:1 reduction (epicyclic) drives with 1/4in diameter shafts as per Maplin/Cirkit catalogues. Tel: Keith G0RSL (01524) 418323.

Wanted for Eddystone EC10 MkII range switch wafers and any other spares for above. Tel: J Pusey (01983) 521103, evenings. 29 Arthur Moody Dr, Carisbrooke, Isle of Wight PO30 5JR.

Wanted for R216 receiver: p.s.u. and lead, b.f.o. cover, i.f. cover. Contact Michael Forman, 5 Vernons Court, Vernons Lane, Nuneaton, Warwickshire CV10 8BB.

Wanted for TMRT: (RA217D/f.s.k. adapter) six hole female thorn plug for power input with connection information and/or manuals or photocopies of same. Write to Barker, 29 St. Andrews Court, Fairways Estate, Benton, Newcastle upon Tyne NE7 7UT.

Wanted: copy of service manual for FT-690R MkII, can you help please? Tel: Mr Harris on Swansea (01792) 772632, 64 Frederick Place, Llansamlet, Swansea SA7 9SK.

Wanted: original or photocopy of Sony CRF-320 radio instruction operating handbook. Tel: John on Bristol (01275) 845351.

Wanted: Service information on Pye 6000 transistor portable radio and Cambridge P Series amplifiers. Tel: Esher (01372) 467264.

Wanted: service manual or circuit diagram for Trio TR-7010 2m (144MHz) s.s.b./c.w. rig. I will buy, borrow copy and return or pay photocopy costs, please help. Tel: Tony G0MQG on Norwich (01603) 744197, leave message on answer phone.

Watford Electronics EPROM programmer for a BBC model B microcomputer, working or not, with or without software, cash waiting. Tel: Tony G0MQG (01603) 744197.

Yaesu FT-620B 6m (50MHz) transceiver/receiver, also FT-220 2m (144MHz) transceiver/receiver, prefer in good condition and working. WHY? Cushcraft R5 or R7 vertical. Please telephone with condition and prices. Tel: Pete on Bristol (01454) 854348.

Yaesu FTV-107R transverter and 6m/70cm (50/430MHz) modules. Tel: James (01206) 262873.

Please use the Form from a previous issue to send your advert in or write it neatly on a postcard.

RadioScene

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THIS MONTH DAVID BUTLER G4ASR MARKS THE TENTH ANNIVERSARY OF WHEN HE FIRST BEGAN WRITING THE 'VHF REPORT' COLUMN FOR *PW* AND SO, INSTEAD OF LOOKING AT YOUR PROPAGATION REPORTS, HE LOOKS AT SOME OF THE GREAT OPENINGS THAT HAVE OCCURRED OVER THE PAST TEN YEARS.

This issue marks the tenth anniversary of when I first started writing this column in July 1989. So, this time around, instead of looking at your propagation reports I'm going to review some of the great openings that have occurred on the v.h.f. bands over the last ten years. (Actually, the truth of the matter is that propagation has been so abysmal recently that there really is nothing to report this time)!

VERY FIRST

In my very first 'VHF Report' ten years ago, I gave details of an intense auroral event that had occurred on March 13-14 1989. This opening was enormous and I reported that at my QTH (IO81) a total of 186 c.w. contacts were made on the 144MHz band with stations in 74 locator squares and 18 countries.

My furthest QSOs on those days were with UK5KY (KO31) at 2029km, RB5PA (KO21) at 1920km and YO2IS (KN05) at 1900km. Other contacts included ten YUs, 12 HAs, 17 SPs and 27 OK stations.

On the 50MHz band, the first authenticated transatlantic contact via auroral-E (Au-E) was recorded during the same period. **Dave Newman G4GLT** (IO92) spent most of his time on March 13 looking to the west for North American contacts and at 2234UTC he made the first two-way Au-E QSO when he contacted KA1MFA on c.w. with reports of 579/559.

Who is this?
(Photo taken March 1966

More exciting than that, was the report from **G4FUF** (JO01) who made a one-way auroral contact with HG2RO (JN87WB) on the 1296MHz band. Keith received a report of 55A from the Hungarian but couldn't make it a two-way as HG2RO was only running 2W output.

A few days after the large aurora, on March 20 1989, the station of **Tim Hughill G4JFK** (IO81) made the first 50MHz QSO with Australia when he contacted VK6KXW at 0833UTC. Tim was using 10W from an Icom IC-551D and a 5-element Yagi.

GOOD TIMES

The spring and summer period of 1989 were good times for UK 50MHz operators with regular openings to South America, North America, Africa and the Far East. Conditions later in the year during October to November 1989 were also excellent with many openings to Australia, Guam, Japan and the Philippines.

This period of the year, at the peak of the sun spot cycle, is always very good for working VK on the 50MHz band. In October 1990 I noted that **Gareth Jones GW6ARL**, (IO72) using only an FT-690R and a 3-element Yagi, contacted VK6TM and was aiming to get the DXCC award - 100 countries confirmed on 50MHz.

FEBRUARY 1991

In February 1991 I wrote ... "Fantastic! Great! Worked all continents in three hours!" The 50MHz band was in tremendous shape during the month with openings nearly every day. During the middle of February the band was open for 12 consecutive days. Propagation was especially good to Oceania and Africa although at this time, there were also some openings to Asia, North America and South America.

These excellent conditions continued through to the second week of March allowing many UK operators to work DX stations such as KE0SC/DU3, KG6UH/DU1, KJ0WO/DU3, KG6DX, VK6JQ, VK6PA and VK8ZLX. In addition to these were numerous JAs, V73AT, KH4AF, KP2A, CX4HS, LU7DZ, PY5CC, PZ1AP, ZP5AA and ZP6XDW.

Signals from Africa included A22BW, FR/JG3KUT, G8MFE/5N2, V51DM, numerous ZS6 stations, ZS4S, ZS9H, Z23JO, 3DA0BK, 3X1SG, 7Q7JA and 7Q7RM. The 50MHz band was also in good shape later in the year with similar openings to all continents taking place during October and November.

The year of 1991 was also notable for a number of intense, widespread auroral openings effecting all v.h.f. bands and frequencies as high as 430MHz. One such event occurred on April 29 1991 with a very interesting contact taking place on the 50MHz band.

Chris Tran GM3WOJ (IO77) had been working stations around north-west Europe via the northerly aurora when, at 1536UTC, he was called by CX8BE (GF15) in Uruguay. Assuming that propagation was via F2-layer or trans-equatorial propagation (t.e.p.), Chris turned his antenna on the direct path of 220° but nothing was heard.

On returning the 6-element Yagi back to the original beam-heading of 45°, contact was again established, GM3WOJ sending a report of 55A and CX8BE giving a similar report of 55. Later in the event, Chris worked SM6HYG and SM7NNJ who both confirmed that they had heard CX8BE via the aurora.

A telephone conversation with CX8BE also confirmed that the QSO had taken place and that GM3WOJ was the only European station heard at the time and that it really was tone-A. It's assumed that in Uruguay, auroral signals have not been heard before hence the 55 report. As both signals were tone-A and as the contact could only be completed via the auroral curtain, Chris claimed this as a new world record for 50MHz auroral working - 11300km!

LARGE SCALE AURORA

Another large scale aurora occurred on June 5 1991. I was active from 1330UTC but it wasn't until 1445UTC that the band really opened up. For the next five hours it was total bedlam, with hundreds of c.w. stations all jockeying for space at the bottom of the 144MHz band.

In total, I made 150 QSOs in 73 locator squares and 18 countries, DL, F, G, GI, GM, HB9, HG, I, LA, OE, OK, OZ, PA, SM, SP, UB, Y (the old East German call sign) and YU. Some of my highlights included 14 YUs, the best being YU1LA (KN04) at 1900km, ten HGs, 14 OKs, four SPs, two OEs, seven Is and UB5WBG (KN19) at 1875km.

Another operator active on the 144MHz band was **Andy Cook G4PIQ** (JO01). Between 1500-2030UTC he made 190 QSOs which included 16 YUs, 15 HGs, ES5RE (KO38) and UB5WBG. **John Regnault G4SWX** (JO02) concentrated on a northerly beam heading to work the elusive Finnish and Russian operators. He was rewarded with a number of quality contacts including UA1AFA (KO59) at 2070km, UV1AS also in KO59, UC2CBZ (KO34), ES5RE (KO38), OH2AV, OH2BAP, OH2TI and OH5LK.

John was also active on the 144MHz band in the next big auroral opening which took place on July 13 1991. Between 1257-1746UTC he made 121 c.w. QSOs in 20 countries, the best DX being OH2BNH (KP20), RB5PA (KO21), UT5DL (KN18) and YP0A (KN16). Other contacts included 24 OKs, nine HGs, six HB9s, four Is, four YUs and OE3HGW (JN88).

Results at my QTH were very similar, working 111 c.w. stations between 1335-1805UTC. The furthest distance QSO was with YU1EXY (KN03) at 2012km but the highlight of the aurora came at 1724UTC when a contact was made with IW0AKA (JN61FI) 53A

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51A, a considerable distance to the south. Other contacts included 21 OKs, 12 HGs, seven Is, four YUs, four SPs, four HB9s, OE3HGW and EJ7FRL, the Irish expedition to Fastnet Rock (IO51).

TREMENDOUS SPORADIC-E

Moving on now to 1992 and a tremendous Sporadic-E (Sp-E) opening which took place between 1825-2010UTC on June 22. In a 100 minute period from 1827UTC, I made 103 s.s.b. QSOs on the 144MHz band. Nine countries were contacted including 60 YUs, 17 Is, 12 OEs, five DLs, four SPs, two HGs, LZ2FO (KN13), YO5QA (KN16) and SV1ALS (KM09) at 2256km.

However, all these contacts were nothing compared to that worked by **Calum GM0EWX**. Between 1734-2100UTC he made 250 s.s.b. QSOs which included over 150 DLs, 46 Is, 18 HB9s, nine YUs, eight Fs and six OEs - a total of 28 locator squares were worked with the best DX being IK7MOI (JN80) at a distance of 2481km. Phew!

Conditions on the 50MHz band during the autumn of 1992 contrasted sharply to the large amount of DX that had been worked twelve months previously. **Neil Carr G0JHC** (IO83) mentioned that between July and October 1992, he only heard one station outside of Europe and that was ZS6AXT on October 26. It was even worse in November 1992 with only a solitary station, CN8ST in Morocco, being worked by a few UK operators.

ON TO 1993

So, on to 1993. Although there were many openings on the 144MHz band, none were truly spectacular. One surprise though was a brief Sp-E opening on May 12 to SV1, SV3, SV4, SV5, SV8 and SV9. That's three DXCC countries, Greece (SV), Dodecanese (SV5) and Crete (SV9).

Another reasonably rare opening took place on July 18 1993. Around 1600UTC **Colin Morris G0CUZ** (IO82) heard a weak Spanish speaking station on 144.300MHz. There was an ocho (8) in the call sign and he guessed that it was an EA8 station in the Canary Islands.

At 1728UTC the same very weak signal appeared again and a difficult contact with EB8BTV (IL18) resulted. Colin then went on to make two more s.s.b. QSOs with EA8 stations at a distance of nearly 3000km.

Located on the south coast **Mark Holloway G4YRY** (IO90) reported making s.s.b. contacts with EA8AGA, EB8ALZ and EB8BTV between 1822-2055UTC and at my QTH I succeeded in making three s.s.b. contacts with the Canary Islands (IL18) at a distance of 2900km. At the time, I reported the propagation mode as being Sp-E but in hindsight I now think it was probably made via tropospheric enhancement.

A similar opening was observed the following year when Colin G0CUZ heard EB8BTV at 1545UTC on June 26 1994. The signals on the 144MHz band were very weak and no contact was made at this time. However, at 1853UTC and again at 2017UTC s.s.b. contacts were made with reports of 52/51 being exchanged.

SUPER-TROPO

The super-tropo continued through to June 27 and G0CUZ again worked EB8BTV. Fading was severe on this occasion and signals only peaked a few dB above the noise floor.

Joe Ludlow GW3ZTH (IO81) reports that he operated portable from a local hill and at 1529UTC he was called by EB8BTV. A contact was quickly established although signal strength at this time was quite weak, S1-3. This was followed by a QSO with EA8BEB, again at the S2 level. From 1600UTC, however, the strengths increased dramatically and the stations of EA8BHN and EB8ALZ were both contacted on s.s.b. with 59 reports.

It was now becoming obvious to some seasoned operators that the marine ducting opening between parts of the UK and the Canary Islands was not as uncommon as some people had first thought. Indeed it was now recognised that stations located in Cornwall, Wales, Ireland and the Isle of Man could expect to work this 3000km path a few times every year in the June-July period.

It was also noted that these long distance openings were not restricted to the 144MHz band. In fact, the higher in frequency you went, the better it got. The only problem is that this type of marine duct doesn't normally extend very far inland and relatively few microwave operators live in the preferred coastal locations.

Incidentally the existing European tropo records on the 144MHz, 430MHz and 1296MHz bands are all for contacts made between the UK and the Canary Islands. The 144MHz record is held by GM0KAE and EA8BML for a 3264km contact. The 430MHz record is with GW8VHI and EA8XS for a 2786km contact and on the 1296MHz band the record is held between G6LEU and EA8XS for a contact over a path length of 2617km.

I didn't record any two-way contacts being made on this super-DX path the following year in 1995 but I did mention that the station of EB8BTV (IL18) was heard by **GW0PZT** (IO73) at 1800UTC on July 28 and later in the year on August 12 by **Andy Stafford G4VPM** (IO80).

MULTI-HOP SP-E

On both occasions, the signals were just above the noise level. During 1995, it was observed that the incidence of multi-hop Sp-E transatlantic openings was considerably enhanced. Based on results from previous years, about four or five such openings are expected during the months of June and July. In 1995 the total was eighteen!

I couldn't find any details of spectacular openings on the v.h.f. bands during 1996. Indeed, most forms of propagation seemed to be at a low ebb and I reported that Sp-E propagation within Europe (both at 50MHz and 144MHz) has been very much suppressed during the summer.

Traditional single-hop Sp-E propagation on the 50MHz band was fairly unstable and of low duration, but on the other hand, the incidence of transatlantic openings had been on the increase with a total of seventeen days in the UK when the path was open.

Some operators suggested that observations of the weak, geographically selective events over the Atlantic path may have been some form of E-layer enhancement rather than the traditionally accepted Sp-E propagation. So, it's possible that these events are more prevalent at solar minimum.

On the 144MHz band the results were very poor indeed. In the UK, there were only five Sp-E openings in May, two in June and none in July. One event that did catch the attention of some operators was the increased activity during the Leonids meteor shower in November 1996.

A number of stations reported bursts on the 144MHz band of up to two minutes duration and some reports mentioned that for an hour or so the band sounded as if a Sp-E opening was in progress.

TRANSATLANTIC OPENINGS

Moving on to 1997 and reports of transatlantic openings on the 50MHz band were very similar to that recorded in the previous year with a total of 16 days when the path was open between the UK and North America. These events, by the way, occurred during what is known as the summer Sp-E season, around the June/July period.

Later in the year, the Leonids meteor shower on November 17 1997 displayed even more activity and I reported that "... stations on the 144MHz band received bursts of signals of up to three minutes duration lasting for a number of hours throughout the morning".

At my QTH I made 27 s.s.b. contacts between 0657-1129UTC with stations in DL, EA, F, HA, HB9, I, LA, OE, S5, YU and 9A. My best DX was YU7EW at 1859km, I8MPO at 1829km and I8TWK at 1827km.

Last year, 1998, saw a number of good openings produced via a variety of propagation modes. First up was an excellent long distance Sp-E event on the 144MHz band to Greece (SV), Crete (SV9) and Israel (4X). This occurred around 1215UTC on June 3 1998 allowing stations in south-east England (mainly in IO91 and JO01) to work SV1OH (KM18), SV7ADJ (KN20) and SV9/DC9KZ (KM35).

The real DX, though, were the stations of 4X4MO (KM72), 4Z5BS (KM71) and other Israelis up to 3600km away who were contacted on s.s.b. between 1241-1244UTC. According to **David Dibley G4RGK** (IO91), the station of G4FUF (JO01) contacted three 4X stations, although nothing was heard of them at his QTH.

David did manage to work SV9/DC9KZ at 2800km, as did **Neil Whiting G4BRK** (IO91) who reported that his 2866km QSO was his furthest ever distance made on the 144MHz band.

TROPOSPHERIC PROPAGATION

Tropospheric propagation next and on July 6 1998, **Derek Hilleard G4CQM** claimed to have heard the VE1SMU/H beacon (144.300MHz) over a path of some 4376km. Although this reception was unverified, two days later the 144MHz band did support a tropo path in excess of 3000km.

Of course, it was our old favourite the G-EA8 marine path again. Between 2215-2310UTC on July 8 1998, the station of **Jamie Ashford GW7SMV** (IO81) heard EB8BTV (IL18) on the s.s.b. calling frequency with signals

peaking to S2.

On this occasion though, the signals made their way right across the UK to the QTH of **David Johnson G4DHF** (IO92) located in Lincolnshire. He reported that EB8BTV was peaking S4 and that he was very pleased to make the 3074km contact.

Even more QSOs were made in the following month when the path opened up on August 7, 8, 9 and 15. During this period G and GW stations in locator squares IO70, IO72, IO80, IO81, IO82, IO83 and IO93 made many contacts with a number of Canary Island stations which included EB8ALZ, EB8BEB, EB8BTR, EB8BTV, EB8BTZ and EB8BYR.

The longest recorded distance during this opening was between **David Anderson GM4JJJ** (IO86) located in Fife, Scotland and EB8BTV on Tenerife. Reports of 51 were exchanged on s.s.b. over a path of some 3253km, unfortunately only 11km short of the existing Region 1 tropo record.

LEONIDS METEOR SHOWER

For many operators, the highlight of the last ten years occurred last autumn during the Leonids meteor shower on November 17 1998. From 2330UTC on November 16 some very loud bursts of signals were heard on the 144MHz band.

Over the next hour or so, the meteor scatter (m.s.) conditions progressively got better as bursts of signals turned into continuous transmissions, first a few minutes in length and then up to five or six minutes in duration. It really was tremendous and it continued right through the night until the shower disappeared below the horizon around 1200UTC on November 17.

Everyone likened it to a Sp-E opening, but this event was even better than those types of geographically selective events. The ionisation was very intense and spread all over Europe at the same time. You could work stations via forward scatter, back scatter, side scatter, in fact in any direction you wanted.

As a consequence, it made very little difference in which direction you were beaming. Beam towards Finland (OH) and work into North Africa (EA9), beam towards Hungary (HA) and work into Portugal (CT). On the 144MHz band the best European DX reported were contacts between G4ASR (IO81) to RW1AW (KP50) at 2231km, EA7GTF (IM87) to SP2FAX (JO83) at 2372km and F5OWN (JN25) to LA3FL (KP19) at 2871km.

With signal reports of 59 being exchanged on s.s.b. with stations over 2000km and with many UK stations working over 20 countries in one night of v.h.f. activity, this really was the event of the decade.

Deadlines

That's it again for another month. Perhaps you might like to let me know what **your** best v.h.f. opening was. Please forward any details, comments or photographs to the address and by the date given at the top of the column.

THANKS FOR YOUR LETTERS AND GOOD LUCK WITH THE DX. SEE YOU AGAIN NEXT MONTH.

73 David G4ASR

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THIS MONTH LEIGHTON SMART GW0LBI BRINGS YOU A BIT OF A 'MIXED BAG' - SOMETIMES CONDITIONS CAN APPEAR TO BE GOOD HE SAYS, THE NEXT, PROPAGATION IS DROPPING AWAY! HE COMES TO THE CONCLUSION THOUGH, THAT OVER ALL, PROPAGATION CONDITIONS ARE IMPROVING - HONEST!

Judging by comments from our reporters this month, conditions have been remarkably good, although once again, there have been times when propagation has dropped out for short periods. Overall though, I think that the general trend is upwards and that propagation conditions are continuing to improve, judging by reports.

For the larger part of the month I was rendered unoperational on the h.f. bands due to a blown p.s.u., though the offer of a loan of a power supply came in from quite a few amateur friends. However, the problem was soon rectified by **Andrew GW0TOI** who lives nearby and I'm now back on the air with my 5W.

Once again this month, most of our reporters have tended to concentrate on the higher frequency bands, making the most of the DX that's been appearing there of late. However, the lower bands should not be ignored if you have the space for an antenna, as these bands, especially 3.5 and 7MHz, still throw up some nice DX gems during the evenings and early mornings.

THE NOVICE DEBATE

The comments of **Alan Clay M0AXJ** from the Wirral in the May issue on the Novice Licence has brought forth a response and the debate over the novice allocations rages on! A spate of letters came in this month offering opposing views as to what can be done to improve the lot of Novice licensees.

The first letter came from **Anne Reed 2E1GKY** of Cheltenham who says that she's been interested in radio since 1955 and now, at the age of 60, has got herself a Novice licence. However, she says that the restrictions are 'pretty awful' for the novices.

Anne suggests that the under-used 144MHz band be opened to novices, as it would give them more scope than the present 430MHz band and make use of what is a sparsely populated allocation.

Andy Hoskins 2E0AP/M0CFM pointed out that Novice licensees have been well trained and deserve to at least have their power limit raised to 5W to bring them into line with the agreed QRP limits, although he also says that the band allocations should stay as they are to provide some incentive to upgrade to 'full tickets'.

On the other hand, **Grant Merills G0UQF** of Barnsley disagrees with the argument that Novices should have any improvement in licensing allocations, saying that all they have to do is to progress upwards like other Radio Amateurs, through the RAE and Morse Test. What is worth having is worth fighting for, he states.

My own view is that if the Novice Licence offered more than the extremely limited allocations it does now, then we'd see more people taking up Amateur Radio. I fear that our hobby, as interesting, fulfilling and satisfying as it is, is falling behind in the modern world.

There are many other activities directly competing with Amateur Radio that simply didn't exist ten or 15 years ago, such as the Internet, for example, where world-wide communication can be had at the push of a button.

I'm afraid that Amateur Radio is coming second every time and we're losing numbers as a result. If our numbers continue to fall, then in perhaps 20 years time, we will find ourselves being the pall-bearers at the funeral of our fine hobby.

The allocation of all bands and modes to Novices with a power limit of 5 or even 10W would, I think, make Amateur Radio a much more attractive activity to those people we're trying to bring into the hobby, but who we're simply losing under the present Novice system. I've no doubt that this debate will continue, so let's hear what **you** think! (See Stop Press in News, page 13.)

YOUR REPORTS

Now on to your reports for this month, starting with the 1.8 and 3.5MHz bands. The log from **Eric Masters G0KRT** of Milton Keynes shows a 100W c.w. contact with UA2FZ (Kaliningrad) at an early 1605UTC, while on the 3.5MHz band he used s.s.b. to hook up with LX6T (Luxembourg) at 2108UTC for a new country and back to c.w. again to work G0AOZ who was using a **100mW** home-made rig (real QRP!).

Next up comes short wave listener (s.w.l.) **Gordon Hurrell BRS-91705** from the Isle of Wight, who spent some time listening to the 1.8MHz band this month. His log shows s.s.b. reception of OY9JD (Faroe Islands), 3V8BB (Tunisia), UA3GUX (European Russia), 4L0G (Republic of Georgia) and EU5A (Belarus), all between 2200 and 0205UTC.

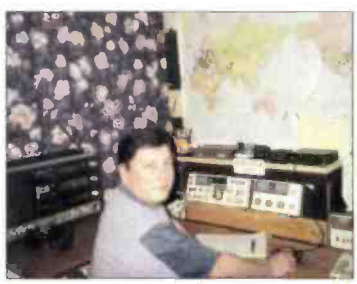
THE 7MHz BAND

Down on the Isle of Sheppey in Kent is **Ted Trowell G2HKU**, who starts off the 7MHz band report, quite rightly laments the 'passing' of the RSGB's *DX Newsheet* which is to close down after many years. Formerly known as the *Geoff Watts DX Newsheet*, it will be mourned by many h.f. DX chasers I'm sure.

Ted's all c.w. log shows contacts on 7MHz with VK6HD (Australia), as well as 5B4AGC (Cyprus) and C56SW (Gambia). Ted uses a Ten-Tec Omni V transceiver at 70W output and G5RV dipole/HF6 vertical antennas.

Not to be outdone, **Sean Gilbert G4UCJ** of Milton Keynes (see **Fig. 1**), offers c.w. contacts

Fig. 1: Sean Gilbert G4UCJ of Milton Keynes who, Leighton said, wasn't to be out done on the 7MHz band!



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on the 7MHz band with 3B8/G3PJT (Mauritius) at 2258, ZL2CD (New Zealand) at 0630, SU9ZZ (Egypt) at 2357, as well as R1FJL (Franz Josef Land) at 0035 and VK6VZ (Australia) at 2135UTC, all using 30W and an indoor dipole!

THE 10MHz BAND

The 10MHz band is the narrowest of our h.f. allocations at a mere 50kHz wide, but nevertheless, can provide some interesting DX. Using 30W of c.w. Sean G4UCJ hooked up with 3B9R (Rodriguez Island) at 1332, 3B8/DL6UAA (Mauritius) at 2100, C56SW (The Gambia) at 2300 and BV9A (Taiwan) at 2217UTC, while Eric G0KRT used s.s.b. to work UA3FV (Russia) at 1803UTC.

THE 14MHz BAND

The 14MHz band was where **Carl Mason GW0VSW** of Skewen in West Glamorgan spent most of his time this month. Using a QRP Plus rig at 4W output and a half-sized G5RV dipole, he lists all s.s.b. contacts with T77V (Republic of San Marino) and SV1DKR (Greece) at 0700, WO8CC (USA) at 1050, as well as CN8WW (Morocco) at 1435 QSL via DL6FBL and finally VO1WET (Newfoundland) at 1743UTC.

At his listening post, Gordon BRS-91705 reports 14MHz s.s.b. reception of VU2DK (India) at 1457, OD5SB (Lebanon) at 1700, AP2RP (Pakistan) at 1420, XXPTRR (Macao) at 1630, ZL4BX (New Zealand) at 0800 and ZS1ESC (South Africa) at 1700UTC, while Ted G2HKU lists two 14MHz c.w. contacts with HS4BPQ (Thailand) and 9H3ZV (Malta).

Sean G4UCJ, again using his indoor antenna, used 30W of c.w. to hook up with VK6VZ (Australia) and ZL6QH (New Zealand) at 1700, 5N3CPR (Nigeria) at 0003, CE0AA (Easter Island) at 0700, 9M6UZT (East Malaysia) at 1800, 3B9R (Rodriguez Island) at 2300 and with 5W output VK2BJ (Australia) at 1752UTC.

THE 18MHz BAND

On to 18MHz now and the higher frequency bands have certainly been the most attractive this month (in terms of DX) and our reporter's logs seem to bear this out as we turn to these bands.

A nice one on the 18MHz band for listener Gordon BRS-91705 was KH0EX (North Mariana Island) at 0830, while ZL2YET (New Zealand) was logged at 0900 and JW5NM (Svalbard) was heard at 1720UTC.

Carl GW0VSW lists just a single 2W c.w. contact on the 18MHz band in the form of ZB2CN (Gibraltar) at 1000, as does Eric G0KRT who used s.s.b. to hook up with YL3BU (Latvia). at 1728UTC.

Meanwhile Sean G4UCJ spent quite a bit of time on this band and lists c.w. contacts with J3/K4LTA (Grenada Island) at 1700, VQ9DX (Chagos Islands) at 1530, X9TRR (Macao) at 1600 as well as JT1BH (Mongolia) at 0947 and a 3W QRP contact with VR2KF (Hong Kong) at 1500UTC.

THE 21MHz BAND

Using 70W output of c.w. Ted G2HKU has been busy on the 21MHz band. His log shows contacts with VX6LO (Canada), JH3AIU (Japan), XX9TEP (Macao), SU9ZZ (Egypt) and VU3VLH (India), while Eric G0KRT worked ZS4IPA (South Africa) for a new country at 1800, as well as WB9Z (USA), Z3ZM (Macedonia), and a long string of north American stations at around 1700-1800UTC. "Conditions were excellent on fifteen" says Eric.

Sean G4UCJ also spent some time on 21MHz, listing, amongst others, his 30W contacts with 9V1YC (Singapore) at 1744, XW8KLP (Laos) at 1543, BV7FF (Taiwan) at 1253 and a 5W QRP contact with HL1CG (South Korea) at 1147UTC.

At his listening post on the Isle of Wight, Gordon BRS-91705 received s.s.b. signals from 6W1RB (Senegal) at 1600, 5A22PA (Libya) at 1500, HS0/G3UUM (Thailand) at 1606, V51HK (Namibia) at 1947 and BY7WGL (China) at 1028UTC.

Using 3W of c.w. on the 21MHz band was Carl GW0VSW who lists contacts with ZA1K (Albania) at 0700, 9H1ZA (Malta) at 0800, as well as W3RDF (USA) at 1700 and finally SV1DLS (Greece) at 1847UTC.

THE 24MHz BAND

The 24MHz band is certainly one of the allocations to watch as sunspot numbers continue to rise and conditions improve and this was 'where it was at' this month for Ted G2HKU. Judging by his log, my guess is that he must have spent most of his operating time on this narrow 100kHz amateur band.

Pounding the key as usual, Ted's log shows amongst others, his 70W contacts with J28BS (Djibouti) V21CW (Antigua), N0TM (Nebraska, USA), special call 5N99MSV (Nigeria), ZS5RON (South Africa), HK6KKK (Colombia), JH7CJM (Japan), ZF1WD (Cayman Islands), YB0FMT (Indonesia), TT8DF (Chad) and E4/G3WQU (Palestine).

Eric G0KRT used 100W c.w. to hook up with US7IB (Ukraine) and switched to s.s.b. to contact RZ3TZM (Russia) both at around 0800, while Sean G4UCJ stuck to c.w. at 30W to work KG4BV (Guantanamo Bay) at 1737, 3DA0CA (Swaziland) at 1600, 7Q7LA (Malawi) at 1000, ZF1WD (Cayman Islands) at 1651 and JA8RRF (Japan) at 1112UTC.

Back at his listening station, Gordon BRS-91705 reports s.s.b. reception of P49MR (Aruba Island) at 1519, BV2KI (Taiwan) at 1300, FR5HR (Reunion Island) at 1545, TL5A (Central African Republic) at 0940 and CX3A (Uruguay) at 1520UTC.

THE 28MHz BAND

The 28MHz band was where **Ian Cowdrey G4TNZ** of Derby decided to test out his experimental antenna, which consists of 41.5m of wire simply slung around the garden along the top of his apple trees at a height of about 3.5m. He's as pleased as punch with what he's been able to work with it and his 28MHz log shows why.

Ian lists 100W s.s.b. contacts with 4M4X (Venezuela), ZD8BA (Ascension Island), 5X1Z (Uganda), CE3F (Chile), HT2H (Nicaragua), CQ9K (Madeira Island), LI1F (Argentina), PY2MNL (Brazil), P49M (Aruba Island), KP3A (Puerto Rico) and VO1SA (Newfoundland). There goes a happy antenna experimenter!

Using the c.w. mode, Ted G2HKU used his 70W on 28MHz to hook up with C56SW (The Gambia), 3B8/G3PJT (Mauritius), CP4BT (Bolivia), KG4TO (Guantanamo Bay), FM5/F2PI (Martinique Island) and ZS6SA (South Africa), while Eric G0KRT lists all s.s.b. contacts on 28MHz with L2F (Argentina) and W5WMU (USA) at around 1600, as well as CQ9K (Madeira Island) and ZX5J (Brazil) at around 1800UTC.

The final mention this month, though, must go to **Jayne Gilbert 2E0ASR** of Milton Keynes, who is no doubt over the moon to have hooked up with the Galapagos Islands.

Jayne worked HC8A at 2130 using a mere 3W into a wire dipole in the attic! Indeed, so envious was her 'other half' Sean G4UCJ, that he had to do the same, which he promptly did. However, being second is not as rewarding as doing it first, I'd say and I'm sure our readers would agree with me!

SIGNING OFF

Some nice spectacular DX has been reported this month, so I'm sure you'll agree when I say that I hope conditions will continue to improve. Thanks again to all correspondents for their reports, information and input to the column.

AS USUAL, REPORTS AND INFORMATION (AND PHOTOS PLEASE AS I'M STILL LOOKING FOR PHOTOGRAPHS OF OUR REPORTERS!) BY THE 15TH OF EACH MONTH. DETAILS AT THE TOP OF THE COLUMN.

PW Listening & Operating Watch List (all times in UTC):

Charlie Blake M0AIJ listens and operates:
0500-0700 on 7.061MHz s.s.b. with an NRD-525 receiver & sloping wire antenna and is also busy with his mobile rig;

George Woods G3LPT (Suffolk) operates:
an open net on 29.630 f.m. every weekday morning except Monday at 0930 local time;

Don McLean G3NOF operates:
1030 Saturdays on 3.685MHz on the ISWL Net or 1030 Sundays on the Yeovil ARC Net on 3.665MHz s.s.b. using a Kenwood TS-950 & trapped dipole antenna;

John Wheeler G0IUE monitors:
28.600 n.b.f.m. every evening between 1730 and 2230 regardless of conditions using a Yaesu FT-920 running 100W and a 2-element TET tri-band beam antenna/half-wave vertical antenna;

Leighton Smart GW0LBI operates:
on 1.949MHz s.s.b. and around 1.820-1.836MHz c.w. on weekday evenings between 1900 and 2230

using a Yaesu FT-747G QRP transceiver at 5W maximum and a 60m long wire Marconi antenna;

Rob Mannion G3XFD listens and operates:
1800-1830 (weekdays & weekends) on 3.7MHz 100W s.s.b. & 3.530 or 3.560MHz and 18.105MHz QRP c.w. using an Alinco DX-70TH transceiver and a long wire antenna. Also at 2300 on either 3.560, 7.025MHz (c.w.) or 3.7MHz s.s.b. Now also operating /P from the car with a DX-70 on weekends and on way home from work on 7, 14 and 18MHz after 1630UTC. (All operation dependent on *PW* workload!).

Sean Gilbert G4UCJ operates: around 0700 to 1100 and 2100 to 0000 seven days a week on 14MHz and 7MHz using an FT-307 and Alinco DX-70 transceivers at 3/30W output and a G5RV dipole antenna in the loft space.

SCENE USA

PLEASE SEND ME REPORTS AND INFORMATION FOR THE OCTOBER COLUMN BY JULY 15TH.

ED TAYLOR N0ED
PO BOX 261304
DENVER
COLORADO 80226
USA

E-MAIL: n0ed@radiolink.net

THERE'S NO ESCAPE FROM THE INTERNET! ED DESCRIBES A COUPLE OF FREE CYBER-FACILITIES PROVIDED BY RADIO AMATEURS IN THE USA BUT AVAILABLE TO EVERYONE. HE ALSO BRINGS SOME NEWS ITEMS OF INTEREST TO OUR READERS FROM ACROSS THE POND.

I suppose it wouldn't be an exaggeration to say that the Internet has affected almost everyone in the western world. Unfortunately, this includes Radio Amateurs, particularly since our hobby has close ties to electronics and computers.

It's an interesting question - how will the popularity of E-mail, the Internet and similar sorts of rapid world-wide communication affect Amateur Radio?

Whether we like it or not, we will have to accustom ourselves to the reality of the 'on-line culture'. For myself, the availability of reliable communication with fellow amateurs has meant a reduction of time on the air, which I regret and which I take steps to rectify. Instead of having a weekly sked with friends in the UK, for example, I now use E-mail.

Many of the developments that have taken place in computers and the Internet and which are of direct relevance to Radio Amateurs everywhere, come from the USA. This should not be surprising, since the US has both a large number of Radio Amateurs and a large number of people working in computer fields. Let's take a look at some of the radio-related facilities that we can use as a result of work done by American amateurs.

FINE SERVICES

One of the fine services offered by American Radio Amateurs on the Internet is provided by **Al Waller K3TKJ**. He runs several Web sites each carrying out different functions.

The oldest of these Web sites can be found at: **www.qsl.net** which was set up a couple of years ago. (See **Fig. 1**). If you visit the qsl.net site, you will appreciate all the myriad functions. Al says that he's found this way of putting back something into the hobby to repay everything that he has gained from it.

Let me summarise what's available from qsl.net and tell you about the features I like best. The main purpose of the site is to provide Web pages for any Amateurs who want them. If you check the index on qsl.net, you will see that over 10 000 people have taken advantage of this offer.

There are some fairly light-hearted pages along the lines of: "This is me and here is a picture of my shack". There are other sites, particularly those maintained by clubs, which are very elaborate.

Take a look at some pages from the Web sites of the **Parallel Lines Contest Group**: **www.qsl.net/g4cla** and the **Caboolture Radio Club** (Australia) at **www.qsl.net/vk4qd** (See **Fig. 2** and **Fig. 3**). These sites are by no means the most complicated, but show what can be done with a little bit of time and effort.

Amateurs from around the world find this sort of Web site a great way to show what they are doing, to bring in new people and to keep their members (or friends) up to date with activities.

I think that using qsl.net for club Web pages has a lot going for it. Of course, many radio clubs have already produced Web sites using the Internet facilities of one of their members. The problem with this is that members change or move and people also change their Internet Service Provider (ISP).

Fig. 1: qsl.net which is run by K3TKJ.

The advantage of using qsl.net is that any member of the club can maintain the site and it is independent of the fortunes and vagaries of ISP changes.

CREATING A WEB SITE

Creating a complex Web site requires quite a bit of skill, but anyone with a little knowledge of computers can put together a simple and very useful home page quickly.

There are programs which will produce much of the

Fig. 2: Part of the Parallel Lines Contest Group Web site.

necessary HTML code for you, including word-processing software such as ***Word '97***. Several free programs will do the same job and sometimes better.

I like ***AOL Press***, which is straightforward and doesn't have too many unnecessary features to

Fig. 3: The Caboolture Radio Club have this unusual Web site at qsl.net

remember (download from **www.aolpress.com**). There are also guidelines and assistance in creating and publishing Web pages in the help section of qsl.net

TERRIFIC FREE FACILITY

Another terrific free facility that K3TKJ offers will allow any licensed amateur to use E-mail forwarding. What does this mean? It lets you create a nice E-mail address such as G3SQX@qsl.net which you can tell all your radio friends. This is much easier than trying to remember and spell out something like fredxyz@derby498.freebies.co.uk. If your E-mail facility is provided by your employer or college, this is a good way of separating personal mail from 'business'.

It's also useful for the inevitable time when you change to a new ISP and have to inform everyone about your new E-mail address. Your 'Callsign Address' stays the same.

Fig. 4: qth.net - Reflectors on Amateur Radio topics.

To get this service, go to the www.qsl.net site and select the 'Sign Up' section. If you don't have access to the Web, someone else can do this and you can still use the E-mail forwarding.

Supply a minimum of information and specify an E-mail address to which you would like your messages forwarded. From then on, any E-mail sent to your 'Callsign Address' will be automatically forwarded to your

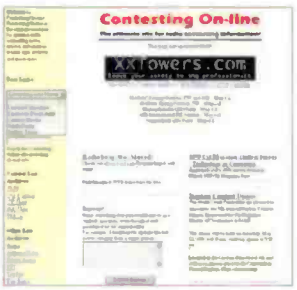

Fig. 5: N5KO's Web site at contesting.com

actual ISP. You receive it in your software mailbox along with the usual mail.

It's convenient to be able to set the return address on your E-mail to reflect your 'Callsign Address'. Then your 'Callsign Address' will be used when

Fig. 6: The DX Century Club award.

PW's REGULAR REPORT SECTION - FULL OF TIPS, IDEAS AND INFO ON THE VERY LATEST IN THE AMATEUR RADIO

RadioScene

correspondents press the 'reply' button, or when your address is added to their address book. You can do this with E-mail software that allows different 'accounts', that is, several identities for your outgoing E-mail. Here's how to do it with ***Outlook Express***:

Choose 'Tools', 'Accounts' and highlight the Mail service corresponding to your ISP. From 'Properties', copy down the information in the boxes under the 'Servers' tab. Cancel this operation and under 'Internet Accounts', choose 'Add' and 'Mail'.

A 'wizard' will probably appear and you answer the questions. For your 'Name From' type in 'Mortimer G9DX' (or as you desire). Your E-mail Address (where people send you mail) is your 'Callsign Address' (be accurate!).

Enter the Incoming Mail, Outgoing Mail, Account Name and Password information that you previously copied down. When you've finished, you can look at the properties of the new Account you've created and see if they are OK.

It's wise to remove the tick from the "Include this account when receiving mail" box for your Callsign Address, to avoid checking mail twice each time you log in.

It sounds harder than it really is and you'll be pleased with the results. When you send mail, you will have a choice of doing so from your usual E-mail address, or from your Callsign Address.

By the way, if you like the idea of having a more convenient and permanent E-mail address, forwarding services are available from several other suppliers. Try **www.email.com** if interested.

SISTER WEB SITE

A sister web site, also run by **K3TKJ**, organises the many mailing lists that are available on Amateur Radio topics. Mailing lists are also known as 'Reflectors', which accurately describes the way they work.

Each Reflector is dedicated to a particular topic and subscribers can participate in which ones they choose. Messages are sent from individuals to the Reflector server, which then re-sends the messages to everyone who is subscribed.

So, we have a series of huge bulletin boards, where questions can be asked and points raised. Instead of sending E-mail to the hundreds of amateurs interested in each subject, we just send one. This complements the Usenet or Newsgroup system, which is available from most ISPs and can be accessed from the usual E-mail software.

K3TKJ's Web site devoted to Mailing Lists is at **www.qth.net** Here you select which of the many Reflectors to subscribe to. You can choose from 'Contest', 'ForSale-Swap', 'DXPeditions', 'NewsVHF' and hundreds of others.

As well as reflecting all of the messages sent to it, the Mailing List computer (whose software is called 'majordomo') also prepares digests of the E-mails posted to it every day or so. If you prefer to receive one message per day instead of dozens, use the digest form.

The instructions at qth.net are very clear and allow you to subscribe in a matter of minutes. See **Fig. 4** for the site's home page. If you have E-mail but no Web access, you can still use the system. Have someone list the Reflectors and a summary of the instructions, then send E-mails to majordomo to specify your requests.

This is not the only Mailing List resource for Radio Amateurs. For instance, there are Reflectors residing on **www.contesting.com** which is oriented towards contesting, but has other topics as well. The instructions are similar to those at qth.com and you can get the flavour in **Fig. 5**. This site is run by **Trey Garlough N5KO**.

Generally, the facilities provided by these public-spirited amateurs are free, however, donations are accepted and amateurs in the more prosperous countries (such as the UK and US) who make use of the systems should help with a contribution.

MAIN DX AWARD

Most people are aware that the world's main DX award is called **DXCC**, or **DX Century Club** (see **Fig. 6**). To obtain the award, an amateur has to contact at least 100 countries and then obtain QSL cards.

The QSL cards are then submitted to the USA's national society, the **American Radio Relay League (ARRL)**. After checking, the DXCC certificate is issued, and it can be endorsed for different bands or modes.

There has been much discussion as to what constitutes a 'country', since the rules take into account geographical separation and other factors as well as political independence. In fact, ARRL now talks about "entities" rather than "countries", but most amateurs still consider them countries.

Competitive Radio Amateurs will try to work as many countries as possible and then get on to the 'Honor Roll'. This requires QSLs from all but ten of the available countries and is difficult because there are countries where operation is either forbidden or takes place very infrequently.

There is no doubt that DXCC is a valid way of acknowledging operating competence and perseverance. However, it doesn't really encourage activity among the most skilled amateurs, who will perhaps not go on the air until a rare country appears. Then there is bedlam, as the whole world tries to contact the same station!

The ARRL has added a few new awards to supplement the basic DXCC. The idea is to downplay the importance of places such as North Korea, which is at or near the top of the list of countries needed and assumes a relevance out of proportion to its real difficulty.

The 'DXCC 2000 Challenge Award' will give **one point per country per band (1.8-50MHz)**. There are certificates at several levels starting at 1000 points. There will also be a trophy for the leader each year - I'm sure the trophy will be hard fought over.

Of more relevance to those of us with family, mortgage, 100W and a dipole, is the 'Special DXCC 2000 Award'. This simply requires working 100 or more countries during the year 2000, without QSL cards - presumably the ARRL will use the honour system for submissions.

The award shouldn't be difficult, particularly if the sunspots reach their maximum next year, I would expect to see it on the shack wall of many amateurs.

RECIPROCAL LICENSING

After much cliff-hanging, we have the news that the USA will allow operation by amateurs from many countries without the need to apply for a reciprocal licence. This includes the UK and is effective immediately.

However, be aware that you must carry your British licence and proof of citizenship (i.e. British passport) at all times when operating. Remember to use the correct callsign - see 'Scene USA', October 1996.

So, it's now possible to operate in both the USA and Canada without applying for a reciprocal licence - very good news!

THAT'S ALL FOR THIS TIME. I HOPE TO CONTACT MANY OF YOU IN THE RSGB'S IOTA CONTEST (24-25 JULY), WHEN I'LL BE OPERATING CW AS VP9/N0ED. THANK YOU FOR ALL OF YOUR CORRESPONDENCE.

73 Ed N0ED

DATA SCAPE

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THIS MONTH ROGER COOKE G3LDI DISCUSSES A NUMBER OF 'DATA SCAPE' SUBJECTS - STARTING WITH THE IMPORTANCE OF KEEPING YOUR WEB SITE FRESH AND INTERESTING!

Welcome back to yet another 'Data Scape' column - I've spent an incredible amount of my time, between last month's column and now, trying my hardest to find time to improve my first attempt at producing a Web site. However, with the advent of Spring, it doesn't look likely that this is going to happen! I'm afraid that the garden beckons at this time of year and with all the chores out there to do, "shock, horror", there's been little time left for playing on the PC!

However, Web sites must be continuously updated if they are to thrive. The initial decisions which you make concerning updating and expanding your Web site will directly affect its efficiency and performance. Not only that, but it gives a lot of satisfaction to keep a site fresh and provide information that is useful for a wide range of visitors. Be warned though - this entails a lot of work and could take over your life!

MAIN PROBLEMS

One of the main problems in maintaining interest in your Web

site is keeping up with the available technology. Web sites are becoming more and more complex with increased media-rich content which can contain text, animated images, streaming audio and full-motion video. Updating this sort of information could be, and is for some people, a full-time occupation and not a chore to be undertaken lightly!

Fig. 1: The introduction page at www.searchenginewatch.com

If you're looking to create your own, non-commercial Web site, the 15Mb of space offered by **Freeserve** is more than adequate. It will take a considerable amount of information to fill this 15Mb of space up, as long as you design your site with a **minimum** of video and audio content and few flashing animations, firework displays and so on.

If you have a flare for design and produce a very interesting and attractive site, one of two things could happen. You can turn it into a productive career in Web site design which could provide you with "loads-o'-money" - if you find customers willing to pay what I've seen offered in trade papers! Even if you halved these charges, a comfortable living could be enjoyed.

The other thing that might happen is that your site could be ripped off by some unscrupulous businessman (for want of a better -or should that be stronger - expression!) and presented as his own. All your hard work could then be lifted and it seems that there's not much you can do about it! This sort of plagiarism is out there and with such a structure as the Internet has, it's difficult to trace just who is ripping off your source code!

So, what can be done about this problem, if anything? Apart from policing your site, you could enclose some individual 'metatags' identifications on your pages. These could include an identification, or some strange phrase that is not likely to be found anywhere else. These metatags can then be picked up when the search engine scrolls the Web, hence providing you with an instant snapshot of who is stealing your code!

Over the years, there have been a few cases where one person's design mysteriously appeared elsewhere on the Web and, because of the global nature of the World Wide Web, redress is available. Legal action need not only be limited to English courts if the offending Web site originated elsewhere - you can sue where you want! The only drawback is the fact that if the offending company has no discernible assets there's actually little chance of obtaining damages.

Thankfully, these situations are rare and do not really bother the amateur user, in fact, if an amateur site is copied in some regard, it's usually viewed with the old saying that 'imitation is the sincerest form of flattery'. However, if you are making a living at this sort of design, you may find it annoying - and that's putting it mildly!

Fig. 2: The first page to be found at the QSL site: www.users.tm.net/jjmcd/qslmake.htm

SEARCH ENGINES

As a rule, I normally use the **Google** and **Altavista** Search Engines, but there are several other search engines which are worth checking out. It's useful, though, to know just how search engines work and be able to then tailor your Web site accordingly.

Why not take a look at the following URL: **www.searchenginewatch.com** which explains just about everything you need to know about how a search engine works (See **Fig. 1**).

FREEPHONE INTERNET?

Now on to other developments in the world of the Web! The access market is looking set for another shift ... apparently, freephone Internet access is to be offered on a regular basis.

ISP pioneer, **X-stream** (which launched the UK's first free access service last year), is to extend its March freephone number offer to permanent users, although the service will only be available from 0000 to 0200UTC, Monday to Thursday to users of X-stream's POP3 E-mail service. Still, given what happened following the last of X-stream's innovations, it looks like the UK access market could be in for another shock.

The electrical retail chain **Tempo** is offering free Internet access via screaming.net and off-peak local telephone calls to its access provider Localtel. If you want more details try **http://signup.screaming.net** Read the terms and conditions very carefully though, as they want your credit card details. They offer you free access during the evenings and weekends, but in return you are expected to sign up with them for the telephone service.

W H Smith also launched free Internet access following on from Dixons Egg and Tesco. There are now about 50 free ISPs in the UK. This sort of development will force Dixons to react if it is extended to a 24 hour model, i.e. free access via freephone 24 hours. The stakes are getting higher - I wonder who will be the first to offer this model.

QSL CARDS

I recently had a new batch of QSL cards printed, something I had not had for a number of years. Gone are the days of submitting a design, having it made up into a block and then printed off. I merely produced a view that I wished to use, together with the printing I wanted - on both sides - and I was sent a sample of the finished product.

Actually, it's also possible to do this (on a limited scale) on the PC. Some very good cards can be printed in this way and it's possible to have several different designs, according to how the QSO was made. Try **www.users.tm.net/jjmcd/qslmake.htm** (**Fig. 2** shows the first page and **Fig. 3** gives an example. It's not a good idea to try to print dozens of cards, but for a one-off I think this is very useful).

This particular idea came from **FDS Graphics**, who I originally saw at the Leicester Show. The finished product is very attractive and not overly expensive by modern trends. Take a look at Geoff's Web-site at **www.fds-graphics.com**

APRS RE-VISITED

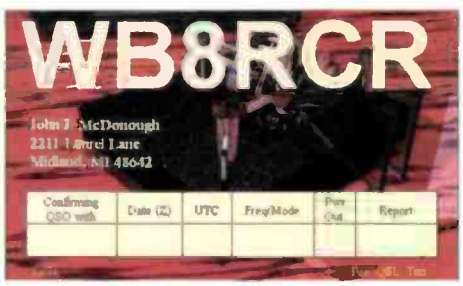
Automatic Positioning Reporting System (APRS) has been with us for a number of years now and is more popular in the USA than in the UK, it has to be said, but the tide is turning.

Its popularity has increased in the UK over the last year or so and is still growing. Information is widely available on the Internet and **Fig. 4** shows the introduction from just one site. A good place to start would be **www.aprs.org** From here you can see hyperlinks to other sites with just about anything you need to start, including downloading the software.

The APRS system started life in the USA as long ago as 1984, shortly after we started on Packet itself. As originally conceived, the initials APRS stood for Automatic Positioning Reporting System, whereby Packet radio was combined with the **Global Positioning System (GPS)** satellite network. This enabled Radio Amateurs to automatically display the positions of radio stations on maps on their PC.

As the system developed, further features not directly related to position reporting were introduced, such as weather station reporting, direction finding (DF) and messaging. This led to APRS being renamed as the Automatic Packet Reporting System. APRS is different from regular packet in three ways:

Fig. 3: An example of a QSL card from the QSL site: www.users.tm.net/jjmcd/qslmake.htm



1. It adds maps and other data displays;
2. It does all communications using a one-to-many protocol so that everyone is updated in real time;
3. It uses generic digipeating so that prior knowledge of the network is not required.

For these reasons, APRS turns

RadioScene

Packet radio into a real-time tactical communications and display system for emergencies and public service applications. Normal Packet radio has only shown usefulness in passing bulk message traffic from point to point. It has traditionally been difficult to apply conventional Packet to real-time events where information has a very short lifetime.

The system also provides universal connectivity to all stations but avoids the complexity and limitations of a connected network. It permits any number of stations to exchange data just like voice users would on a voice net. Any station that has information to contribute simply sends it and all stations receive it and log it.

It recognises that one of the greatest real-time needs at any special event or emergency is the tracking of key assets - "Where is the marathon leader"? "Where are the emergency vehicles"? "What's the weather at various points in the county"? "Where are the power lines down"? "Where is the head of parade"? "Where are the VIPs"? "Where is the storm"? "Where is the DX"?

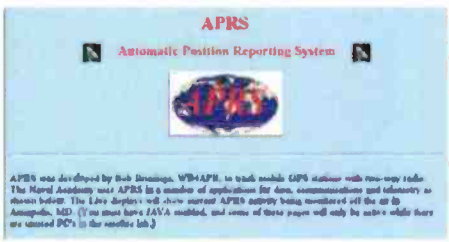
To address these questions, APRS has a fully featured automatic vehicle location and status reporting system too. It can be used over any two-way radio system including amateur, CB, marine band and cellular phone. There is even a nation-wide APRS tracking network on the Internet.

FEATURES

The APRS system runs on several platforms including DOS, Windows 3.x., Windows 95/98 and Mac. There are three major display subsystems and a number of other minor displays. The following is an extract from a white paper written by **Ian Wade G3NRW**:

1. **Latest status** - This display maintains a list of the latest UI-frame received from each station. In DX Cluster mode, this display accumulates a list of all users and what was their latest command to the Cluster;
2. **Positions** - This display maintains a separate list of the positions of each station, often including a brief comment. It can also contain direction finding and weather information;
3. **Maps** - Maps from 3km up to 6437km can be displayed. All other APRS stations are plotted. Stations reporting a course and speed are dead reckoned to their present position. Overlay databases of the locations of all APRS digipeaters, US National Weather Service sites and even amateur stores are built in. It's possible to zoom in to any point on the globe;
4. **Messages** - In addition to the one-line status packets, two-way messages with acknowledgement are supported. All incoming messages alert the user on arrival and are held on the message screen until killed;
5. **Bulletins** - This screen maintains a list of active bulletins. These are important multi-line bulletins addressed to everyone;
6. **Traffic** - This screen shows the last 42 messages monitored between other stations on the net. DX-mode talk traffic also shows up here. A keyboard command will connect these stations with lines on the map;
7. **All Packet Log** - This display is a time sequenced log of every new status or message received;
8. **Heard Log** - Displays the total number of packets per station per hour. These statistics show the connectivity of the network over varying paths, such as h.f., or to see when stations enter and leave the net;
9. **Digipeater List** - This displays raw packet headers so that APRS users can see what digipeater paths other stations are using;
10. **Station Tracking** - Although APRS automatically tracks mobile GPS/LORAN equipped stations, it also tracks perfectly well with manual reports or grid squares. Additionally, any station can place an object on his map (including himself) and within seconds that object appears on all other station displays. In the example of a parade, as each checkpoint with Packet comes on line, its position is instantly displayed to all in the net. Whenever a station moves, he just updates his position on the map and that movement is transmitted to all other stations. To track other event assets, only one Packet operator needs to monitor voice traffic to hear where things are. As he maintains the positions and movements of all assets on his screen, all other displays running APRS software display the same information. There's also a tracking command that will cause APRS to keep the map display always centered on a selected object.
11. **ACARS** - If the TNC has an ACARS modem for receiving airline digital packets on 131.55MHz, then a special version of APRS will plot the positions of all aircraft in range (usually up to about 322km out).

Fig. 4: The Home page from just one site where you can get more information about APRS.



TO BE CONTINUED ...

Well, I'm afraid that's just about all I've got time (and room) for this month. I hope that you are enjoying the column please let me know if there's anything which you would like to see covered in this column.

UNTIL NEXT MONTH THEN.

73 Roger

BROADCAST

REPORTS AND INFORMATION TO ME PLEASE:

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MORE NEWS THIS MONTH FROM PETER SHORE ABOUT THE "MEDIA WAR" WHICH IS TAKING PLACE IN AND AROUND YUGOSLAVIA. HE BRINGS NEWS OF STATIONS WHICH HAVE EXTENDED PROGRAMMES IN THE HOPE OF ENSURING THAT UNBIASED INFORMATION IS ALSO REACHING THE REFUGEES.

With Nato's bombardment of Yugoslavia continuing unabated as this edition of *Practical Wireless* goes to press, the media war is also developing. Many western international broadcasters have stepped up their programme output for the region in the hope of reaching the refugees and getting unbiased information into Yugoslavia to counter to Milosevic propaganda machine.

Deutsche Welle (DW), for example, has expanded all its programmes for the Balkans and the German station has initiated a humanitarian 'tracing' service for missing people.

"Deutsche Welle hopes to be able to reach even more of the thousands of people from the Balkans currently living in Central and Western Europe", says **Dietrich Schlegel**, head of DW's South East European department. "We want to inform them about events in their home countries".

Deutsche Welle's short wave and medium wave transmissions in Balkan languages are:

HUMANITARIAN BROADCASTING

The **BBC World Service** has stepped up its humanitarian broadcasting in conjunction with the Red Cross. The "BBC World Service hopes to contribute to the alleviation of what has been called the biggest refugee crisis in Europe since the end of the Second World War", says **Mark Byford**, BBC World Service Chief Executive.

"We hope that these radio broadcasts will help the refugees of Kosovo be reunited in the same way that our 'lifeline' service in the Kinyarwanda language continues to help refugees in Rwanda and Burundi find their families". There are two programmes on weekdays, at 1015-1030UTC on 13.745, 15.415 and 17.67MHz and 1330-1345UTC on 11.68, 15.115 and 13.67MHz.

THE US GOVERNMENT

The US government, working through its USAid humanitarian assistance arm, built a ring of high power f.m. transmitters in countries neighbouring Yugoslavia. These, all operating

Albanian (Times are in UTC):

0745-0800	7.190, 9.750MHz;
0930-1000	7.190, 9.650, 11.905MHz;
1000-1030	9.650, 11.905MHz;
1300-1330	9.650, 11.905, 11.970MHz;
1630-1700	7.185, 9.650, 9.770MHz;
1700-1730	7.185, 9.770, 15.470, 17.835MHz;
1930-2000	7.185, 11.905, 15.470MHz;
2000-2030	7.125, 15.470MHz;
2215-2230	5.955, 7.125, 13.790MHz and on medium wave 1458kHz.

Bosnian (Times are in UTC):

0800-0815	7.190, 9.750MHz;
1330-1400	9.650, 11.905MHz;
1400-1430	7.185, 9.650, 9.770MHz;
2030-2100	7.125, 15.470MHz.

Bulgarian (Times are in UTC):

0700-0730	7.190, 9.750MHz;
1130-1200	9.680, 11.825, 15.545MHz;
1200-1250	9.650, 9.680, 11.825, 11.905, 15.545MHz;
1800-1900	15.470, 17.835MHz (ends 1850UTC).

Croatian (Times are in UTC):

0900-0930	7.190, 9.650, 11.905MHz;
1430-1500	7.185, 9.650, 9.770MHz;
1900-1930	7.185, 11.905, 15.470MHz.

Macedonian (Times are in UTC):

0830-09.00	7.190, 9.750MHz
1100-11.30	9.650, 11.905MHz
1500-15.30	7.185, 9.650, 9.770MHz
1730-18.00	7.185, 9.770MHz

Rumanian (Times are in UTC):

1030-1130	9.680, 11.825, 15.545MHz;
1730-1800	1.5470, 17.835MHz;
2100-2200	6.140, 7.125, 9.470, 11.855MHz.

Serbian (Times are in UTC):

0730-0745	7.190, 9.750MHz;
0815-0830	7.190, 9.750MHz;
1030-1100	9.650, 11.905MHz;
1130-1200	9.650, 11.905MHz;
1530-1630	7.185, 9.650, 9.770MHz;
1800-1900	7.185, 9.770MHz;
2200-2215	5.955, 7.125, 13.790MHz and on medium wave 1458kHz.

Hungarian (Times are in UTC):

1130-1200	7.130, 9.690MHz.

on a single frequency of 106.5MHz, carry programmes from the **Voice of America** and **Radio Free Europe** and target Serbia.

The **Voice of Russia** has also increased its activities in the region. A sequence of programmes for the Balkans starts at 1900 for two hours, including Serbo-Croat, Albanian, French, German and English material. The frequencies used are 7.35, 9.865, 11.98 and 12.00MHz plus 1548kHz medium wave. The English service of the Voice of Russia has been carrying heavily anti-Nato commentaries.

ORF Radio Austria International have added a special service to the region. Broadcasting between 1800 and 2300UTC on 1476kHz medium wave and 5.945MHz short wav, The programmes are in Serbo-Croat, Albanian, English and German with missing persons sections for refugees.

Croatia, so far unaffected in any material way by the war, has an English component of its radio service which is on the air with English news for a couple of minutes an hour between 0100 and 0500 on 9.925MHz and from 0500 to 0900UTC on 13.82MHz.

There is a crisis of a different sort in the Ukraine where **Ukrainian Radio's World Service** has lost many of its short wave transmissions. It used to lease capacity from the Russian Radio and Television organisation but now cannot afford the prices for the four powerful transmitters in Kharkov and two in Kiev and others in Nikolayev.

Radio Free Asia (RFA) has ordered a new transmitter and antenna from the US company, Continental Electronics. The order, announced by Continental at the NAB broadcasting convention in Las Vegas in April, is worth US$1.7 million and the equipment will be installed in Saipan, bringing the complement of RFA transmitters there to three.

FREQUENCY NEWS

Now on to frequency news to help you tune in to the world. **Kol Israel**, the **Voice of Israel**, is on the air in English at: 0400-0415 in 9.435, 11.605, 17.535MHz; 1030-1035 on 15.64, 17.535MHz; 1400-1430 on 15.65, 17.535MHz; 1900-1925 on 11.605, 15.64, 15.65, 17.545MHz; 2330-2335 on 11.585, 15.615, 15.64MHz.

Kol Israel can also be heard on **WRN1** on Sunday at 0930UTC in Europe, with a review of the week's news from Israel. However, the programme also has a news bulletin from Saturday evening which is confusing as items refer to events 'yesterday' that were actually on Friday!

Radio Pakistan is on the air with English: 0200-0245 on 11.93, 15.455, 17.895MHz; 0805-0810 on 15.53, 17.835MHz; 1105-1120 on 15.54, 17.835MHz; 1600-1630 on 15.335, 15.465, 17.535, 17.72MHz.

There are two religious short wave stations which you should have a go at listening at - one is relatively easy to hear, the other less so! **HCJB** in Quito, Ecuador, has English: 0000-0700 on 9.745, 12.015, 21.455MHz (u.s.b.); 0700-0900 on 11.95MHz; 0700-1100 on 15.115, 21.455MHz (u.s.b.); 1100-1630 on 12.005, 15.115, 21.455MHz (u.s.b.); 1900-2200 on 17.66, 21.455MHz (u.s.b.).

The other station, **KNLS** in Alaska, is a more difficult station to hear as it broadcasts to the Asian part of the Former Soviet Union and China. English is broadcast 0800-0900 and 1300-1400 on 9.615MHz. At other times this frequency carries Chinese and Russian.

THAT'S ALL FOR THIS MONTH. GOOD LISTENING UNTIL I BRING YOU UP TO DATE WITH ACTIVITIES ON THE INTERNATIONAL BROADCASTING BANDS IN NEXT MONTH'S MAGAZINE!

Classified Ads

To advertise on this page see booking form.

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For Sale

TECHNICAL MANUALS, AR88, CR100, R210, HR0. £5 each. Circuits £1.50. Hundreds available. SAE list. Bentley, 27 De Vere Gardens, Ilford, Essex IG1 3EB. Tel: 0181-554 6631.

THE UK's LARGEST SOURCE for Vintage Service data, circuits and manuals from 1900 to the 1970s. Free brochure from Tudor Gwilliam-Rees, Savoy Hill Publications, 50 Meddon St, Bideford, The Little White Town, North Devon, EX39 2EQ. Tel: 01237 424280.
E-mail: tudor.gwilliam-rees@virgin.net
Visa & Mastercard accepted.

WE BUY & SELL HAM GEAR New and used amateur equipment bought and sold, PX welcome. Ring Dave G3RCQ the gentleman dealer on: showroom (01708) 374043 or office 0956 854947.
Open 7 days 9am-10pm. 9 Troopers Drive, Harold Hill, Romford, Essex RM3 9DE.

THE RF-KIT CATALOGUE. send 2x 2nd class stamps or browse www.rf-kits.demon.co.uk
Hands Electronics, Tegryn, Llanfyrnach,
Pembs SA35 OBL. Tel 01239 698427.

Valves

VALVES GALORE Most valves available from stock. Otherwise obtained quickly. Please send SAE stating requirements or telephone.
VALVE & ELECTRONIC SUPPLIES Chevet Books, 157 Dickson Road, Blackpool FY1 2EU.
Tel: (01253) 751858 or Fax: (01253) 302979.
E-mail: chevet@globalnet.co.uk

VALVES:- OVER 50000 STOCKED Ham, Vintage, Military, Audio. SAE for FREE list to: Wilson Valves, (Jim Fish G4MH), 28 Banks Ave., Golcar, Huddersfield, West Yorks HD7 4LZ.
Tel: 01484 654650. Fax: 01484 655699.
E-mail: wilsonvalves@surflink.co.uk
Visa etc. Fast & personal service.

CASH FOR VALVES. ECC32 £10. ECC33/35 £6. ECC83/EF86 £3.50. KT66 £35. KT88 £55. EL34 £20. EL37 £18. PX4 £70. PX25 £130. GZ34 £8. GZ32 £8. DA100 £150. 4212E £150. PT15 £10. Ask for free wanted list.
Colomor (Electronics) Ltd, Unit 5, Huffwood Trading Estate, Bookers Road, Billinghurst, W. Sussex RH14 9RZ.
Tel: 01403 786559.
Fax: 01403 786560.
E-mail:
giacomelli@colomor.demon.co.uk

VALVES FOR SALE, swap, wanted. Thompson. 83 School Lane, Hartford, Cheshire. Tel/Fax: 01606 871082.

VINTAGE VALVE RADIOS Various models for sale all fully restored. Wireless repairs and cabinet restoration. Established on the south coast for 12 years.
Tel/Fax: Geoff Luxton 01903 531389.

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for all your valves, tubes, semi-conductors and ICs.
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TEL: 0181-684 1166. FAX: 0181-684 3056.

Holidays

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Packet address:
GW4VAG@GB7BAY#55.GBR.EU

Wanted

WANTED FOR CASH Valve or solid state communication receivers Pre-1980. Preferably working and in good condition. Non working sets considered also domestic valve radios. Items of Government surplus wireless equipment and obsolete test equipment. Pre-1965 wireless and audio components and accessories. Pre-1975 wireless and TV books and magazines. Also, most valves wanted for cash. Must be unused and boxed. CBS, 157 Dickson Road, Blackpool, FY1 2EU. Tel: (01253) 751858 or Fax: (01253) 302979. E-mail: chevet@globalnet.co.uk

WANTED AR58 CRYSTAL FREQUENCY CALIBRATOR type C.T. 432 made by Aeronautical Radio in reasonable condition.
Q Electronic Design. Tel: 0181-391 0545. Fax: 0181-391 5258.

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Tel: 0181-595 0823
http://www.angelfire.com/ok/g8slb

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Trader's Table

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WATERS & STANTON
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HF TRANSCEIVERS

MFJ-9020 x2 20m CW QRP Transceiver £125
Trio TS-120V HF SSB, CW Transceiver 25W with VFO-120. £269
Yaesu FT-757GX HF with Gen.Cov. 12V with FP-757HD 20A PSU £499

VHF/UHF BASE/MOBILE TRANSCEIVER

AKD 2001 2m FM Mobile Channelised 25W £145
Kenwood TM-251E 2m FM Mobile 50W £269
Kenwood TM-451E 70cm FM Mobile 35W 2m RX. Full Duplex £299
Yaesu FT-225RD 2m All Mode Base 25W with Mutek Mains/12V £549
Yaesu FT-290R II 2m All Mode Portable 2.5W £299
Yaesu FT-790R II 70cm All Mode Portable 2.5W £299
Yaesu FT-5100 2m,70cm FM Mobile 50W,35W Full Duplex.. £299

VHF/UHF HAND HELD TRANSCEIVER

ADI AT-200 2m FM H/Held with Nicad, sp.mic £99
ADI AT-600 2m,70cm FM H/Held.Wide RX.Full Duplex £175
Alinco DJ-180 2m FM H/Held with sp.mic,DC lead.Batt box. £135
Alinco DJ-580 x2 2m/70cm FM H/Held £175
Alinco DJ-F1E x2 2m FM Mini H/Held £99
Alinco DJ-S11 2m FM Palm Transceiver with 136-174MHz RX £69
Icom IC-2E 2m FM H/Held £95
Icom IC-2SE 2m FM Mini H/Held with Battery box, Case £109
Icom IC-24ET 2m/70cm FM H/Held £179
Icom IC-W2E 2m/70cm FM H/Held (with sp. mic) £199
Icom IC-W32E 2m/70cm FM H/Held with Full Duplex ..£229
Kenwood TH-28E 2m FM H/Held £199
Kenwood TH-42E 70cm FM H/Held £189
Kenwood TH-46E 70cm FM H/Held £199
Standard C-520 2m,70cm FM with Full Duplex, Batt. box £185
Standard C-558 2m/70cm FM Handheld £299
Yaesu FT-51R x3 2m/70cm FM Dual Display Wide RX 80Ch. £249
Yaesu FT-309R 2m FM H/Held ..... £95 Yaesu FT-470R x3 2m/70cm FM H/Held with Dual Display £189
Yaesu FT-530 2m,70cm FM Handy with Full Duplex £195
Yaesu FT-811 70cm FM H/Held with DC adapter £189

SHORTWAVE RECEIVERS

Drake R-8E 150kHz-30MHz All Mode Receiver Mains ..£625
Grundig YB-206 Portable Receiver with FM £69
Grundig YB-500 x2 Portable Receiver with SSB £130
Icom IC-R70 100kHz-30MHz AM,SSB,CW Mains £425
Icom IC-R71 100kHz-30MHz All Mode Receiver Mains £425
Icom IC-R72 x2 Base Staion Receiver £449
Icom IC-R72 DC 100kHz-30MHz AM,CW,SSB 12V with PSU £449
Lowe HF-150 30kHz-30MHz All Mode 12V with Keypad,PSU £259
Lowe HF-225 x2 30kHz-30MHz All Mode Receiver 12V £299
Lowe HF-250 30kHz-30MHz Receiver 12V PC Computable . £399
Roberts R-802 Digital FM,MW,SW Portable Radio £45
Sony ICF-SW55 Portable Receiver with FM stereo and SSB .. £189
Sony ICF-SW100E Pocket Receiver with FM stereo and SSB £49
Steepletone MBR-7 MW,LW,SW with 107-176MHz Portable/Mains £45
Yaesu FRG-100 50kHz-30MHz AM,CW,SSB 12V with PSU. £345
Yaesu FRG-100 As Above with FM,TCXO-4, Keypad 12V with PSU £399

SCANNERS MOBILE/BASE

Realistic Pro-2006 25-520,760-1300MHz AM,FM,WFM 400Ch. £175
Realistic Pro-2014 68-512MHz (with gaps) FM Receiver 50Ch. 12V £85
Realistic Pro-2026 x2 66-956MHz (with gaps) AM,FM 100Ch, 12V £149

Scanners Hand Held

Alinco DJ-X1 x2 100kHz-1300MHz AM,FM,WFM 100Ch.. £139
Alinco DJ-X10 100kHz-2000MHz All Mode 1200Ch.... £225
Icom IC-R1 x3 0.1 - 1300MHz AM/FM/WFM..... £199
Opto R-10 x2 30MHz-2GHz FM Interceptor £129
Realistic Pro-43 x4 68-999MHz (with gaps) AM,FM 200Ch... £129
Realistic Pro-62 68-960MHz (with gaps) AM,FM 200Ch. Hyperscan £139
Sony Air-7 FM,MW,LW,SW with 108-137,144-174MHz £99
Yupiteru MVT-3300 x2 66-1000MHz (with gaps) AM,FM 200Ch £129

NEVADA
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ALINCO DX-70T 100W HF + 10W 6M TRANSCEIVER ..£475
ALINCO DX-70TH 100W HF+6M TRANSCEIVER £499
ICOM IC-725 HF 100W TX £499
ICOM IC-765 HF 100W TRANSCEIVER £999
KENWOOD TS-50S HF MOBILE £499
KENWOOD TS-680S 100W HF + 10W 6M + CTCSS £999
KENWOOD TS-930S 100W HF TRANSCEIVER £699
YAESU FT-757GX HF 10W TX/RX £395
YAESU FT-1000 200W HF TRANSCEIVER + ALL FILTERS... £1799

TRANSCEIVERS VHF/UHF

AKD 2001 2M FM MOBILE TRANSCEIVER £115
ALINCO DR-590 2M/70CM MOBILE TRANSCEIVER £225
ICOM IC-207H 2M FM MOBILE TRANSCEIVER £225
ICOM IC-228H 2M 45W MOBILE £185
ICOM IC-240 2MTR 10W FM MOBILE £99
ICOM IC-345 2M MULTIMODE TRANSCEIVER £149
KENWOOD TM-201A 2M FM MOBILE £159
KENWOOD TM-255E 2M MULTIMODE £499
KENWOOD TM-732E DUAL BAND MOBILE TRANSCEIVER £329
SHAKESPEAR SE2500S 25W MARINE TX £229
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STANDARD C-8900 2M MOBILE £185
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TRIO TR-2200 GX 2MTR MOBILE TX £75
TRIO TR-7500E 2M MULTIMODE TRANSCEIVER £329
TRIO TR-9130 2M MULTIMODE £249
TRIO TS-700 2M MULTIMODE BASE £295
YAESU FT-227R 2M 10W FM MOBILE £99
YAESU FT-290R 2M MULTIMODE+ ACC £199
YAESU FT-290 R11 2MTR M/MODE £275
YAESU FT-290 R11 + FL2025 AMP 2MTR M/MODE £375
YAESU FT-726R 2M/6M MULTIMODE BASE £499
YAESU FT-726R HF/2M/70CMS BASE TX £599
YAESU FT-5100 DUAL BAND MOBILE £269
YAESU FT-8100R 2M/70CM MOBILE TRANSCEIVER £325

RECEIVERS

DRAKE - R8A HF RECEIVER £799
ICOM ICR-71E HF RECEIVER+REMOTE £899
ICOM PCR-100 PC BASED SCANNER £149
LOWE HF-225 HF RECEIVER £399
SANGEAN ATS-803A S/WAVE RX £99
SONY ICF-7600D SHORTWAVE RECEIVER £69

HANDHELDS

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ALINCO DJ-180EB 2M HANDIE - EX DEMO £129
ALINCO DJ-180 2MTR H/HELD + EDC46 FAST CHARGER £129
ALINCO C5 DUAL BAND MICRO - EX DEMO £149
ICOM IC-4IE 70CMS - EX DEMO £155
KENPRO 202 2MTR H/HELD TX £99
KENPRO KT-44 70CMS H/HELD TX £85
KENWOOD TH-215E 2MTR H/HELD TX £89
KENWOOD TH-28E 2MTR H/H TX+70CM RX £149
KENWOOD TH-45E 70CMS H/HELD TX £139
YAESU FT-23R 2M HANDIE £99
YAESU FT-50R 2M/70CMS HANDIE £199
YAESU FT-470 2M/70CM HANDI+ACC £159
YAESU FT-708 70CM HANDIE £89

MISCELLANEOUS EQUIPMENT

COMET FS-24BM 70/23 CM MOBILE WHIP £25
COMET CM-420M MINI 2MTR/70CM SWR METER £25
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DATONG ASP AUTOMATIC SPEECH PROCESSOR £65
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KENWOOD AT-230 ANTENNA TUNER £169
KENWOOD DFC-230 FREQ CONTROLLER £49
KENWOOD PS-430 POWER SUPPLY £100
KENWOOD RC-10 REMOTE CONTROLLER £49
KENWOOD TL-120 100W HF AMP £185
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YAESU FT-S17 CTCSS & FT-411/811 ETC £39

SOUTH EAST COMMUNICATIONS
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Kenwood MC90 digital desk mic £99
Yaesu FRT7700 short-wave A.T.U. £49
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Yaesu FRG100 boxed mint with PSU £349
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AOR 8000 0-1900mhz 1000 memories £239
Icom PCR100 0-1300mhz AM, FM, NFM £169
Icom IC7100HF 0-2000mhz all mode 1000mem £699
Yupiteru MVT7100 0-1650mhz charger nicads etc £179
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Realistic Pro 2025 60 memories 66-512mhz £79
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All prices in Sterling

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*Items marked with * are sold on behalf of customers, cash or cheque, no warranty. All other equipment includes 3 months warranty.*

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Icom IC-745 Gen cov RX 100W 12V DC .. £395
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IC-730 100W 12V DC £295*
IC-725 Gen cov Rx 100W 12V DC £495
Yaesu FT-101Z 240V 100W £250
FT-757GX 100W plus FP757 psu £495
Heathkit HW9 inc WARC £225*
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MFJ 989C 3KW ATU £175*
949D ATU £75
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CB

Midland 77104GTL + PSU £45
Danita 640 (Eur) £30*
Altai 5-7A PSU £15

Book Store

Put your *Practical Wireless* Magazines in order this month with our special binder offer!

BUY of the MONTH

This month, *Practical Wireless* are offering our readers the chance to purchase the perfect solution to the heap of *PW* magazines which just seems to keep on growing on the coffee table! The solution is really quite simple - and it comes in the shape of a *PW* Binder!

These very special binders are produced in heavy duty card, coloured in a smart navy blue with the *PW* logo printed in gold lettering on both the front and on the spine. Each one comes complete with a set of year labels and binding bars and will comfortably hold a years worth of your favourite Amateur Radio magazine!

If you order your binder this month, you'll save money on the postage because we are offering them to our readers for a mere **£5 including P&P (UK only, plus £2 P&P for overseas orders)**. Offer closes **31 July 1999**.

To order please either use the form on page 74 or call the Credit Card Hotline on (01202) 659930 and quote PW7.

LISTENING GUIDES

Airband

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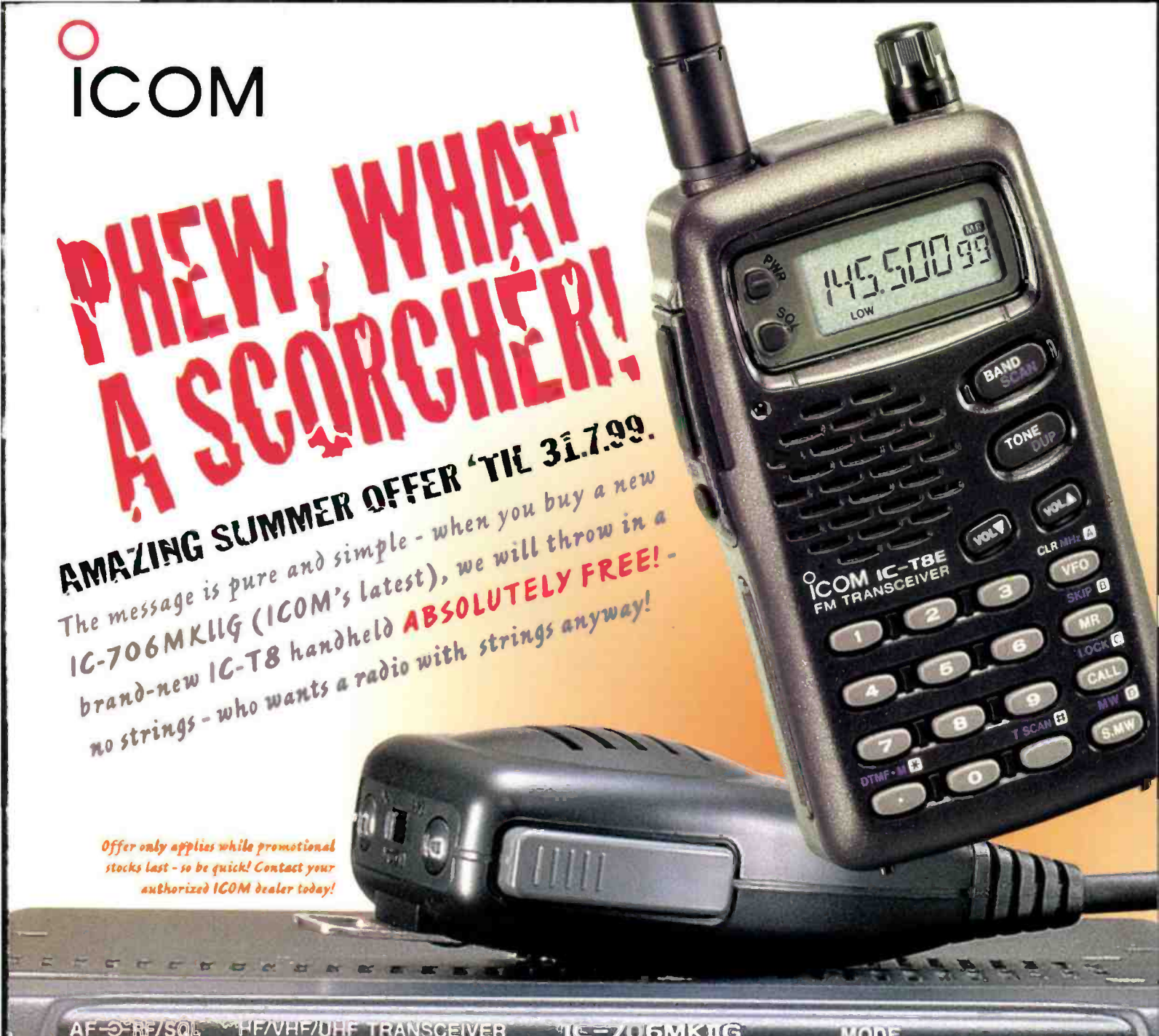

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  TX : 160-6 m/144-146 MHz/430-440 MHz
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- DSP Bandpass Filter, Notch Filter, Noise Reduction, and Equalizer
- IF Noise Blanker
- IF Shift
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- Detachable Front Panel
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FIELD COMMANDER

FT-100

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