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## HAM RADIO TODAY

JANUARY 1995 £1.80

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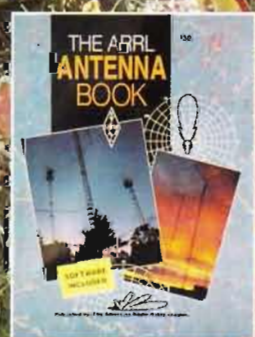
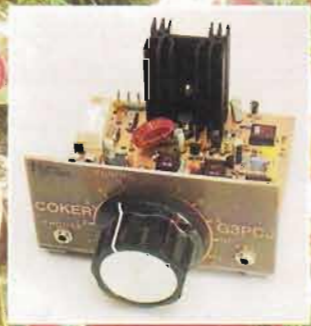


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## HAM RADIO TODAY

VOLUME 13 NO. 1 JANUARY 1995

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# CQ de G8IYA Editorial

*A season of goodwill, to all*

We all have different interests. An old 'cliché' is that the world would be a very boring place if we were all the same. Our mutual hobbies often bring many of us together. For example, my Tech Ed once found himself in Riyadh, Saudi Arabia. He was very pleased, and honoured, to learn that he'd been invited to a traditional Arabic meal at a large mansion, as a guest of the radio ham owner. The very pleasant meal was followed by a spell on air, with Chris calling 'CQ G' on 20m using his host's individually-issued HZ callsign.

The world isn't always a happy place to be in. Suffering exists in many places. Wars between rival nations do little to help matters. Yet, despite these differences, you'll often find the international hand of friendship is extended over the airwaves, between people who see themselves as equal human beings on the bands. Great friendships have sometimes resulted, often between people who have never met, and who may never get a chance to meet each other.

At the other end of the scale, we have raging 'battles' being carried out, often on a local level. People with one interest dislike what others are doing. Some feel packet radio on their traditional 'natter channel' at the bottom end of 2m is a diabolical intrusion, and go all out to cause deliberate interference to any such 'intruders' whether they're using the channel or not. Others feel that 'real' amateur radio is only practised on CW by G3s and maybe some of the earlier G4s. Those G0 guys aren't 'real' radio amateurs at all, and as for the 'new breed' of 2E1 stations....

## Doom and Gloom?

Bodies such as AMSAT-UK, the G-QRP Club, and others are proclaiming their memberships are now dropping. Radio clubs are writing to us to say their rally has had to be cancelled. Repeater groups are finding it increasingly difficult to meet costs. Yet all the time, the cost of amateur gear is becoming relatively less and less expensive in 'real' terms. Not many people would have dreamed of buying something like an FT-1000 ten or twenty years ago (many of us carry on dreaming). Even today's kids are going out and buying CD-i systems for hundreds of

pounds, don't ask me where they get the money from!

If money isn't the only issue, maybe there's a deeper-rooted cause to this 'lack of interest' in our hobby. Maybe we're not keeping up with technology, whatever the technology of any given day or month is perceived to be. Maybe we're not talking to each other on the air, or if we do then perhaps we just go on about what's 'real' amateur radio and what isn't. This isn't always deliberate, it could just be the image we put across without realizing it. We should remember that, when we transmit, there's almost *bound* to be an audience, of anywhere between one to one thousand others, sometimes more, listening to us.

## Be proud, be happy

A new book, "Thanks to Amateur Radio" by Stan Gülich SM7WT, which I've started to read through, is like a breath of fresh air. Don Field G3XTT mentions this in his column this month, and it really *is* a truly readable book, for hams and non-hams alike. It emphasizes the many good points of our hobby, and it's already started to make me feel even more proud to be a licensed radio amateur. You'll see it reviewed in next month's HRT.

In the meantime, be happy, be proud to share this great hobby of ours. Don't let them get you down!

## This month's PC software offer

This month, HRT is offering readers a copy of the **GEOLOCK** shareware program, which gives you a full colour 'radio amateur's map' on your PC screen. The local time at any location in the world can be read, with daylight and darkness areas graphically shown together with a highlighted 'grey line' area, all dynamically in 'real time'. Your own town and location are highlighted on the map, and you can choose a variety of maps, or a global image, to be displayed. It's certainly a stunning 'alternative clock' for your shack, guaranteed to impress visitors as well as being a handy propagation and operating aid for your station.

Together with this, also on this month's disk is **NUMORSE**, a fully-



featured Windows-based Morse code shareware program written by a UK ham author. You can even keep your Morse up to scratch, or learn it in the first place, in between those wordprocessing or database jobs you love doing so much on the office PC!

To obtain your software copy, which comes supplied on a high density 1.44Mb 3.5in disk, just send a £1 coin *securely taped between two pieces of thick card*, together with your name and address (some readers forget to put in a return address) and the original 'corner flash' cut from this month's 'contents' page, to; *HRT Jan 94 Disk Offer, Software Services, 6 Wyre Close, Chandler's Ford, Eastleigh, Hants SO53 4QR.* (Please note this is a **mail order only** service). Please ensure your £1 coin is securely packed - not loose in a flimsy envelope as it'll fall out in the post, use a small 'jiffy' bag if you like as those are quite thick. This just covers the cost of the formatted HD disk and return UK p/p to you, overseas readers may send two US \$1 notes plus an IRC, Eire readers may instead send a one punt note plus an IRC. As this is an 'at cost' service to you by our contracted disk copying service, I'm sorry that cheques can't be handled due to high banking and admin costs for such a small amount - send your cash by recorded delivery if you require additional security. If you'd like copies of any previous month's software offers, you may send the appropriate corner flashes and additional coins in the same envelope if you wish.

## Peace and goodwill

It just remains for me to wish all HRT readers, wherever in the world you may be, a peaceful and happy Christmas. 1995 will bring you a few nice surprises in HRT, I can promise you that.

# Libris Britannia 4 CD-ROM Review

*The HRT Tech Ed takes a look at a CD-ROM packed full of just scientific and technical shareware!*

I reviewed *Libris Britannia 3* from the PDSL (Public Domain and Shareware Library) in the June 94 issue of HRT. This was a collection of the very best PC shareware covering all subjects, from ham radio to games. There I came to the conclusion that it was worth every penny, even if just for the massive amount of ham radio and electronics software. Well, the same people have now brought out Volume 4, which *also* contains over a Gigabyte of compressed software. But this one's limited to *just* scientific and technical programs! No games, no gardening programs, no astrology or fortune telling programs, just 'techie' stuff!

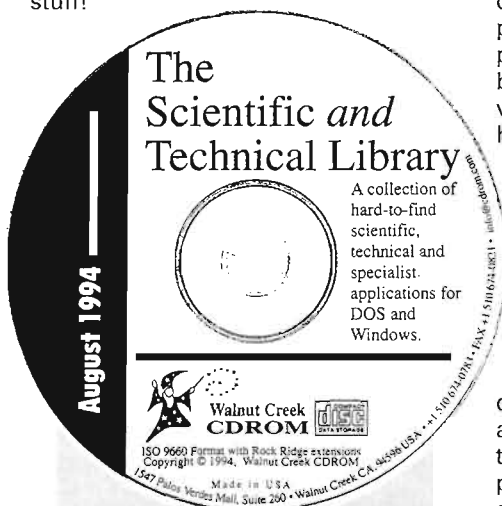
extending to a paragraph or so. Very useful, and very handy in saving you time in 'ploughing through' the whole disk trying to find a program that's exactly what you want!

It's quite 'up to date' in terms of containing many of the very latest shareware offerings, although it looks like publishing timescales unfortunately *do* also have their effect on CD-ROMS! For example, it does contain the popular 'PaKet' program, version 5.1 to be precise, although versions 6.0 and 6.1 have been subsequently released. However, to be fair *no* other CD-ROM I've come across has PaKet 6.0 either! So it's as up-to-date as you can possibly get, anywhere at this time.

I received the review disc some weeks ago, and I'm still ploughing through it - the extent of programs should keep any technically-minded computer user busy for years. There are over 70 ham program collections, plus around 140 more from the 'SIMTEL' files area, covering general ham radio, packet, satellites, hardware design and calculations, logging and QSL programs, propagation, TX/RX control, and the like. As well as this there's *plenty* more on electronics, PCB design, programming, modem

communication, engineering, biology, chemistry, if it's scientific or technical it'll be covered in one way or another!

I was most impressed with PDSL's latest offering, it's available from them direct at £39.00 inc p/p, or from software suppliers. My thanks go to Rod Smith at the PDSL (Tel. 0892 663298) for the provision of the review disc.



**Libris Britannia 4**

## Heavy reading

To help you sort through the vast amount of software provided, the CD-ROM comes with a 96 page book containing a description of every single program, this often


# LIBRIS BRITANNIA ISSUE 4

**The Scientific & Technical Library**

The Ultimate Collection of Virtually all Available Scientific & Technical programs for DOS & Windows.

This CD ROM is intended for the technical and scientific user or programmer who does not want to wade through thousands of games, reminder systems and the like looking for what he wants. Its all here in one collection!

More Than 550 Megabytes of ZIP compressed files. Unpacks to around 1Gigabyte of programs.

**CDROM** 

**A 96 page 'contents' book comes with the CD-ROM**

# LETTERS

## Letter of the month

### Operators, technicians, or both?

Dear HRT,

I have been an SWL since 1977, monitoring exclusively the ham bands. My main interests have always been the DX and award chase. To give an idea how serious I'm taking my hobby: I have heard and confirmed all current DXCC countries, including a few deleted ones and I have achieved some 800 awards (among them some real goodies such as 'Yasme Supreme Award', 'WAB Bronze', 'WPX Award of Excellence', 'DLD-H-1000', etc. As you might imagine, I have little spare time left for any other hobby as I have a job and a family to take care of as well!

With great interest, I read your comments about the 'ticket' in the September '94 HRT. I can only confirm that the examination in Belgium is real hard to pass as well. As I never studied electronics (I used to learn old Greek and Latin - quite different!) I don't possess the technical knowledge to pass the Belgian examination. This brings me to the following point. During my SWL career I have cumulated quite some experience about how to operate on both HF and the higher frequencies properly. If you listen on a common day to some ragchewing, let alone monitoring some huge pile-ups when a large

DXpedition is taking place, you can certainly witness the lack of good operating practice by quite some OMs. So, my question is: does an examination on technical matters make good operators? I leave the answer up to you. However, SWLs with a large practical experience, are being denied any transmitting possibility only because they know how to operate properly, but don't know the answers to all those technical questions. Of course, the vast majority of 'old timers' will strongly oppose my arguments. But, on the other hand, does a good mechanical engineer who fixes cars make a good driver? As far as I can see, cars are far more dangerous than transmitters and nevertheless one only needs the basic principles of knowing how to drive a car as well as the traffic rules to get a driver's licence. At least that's the situation in my country!

Because many licensed hams look down on SWLs, I decided to prepare myself for the FCC examinations. This way the 'established' hams will notice I also have a licence. But, of course, they are already saying that a US exam is very easy to pass, so I assume they consider some 50% of the US licensees as 'ridiculous'. By the way, could you inform me whether a US licence would allow me to apply for any British licence if I should ever visit the UK?

My very 73 from Belgium, Egbert Hertsen.

## Editorial comment;

There is already discussion going on in 'high places' on the need for experience in operating as well as a pure technical test, the UK Novice licence being a working example of this. The US licensing system is certainly more 'practically' based than many others, but it's only the 'lower level' licenses, such as their Novice and Technician exams, with their limited operating privileges, that could realistically be described as being 'easier' than the norm. For example, you'll need to know the radiation patterns of phased verticals at varying wavelength spacing with varying phase difference feeds, Boolean algebra, spread spectrum communication, EME libration fading, satellite Doppler effects, Smith Chart calculations, ATV interlace scanning patterns, and so on, and pass a 20WPM Morse test, before you get the US 'Extra' class licence. You will need at least the US 'General' class licence to obtain a reciprocal or full UK-only ham licence. As a comparison, exam questions for the 'General' licence (from the early 1994 question pool, in addition to the 13WPM Morse test) include the requirement to know which International Telecommunications Union Region the Northern Mariana Islands are in, and to calculate the length of each leg of a symmetrical delta loop reflector element for 14.1MHz. Are even the most difficult UK RAE question pitched at this level?

## 12.5kHz gear for 25kHz?

Dear HRT,

As far as the change to a 12.5kHz channel spacing on two meters is concerned; If those who wish to adopt this were to swap my existing equipment for new gear having switchable filters and deviation

settings, then I would quite happily use any standard that was desired.

More realistically, as this is not going to happen, I will continue to use my existing 25kHz spaced equipment, until there are so many inconsiderate users only 12.5kHz away that it becomes unworkable. Then I will leave the band!

A. Jaques, G3PTD

## Editorial comment;

I seem to remember reading that amateurs were going to carry on using AM on 20m instead of changing to SSB!

## £10 for the Letter of the Month

Do you have something constructive to say on the state of amateur radio today? Perhaps you'd like to put your viewpoint to the readers, get some discussion going, or give an answer to one of the issues raised? We'll pay £10 for the best letter we publish each month. So write in with your views, to Letters Column, The Editor, Ham Radio Today, ASP, Argus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST, or fax your letter direct to the Editor's desk on 0703 263429. Please keep your letters short, we reserve the right to shorten them if needed for publication. Reader's views published here may not necessarily be those of the magazine

# "TONE" BURST



By GOMEN ~~SE~~



## Back to basics

Dear HRT

As a recent 'returnee' to the listening side of the radio hobby, I am surprised at the astonishingly high prices of the top of the range communications receivers, in particular those RX-units with rather pricey 'add-ons' or optional accessories. Surely it is not beyond the wit of manufacturers (and sales outlets) to produce complete receiving gear at more modest prices, if only to increase the sales, and turnover of such equipment. Just how come Far Eastern products that much cheaper than British made products of similar standards?

It is interesting to note that, generally, even the most sophisticated receivers fail to provide all-modes as standard, even though

some are described as being 'multimode'. Despite AM still being used in the HF amateur bands, it seems that some firms produce only SSB/CW HF rigs, and, although it's agreed that 'sideband' is the in-thing, it shouldn't be that difficult to recognize the needs of AM operators and ham band listeners alike, and produce goods accordingly.

Oh for the days of the valved Eddystones, Hallicrafters and others, when tuning in or out, or through the bands, was not confined to jabbing buttons! When radio gear was built to tank and battleship standards, and were a pleasure to use, without lots of add-ons, buttons, switches and LEDs! Surely real radio enthusiasts have little real need for overpriced and incomplete 'status symbols', or do we all descend to the pedigree 'showdog' level, whereby radio gear is for ego-tripping rather than for proper enjoyment of the hobby?

OK, so the above points may not be the usual content of HRT readers' views. So what, and why not? Take a closer look at what's on offer and then ask yourself some pertinent questions as to your needs, and financial undertakings!

Alexander Lexton,  
Hemel Hempstead Pathfinders

**Editorial comment;**  
In 'real terms', ham gear has very much gone down in price over the years, i.e. the price remains constant but with much more sophisticated gear, while the average weekly wage goes up. But then, wages around the world aren't all the same, which of course explains why some countries can 'churn out' gear a lot cheaper than others. It's a pity their quality of life isn't the same. Ah well, back to the shanty town hut and tin bath at the end of the day.

## 12.5kHz channel spacing dropped

Dear HRT,

Thank you for publishing my note on 12.5kHz channel spacing ('Radio Today', October '94 HRT). Thus herewith is a summary of the replies and comments. Also thoughts on CTCSS.

25 individual responses have been received to date, plus a welcome report of a debate and result from the Chichester ARS and a submission from the GB3LD Repeater Group. My thanks all for taking the time and trouble to make your views known. I can only hope that they are representative of the ever silent majority. The net result of the total of 41 opinions expressed was 71% against change. Most challenged the need for change in the light of the

reduced activity on 2m, the cost to users and the possible reduction in performance.

Another view, that I also agree with, is that it is now too late to change. In a few years time, narrow band digital modes will become available (circa 5kHz bandwidth) offering superior performance, auto ID, voice mail etc. It was suggested that their channels could be slotted in between the 25kHz repeaters with little, if any, mutual disturbance. While the existing units were retained for an extended (10 year?) changeover period. In all fairness it should be pointed out, that the Repeater Management Group (RMG) has resisted any enforced change, and is happy to receive this limited support.

The latest suggestion came as a result of it being raised at last year's IARU Region 1 Conference, where it was revealed that some countries in the region had already implemented

12.5kHz spacing! Of more immediate interest is a possible general change to CTCSS access only, instead of the current toneburst plus carrier re-access, with the attendant benefits of reduction in co-channel interference, phantom bleeper and other abuses, plus safer operation for mobiles with only the PTT to operate and selective calling by base stations. Such a change would be welcomed, I know, by my neighbouring repeater keepers. Commercial controllers are available and many of us are already using them, albeit with mods.

The use of CTCSS is extensive in the USA where it is supplied as standard in amateur rigs, and where not, the boards are available for a few dollars. Here they seem to be highly priced, but that could change with increased demand.

Dave McQue, G4NJU  
Special Projects Manager, RMG

# Nova MR-225 2m rig Review

*Chris Lorek G4HCL examines a sub-£100 2m synthesized FM mobile transceiver having professional performance*

For this 'Christmas Review Special', HRT has temporarily gone away from comprehensive reviews of expensive Japanese all-singing all-dancing black boxes (but see next month's issue - there's two sat here!). When I received a call from Paul Taylor of Western Telecom telling me of the Nova MR-225 synthesized FM rigs they were converting for 2m use, I was very, very interested. A sample transceiver arrived within a few days!



PTT. I'm told that Western Telecom now also supply these interface details with each set, which is a good thing as in my opinion this would also make an excellent packet rig for the shack.

## Conclusions

The technical results measured show that there no 'corners cut' whatsoever in term of performance with this rig, it's up with the 'best of the best'. The

## Features

The set measures 200mm x 200mm x 55mm and is, naturally, built to professional and rugged PMR standards. It comes complete with a swivelling mounting bracket, external speaker, and a mobile fist mic. It's a fully synthesized rig, with internal EPROM control of channels in 12.5kHz increments between 144-146MHz, selected by the thumbwheel switches on the set's front panel. These have been arranged to give a direct frequency readout, for example '456' is 144.5625MHz, '550' is 145.500MHz, '577' is 145.775MHz etc. Any additional channels selectable by the final switch have been programmed for 6.25kHz offsets - which of course would probably not be used. The switches are backlit for nighttime use, and a 'busy' LED is fitted to show when the receiver's squelch is open.

The set is supplied fully working and aligned on 2m, i.e. 'ready to go'. It's fitted with IF filters suitable for 12.5kHz channel spacing, and the suppliers can fit 25kHz channel spacing filters as an option (but see later). Likewise, they can add an optional push-button 1750Hz toneburst for repeater access if required, this being the piezo-controlled circuit in the 'Surplus 2-Way Radio Conversion Handbook'.

## On The Air

Despite the 12.5kHz spacing filters, I found the set's receiver worked perfectly OK when listening to my semi-local 2m repeaters. I found the receiver was also exceptionally sensitive, certainly up to that of recent Japanese 'black boxes', although a slightly 'nasal' quality resulted due to the audio roll-off filters in the set. The transmitter gave just under 15W output, quite enough for working most stations that I could hear satisfactorily.

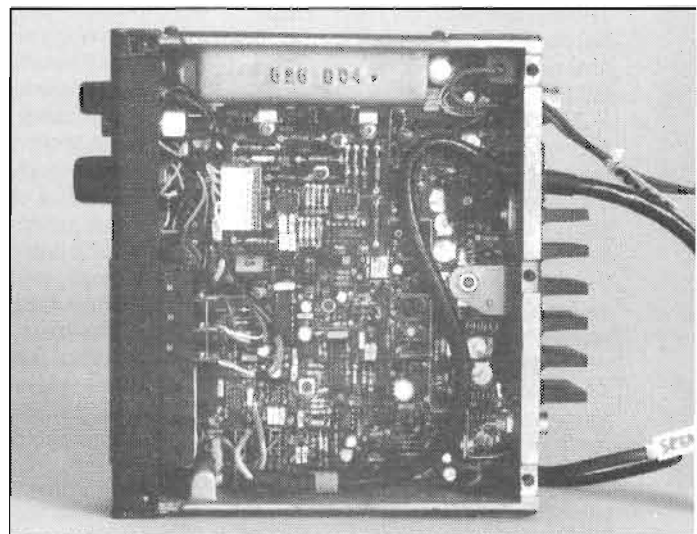
The transmit audio was quite good, although it was rather low in deviation, this having been set up for around 2.5kHz rather than 5kHz as commonly used for 25kHz channel spacing.

However, each set is supplied with complete circuit diagrams, so it only took me a few seconds to find the appropriate trimmer to turn this up a bit. The circuits were also very useful in allowing me to experiment with connecting packet TNCs etc, the PTT being 'positive going' and thus requiring a single-transistor interface to a negative switching TNC

only thing you don't get is the 'bells and whistles' associated with £400 oriental black box rigs such as memories and scanning. You know, the facilities on those flashy front panels that make the rig under your dashboard so very attractive to a thief.

If you're after a 'no-nonsense' 2m transceiver that's easy to use, this rig should fit the bill very well indeed. At a current price of just £95 plus p/p (with no VAT applicable at the time of writing, but check before ordering), it's the lowest cost set in its class that's available, which can't be a bad thing!

*My thanks go to Western Telecom (Tel. 01934 522199) for the provision of the review transceiver.*



# Book Review - The UK Scanning Directory

*Bill Robertson asks "How do they get away with it?"*

I believe it's quite true to say that this frequency guide could be described as 'controversial'. It lists thousands of spot VHF/UHF frequencies in the UK, everything from local taxi services up to tactical firearms unit frequencies. Indeed, the introduction welcomes readers to "...the most controversial and infamous radio book ever published in the UK." It even says it's been used in training at the Hendon Police College (I wonder in what way?), adding that the publishers have been told it is more accurate and comprehensive than internal frequency lists circulated by both the Home Office and the Ministry of Defence!

The huge amount of frequencies listed in the book have been compiled with the help of many readers of previous editions around the UK, and the publishers offer a free incentive local frequency guide to contributors to the next issue. This is apparent as, besides the wide range of 'national'

frequencies listed, many small geographical 'pockets' are very well covered in terms of information. Like the Channel Islands, and sections of Central Scotland, Dorset, Cambridgeshire, and so on. Maybe these are areas inhabited by active scanner users!

Each entry is listed in frequency order, together with the duplex frequency where appropriate, transmission mode, location, and user plus any additional information such as callsigns and remarks. In my opinion, whatever your listening interests are over 25-1800MHz, you'll find plenty of information here to keep you going.

Spiral bound with soft covers, 162mm x 211mm, ISBN 0 9519783 6 5. It's available from the publishers, Interproducts (Tel. 01738 41199) at £17.50 plus £1.00 UK postage, or from your local amateur radio dealer or bookseller.



## LABORATORY RESULTS

All measurements taken on 145MHz with 13.2V DC supply, using supplied DC cable, otherwise stated.

### RECEIVER;

#### Sensitivity;

Input level required to give 12dB SINAD;

0.17µV pd

#### Squelch Sensitivity;

Threshold; 0.12µV pd (4dB SINAD)  
Maximum; 0.53µV pd (22dB SINAD)

#### Adjacent Channel Selectivity;

Measured as increase in level of interfering signal, modulated with 400Hz at 1.5kHz deviation, above 12dB SINAD ref. level to cause 6dB degradation in 12dB on-channel signal;

+12.5kHz; 58.6dB  
-12.5kHz; 57.6dB  
+25kHz; 66.3dB  
-25kHz; 65.7dB

#### Blocking;

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

+100kHz; 79.7dB  
+1MHz; 92.2dB  
+10MHz; 97.9dB

#### Intermodulation Rejection;

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

25/50kHz spacing; 71.7dB  
50/100kHz spacing; 69.6dB

#### Maximum Audio Output;

Measured at 1kHz on the onset of clipping, 8 ohm load;

1.23W RMS

#### Image Rejection;

Increase in level of signal at first IF image frequency (-42.8MHz), over level of on-channel signal, to give identical 12dB SINAD signal;

78.3dB

### TRANSMITTER

#### TX Power and Current Consumption;

10.8V Supply; 9.86W/3.4A  
13.2V Supply; 14.7W/3.8A  
15.6V Supply; 17.7W/4.3A

#### Harmonics;

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

#### Peak Deviation;

2.62kHz

#### Frequency Accuracy;

-121Hz



# Coker Transceiver Kit Review

*Chris Lorek G4HCL gets his soldering iron out and has great fun in building, and using, the 'Coker' transceiver*

The 'Coker' is a single-band CW transceiver for either 80m or 160m. A direct conversion receiver is used, together with an uncomplicated four-transistor transmitter with an FET PA. A common printed circuit board is used for either band, this only having around half a dozen component value differences between bands.

Although the Coker kit gives you a basic 'no frills' rig, for example it doesn't even have a volume control, it has the capability of offering plenty of QSOs when used with a decent aerial. It's also *great* fun to build, and to use, I speak from experience!

## Design

I first heard of the Coker from the designer, Tim Walford G3PCJ himself, who as well as supplying a range of low-cost kits for hams also runs his own constructors club, with its quarterly newsletter, 'Hot Iron'. The 'Coker' was being promoted as a 'club project' rig, and from the many club event details received at HRT this project certainly seemed to have 'taken off'. "This warrants a closer look" I thought, and within a couple of days a sample 80m Coker transceiver kit arrived at my home, together with a ready-built 160m model, both on loan for me to 'have a go'.

## Paperwork

Unlike many other kits, I found the paperwork that came with the kit gave an excellent technical insight into the principles and circuit design



The kit as supplied, ready for building

of the transceiver. Having 'grown up' in the professional RF design world I found this to be particularly interesting, but in my opinion it would also give the Coker constructor a good insight on how the set works. It also gives a few ideas, with practical details, on how the transceiver circuit may be modified, for example to add a receiver volume control, a front panel CW break-in 'delay' control to replace the board-mounted preset, and so on.

Comprehensive 'step-by-step' assembly details are also given in the text, together with performance and alignment checks at each appropriate stage. For example, after the voltage regulator components have been assembled during the first stage of construction, a voltage check with a multimeter is performed, prior to assembling the next handful of components when a further check is made. This really does simplify things, and makes sure no 'compounded' mistakes are made. You know, the kind that make your rig go up in smoke on the first 'switch-on' after completion, destroying all the expensive semiconductors!

## Observations

I feel the kit is not suitable for the unsupervised, absolute beginner, for example a novice attempting to construct the kit without experienced supervision or help. There's no information given to decipher the supplied component colour-coding or value markings, it's up to you to know that a capacitor marked 'D223K' is a 22n and not a 2n2, and to understand the resistor colour code. However, the receiver, transmitter,

and band variant components are all supplied in separate marked bags, which does help somewhat providing you don't just tip everything in together!

Although the instruction text is, in my opinion, excellent and very well presented, it's accompanied by hand-drawn and copied circuit and component location diagrams. The supplied PCB doesn't have a printed component overlay, and during the first stages of assembly I had to be very careful that I'd placed components in the right holes before soldering them in. However, temporarily inserting some of the later-assembled but larger components, first, like the preset potentiometers, gave me a good 'starting point' to the locations of others. Indeed this advice is helpfully given in the assembly instructions to assist others like myself!

## Construction

Apart from the above, which is an observation more than anything else, I had no problems whatsoever in building up the kit. In fact, I had great fun building it. I wish more kits were

like this, there were no ambiguities as to what I should do first, or whether such-and-such was the right way to go about building the transceiver. The instructions also describe extremely well how to first get the receiver oscillator stages going, and then set these up on air for the correct tuning range with the use of either another receiver or a frequency counter if you have one, or indeed by 'trial and error' by listening for suitable amateur signals if you have neither.

It took me just over three hours to build the receiver section, following the instructions carefully and performing the various 'stage tests'. I found, upon the first on-air 'switch-on' before any frequency alignment, the receiver covered 3.65MHz to 3.75MHz, with SSB signals coming

## In use

The completed kit is as shown in the photo, ready for use and mounted on four supplied stick-on feet. You can, of course, add a metal case if you wish, providing there's sufficient ventilation for the transmitter heatsink which gets reasonably warm in use.

I used both my completed 80m transceiver, and the ready-built 160m transceiver also loaned to me, on air. The 160m transceiver I found covered 1.816-1.891MHz between its VFO tuning limits. I found the supplied front panel VFO knob was sufficiently large to allow a reasonable tuning rate in each case, although an extra 'fine tune' potentiometer could easily be added if required. The front panel is an etched PCB, so additional controls, switches or whatever can very easily be accommodated.

The receiver is designed to feed a pair of 30 ohm impedance 'Walkman' type headphones, which I quickly tested it with, gaining good results. I usually prefer to use my 8 ohm closed hi-fi types in the shack, these naturally resulted in a little less audio, but there was still just enough there for 'solid copy'. A volume control certainly wasn't necessary in my case,

but using higher-impedance phones with an added volume control is an option described in the kit's instructions.

Plugging in an external amplified speaker would, in my opinion, also be a worthwhile option for general 'listening around' whilst in the shack.

Even though it's a 'no-frills' transceiver, automatic TX keying with semi-break in switching is used, and there's also a built-in 750Hz CW sidetone provided from the front panel headphone jack

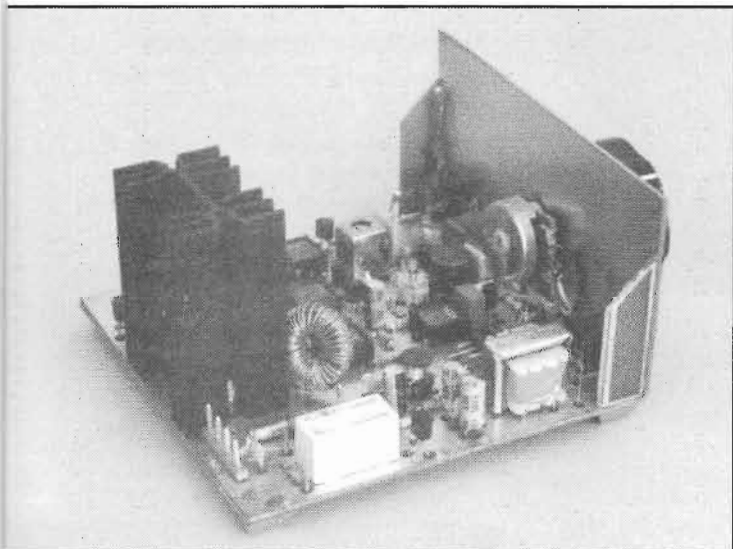
when you're sending, showing that the unit really is a fully 'self-contained' unit, eminently suitable for 'popping into a bag' to take along on holiday! A simple bandpass audio circuit is used on receive to help CW reception, although this isn't such a high 'Q' to prevent SSB reception of sorts if required.

I found the set to be reasonably stable after I'd tuned the VFO, however it was naturally quite 'hot' around the VFO frequency determining components. For example, raising the unit slightly from my shack table to aid tuning, caused a slight frequency shift of 100Hz or so. Adding a metal baseplate, such as you'd have with an overall case, would overcome this of course.

## Conclusions

I've deliberately tried to be critical in my review of this kit, simply because I had so much enjoyment in building it, and using it on air, that if I enthused too much about it in print I'd be accused of being on the supplier's payroll! In my opinion, this would be an excellent kit for the keen constructor, or indeed as a club project where beginners could obtain the required advice and help from experienced builders when this would be required.

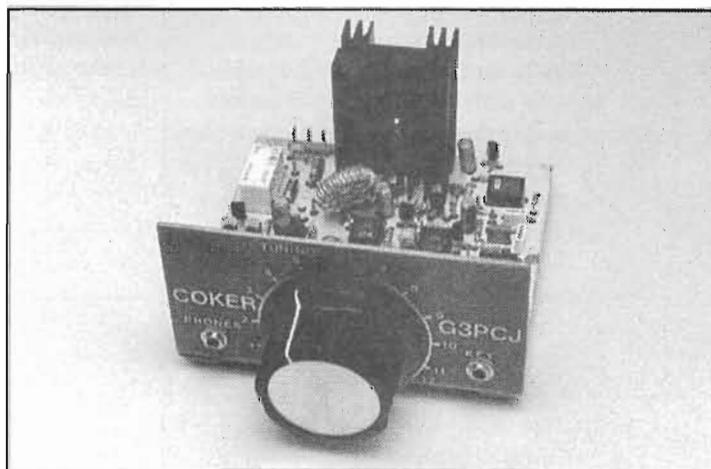
The Coker kit, for either 160m or 80m as specified on ordering, is currently priced at £45 for the transceiver, or £30 for the receiver with the option of the add-on transmitter parts for £17, and my thanks go to Walford Electronics (Tel. 01458 241224) for the loan of the units for review.



**A few hours later**

through nicely. A quick 'tweak' of the frequency-setting coil then put me down into the CW section. Careful adjustment and measurement then resulted in the set covering the range of 3.506-3.600MHz between extremities of the tuning knob, this controlling a potentiometer coupled to a varicap diode oscillator.

Building up the transmitter was similarly trouble-free, this taking me about two and a half hours. Yes, it also worked first time! The assembly instructions advised leaving enough enamelled wire on the toroidal coil in the low-pass filter stage to allow alteration by a turn if required, to give 'even' power across the tuning range. On my set I found that removing one turn was needed for this, but even without this I still managed to get over 5W power output across the 94kHz tuning range achieved.



**The completed transceiver, ready to use on air**

# SCANNERS

*Bill Robertson details improvement mods for the PRO-2004, and reveals a new perspective on worldwide communication monitoring!*

On display at the Timestep Electronics stand at this year's Leicester Show for the first time was a new Inmarsat-A monitoring system.

The Inmarsat network is a system of geostationary communication satellites, in four geosynchronous locations around the world above the Atlantic West, Atlantic East, Indian and Pacific oceans. The Timestep system contains the helical yagi aerial, preamplifier, and coax required, in fact everything apart from a suitable scanner receiver (i.e. an AR-3000A), to enable monitoring of worldwide telephone and fax communication from mobile and transportable inmarsat-A terminals. For the uninitiated, as well as being used for shipbourne communication, including emergency messages, these large suitcase-sized terminals are commonly used by jet-setting news teams, such as CNN, ITN and Sky reporters, via the Inmarsat network to relay live 'on-site' information back to their home studios. During the Gulf conflict a few years ago, Riyadh was the site of several of these, with plenty more being flown out to the Gulf a few weeks ago as a write this.

HRT have been promised an immediate review sample, and it's hoped to feature this in next month's issue. In the meantime, you can get more details from Timestep on 01440 820040.

## Realistic PRO-2004 Mods

R. McCartney G4SSK kindly sent me a PC disk with modification information for a couple of scanners, one being the Realistic PRO-2004 which I feel will be of interest to many readers. These mods are designed to increase the number of available memory channels, increase the scan speed, and finally improve squelch performance.

Firstly, make sure you know what you're doing! If you're not

experienced in dealing with CMOS circuitry, taking the required static precautions, then find someone who is! Also, do remember that any modifications will invalidate any guarantee you have. I haven't tested these modifications, not owning a PRO-2004, so you're on your own!

**Preliminaries;** Take the scanner out of its case by removing the four screws at the rear. Carefully invert the set, and locate a box-like sub-circuit, marked PC-3, near the switch marked 'restart'. Carefully pry off the cover of the metal box. Inside there will be a 64 pin dip IC, this is the scanner's CPU. Be careful not to touch or short out any leads on the chip.

**1) Increase from 300 to 400 channels;** On the top of the sub-circuit board, locate the slot for diode D-513. Count backwards from there until you get to the space for D-510. Install a diode at D-510 oriented with the same polarity as the rest of the diodes. You will now have 400 channels instead of 300.

**2) Increasing scanning speed to 20 channels per second;** Install a diode at D-514, and you will increase the scan speed from 16 channels per second to 20 channels per second.

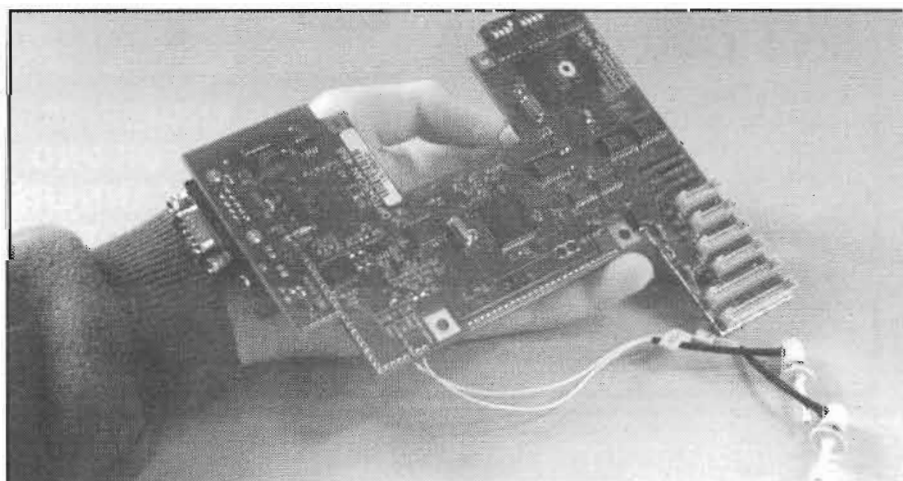
**3) Improving squelch operation;** Carefully reassemble the metal box, and invert the scanner again so it is upright. Locate the sub-circuit box under the sloping front panel, this will have several

alignment holes in the top. Pry the cover off very carefully, and locate IC-2 on the left side of the PCB, this IC should be marked IC-10420. Now locate R-148, a 47k resistor between pins 12 and 13. Cut the lead on this resistor, making sure to leave enough lead on either side of your cut to solder to, and add a 100k resistor in series. Your squelch should now operate more effectively.

## PRO-2005/6 computer control

Owners of the later Realistic desktop scanners may be interested in the latest Optoelectronics computer control 'add-on' for these scanners. I recently received via the HRT Editor a sample of the Optoelectronics OS456 computer interface and software for this, which as well as PC-controlled scanning also offers CTCSS and DCS controlled scanning and logging, DTMF decode and log, plus high speed scanning at 25 channels per second. It's available at the moment from the UK Optoelectronics distributors, Waters and Stanton Electronics (Tel. 01702 206835). Watch out for a review in these pages soon.

That all there's room for this month, so I'll wish all readers a Happy Christmas, and hope to see you in the new year.



Add-on computer controlled scanning for the Pro-2005-6

# TSA 1000

## Spectrum Analyser Adapter Review

*The HRT Tech Ed. reviews a low-cost unit that turns your scope into a spectrum analyser!*

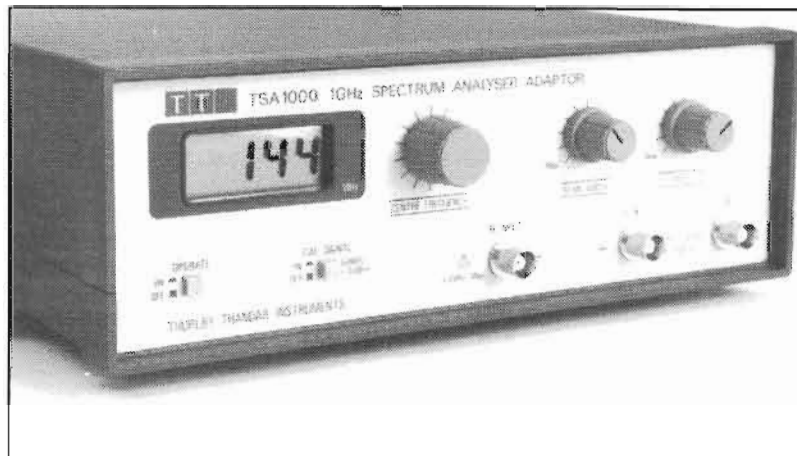
Most readers will have heard of a spectrum analyser, this often being one of those complex objects which 'technical boffins' use in their radio laboratories. Not always so, as many are now to be found in ham shacks as well (see this month's 'QRP Corner'). @BT2: Basically, a spectrum analyser is a swept radio receiver, which gives a display of the amplitude levels of the frequency components of a signal, or spectrum of signals, against a 'base line' of frequency. 'Stand-alone' spectrum analysers of laboratory quality can cost several thousands, and tens of thousands, of pounds. However, the TSA1000 manufactured by Thurlby Thandar has been designed, by a licensed amateur in fact, to work as an *adapter*, allowing you to use any existing oscilloscope as a basic, 'no-frills', spectrum analyser.

### Features

The TSA1000 covers the frequency range of 400kHz up to 1000MHz, with the centre frequency displayed on a large front-panel LCD. Apart from this, it doesn't have any 'calibrated' controls. As such, its main purpose is as an 'indicator' just as experimenters and constructors would need, rather than a fully-fledged (and subsequently very expensive) test instrument. An internal reference marker, at -30dBm at 50MHz, is however fitted, so you can use this to obtain a reasonable idea of the level of any signals you're measuring.

### In use

The first thing that's important to note, is that you *can't* plug your transmitter straight in! This may be obvious to qualified technicians, but you'll find the unit will quickly go up



in a big puff of smoke if you connect your 100W HF rig directly to it to see what your harmonics levels are like!

The maximum RF input is 0dBm (0mW), so you'll typically need an external 30dB coaxial power attenuator to measure rigs of up to 100W power output. The unit's dynamic range goes down to -70dBm, which is the 'noise level' at the bottom of your oscilloscope's screen in use. So with careful choice of your input attenuator, this is the overall range you'll be able to measure, unless of course you add additional notch filters and the like.

As well as varying the centre frequency, the scan width can be varied between 10MHz and the full 1000MHz, to let you 'home in' on signals. The IF bandwidth is fixed at 250kHz, which is a useful compromise

giving acceptable results across a wide frequency range. This I found, wouldn't of course let me see individual modulation components, such as those of a two-tone SSB test, but it was more than adequate for harmonic measurements. Another very

handy use, taking advantage of the 70dB range, was that of aligning various stages of home-construction projects and ex-PMR rig conversions, far better than trying to use a diode probe and absorption wavemeter! Also, by connecting an external wideband amplified aerial, I could instantly see what was happening on the air in my area,

including what frequency the 'monster' VHF signal knocking my 2m rig out was operating on!

### Conclusions

The relatively low cost of the TSA1000 can bring it into the budget of a number of amateurs. It would indeed be a very useful accessory for the well-equipped club workshop. With EMC requirements and the associated legislation constantly looming, a unit such as this is no longer something 'out of the ordinary'.

The TSA1000 is currently priced at £450 plus VAT and p/p, and my thanks go to Thurlby Thandar Instruments (Tel. 01480 412451) for the loan of the review adaptor.

### Specifications (typical);

Frequency range;	400kHz to 1000MHz
Centre Freq adjustment;	By 10-turn control
Meter accuracy;	+/-1% +1MHz
Calibration marker;	50MHz fundamental plus harmonics
Bandwidth;	Fixed 250kHz at -6dB
Freq. scan width;	10MHz-1000MHz
Scan speed;	0.5mS to 35mS per div
Input impedance;	50ohm
Amplitude range;	-70dBm to 0dBm
Amplitude scale;	10dB/div logarithmic
Amplitude linearity;	+/-2dB
Amplitude flatness;	+/-1.5dB
Max permissible input;	+10dBm RF
Calibration marker;	-30dBm at 50MHz
Size;	260mm x 88mm x 235mm
Weight;	1.4kg
Operating voltage;	110/120V or 220/240V AC
Power Consumption;	10VA max

# Garex Airband Preamp Review

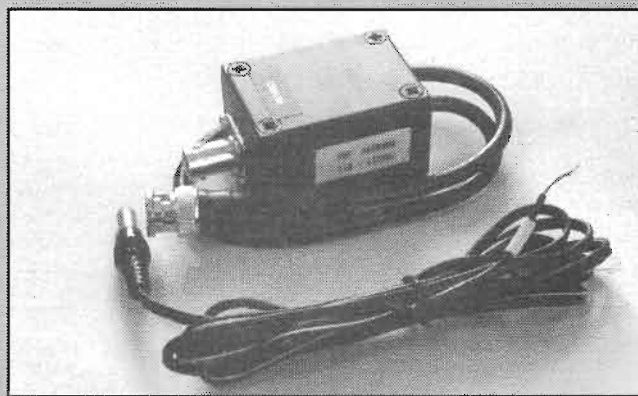
*Bill Robertson gets his scanner selectively amplified*

One of the most popular uses of scanners by devoted hobbyists is that of civil airband listening. But from home, which may be quite a distance from an airport control tower of interest, a sensitive receiving setup complete with an outdoor aerial is often essential, this sometimes being combined with a wideband preamp when needed.

Here's where the scanner owner often finds problems with other strong signals in the locality, for example PMR signals in the 165MHz band giving an 'image' in airband, or strong signal blocking from other local signals. The Garex Airband preamp makes an excellent effort to overcome this, with a high gain, low noise figure in-line preamp suitable for indoor use. It has bandpass filtering built-in to only amplify airband signals, and to attenuate others.

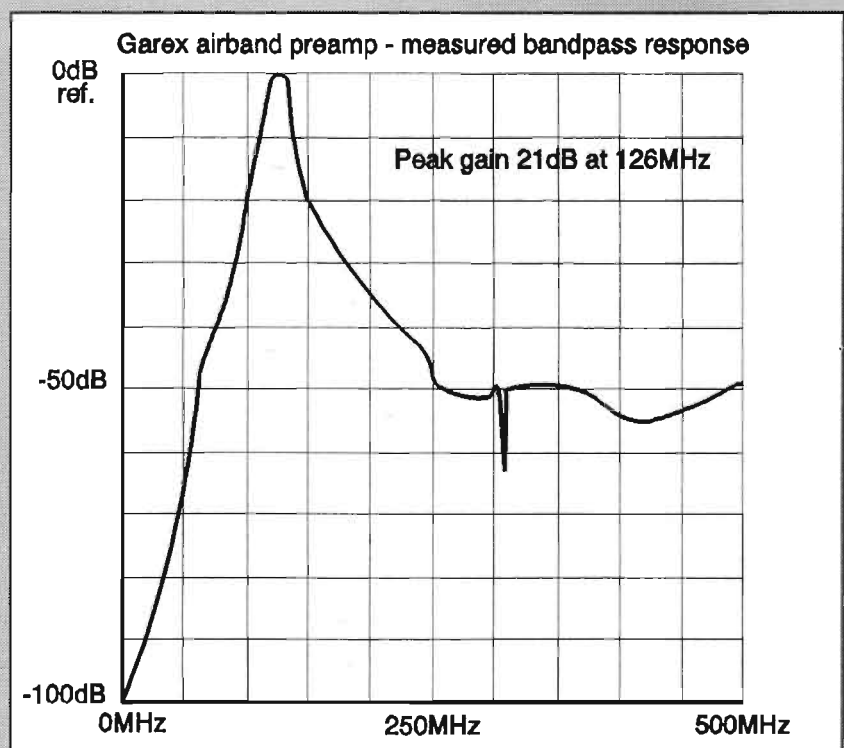
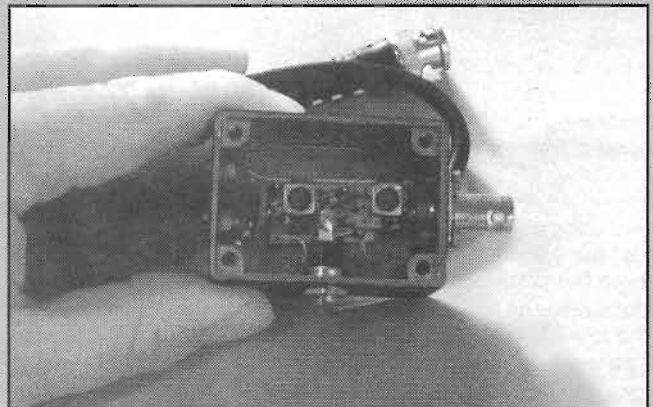
A test on air showed it worked extremely well, bringing virtually uncopyable signals on my discone and Bearcat handheld scanner up to complete readability. It even helped get rid of the problems I otherwise encounter from the taxi firm transmitter half a mile away, which can't be bad! A quick lab measurement showed the preamp had a peak gain of 21dB at 126MHz, a good bandpass response of 116-132MHz to the -3dB points, and excellent out of band rejection.

The preamp is cased in a diecast metal box, and comes with a plug-in DC lead for use with an external 9-15V supply, drawing 10-15mA. It's available direct from Garex Electronics in South Brent (Tel. 0364 72770) at just £28.95 inc. p/p, to whom my thanks go for the provision of the review sample.



The Garex airband preamp

Inside the box

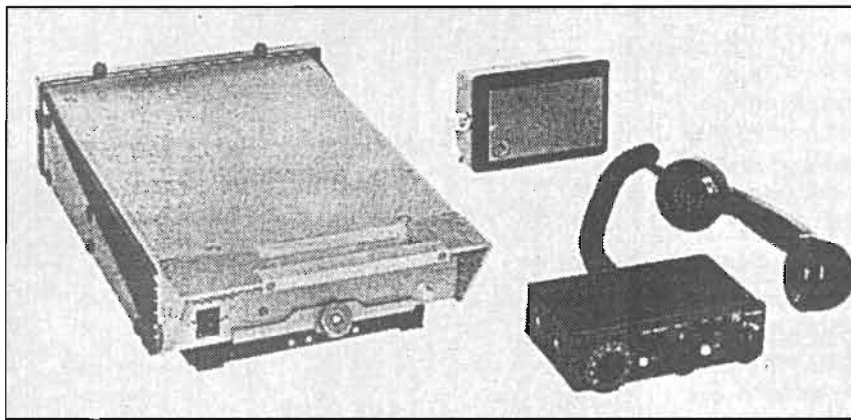


# P-Band Whitehall Ex-PMR Conversion To 70MHz

*Peter Longhurst gives details on converting the P-Band Pye Whitehall to a 70MHz set*

The W20 is an AM/FM mobile transceiver, which commonly appears as the 79-101MHz version. The transmitter and receiver are designed to have wideband coverage by using varicap diodes in the tuned circuits. Each channel has associated potentiometers which adjust the varicap voltage for optimum performance.

The normal operating frequency of the transmitter is in the 80-85MHz range, and by suitable adjustments it will tune down to the 70MHz amateur band. The receiver normally operates



around 100MHz and the tuned circuits will not stretch to 70MHz, so modifications are necessary. The wideband tuning facility is disabled in this project as I considered it

unnecessary for amateur purposes.

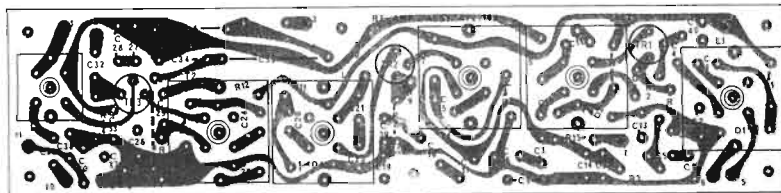
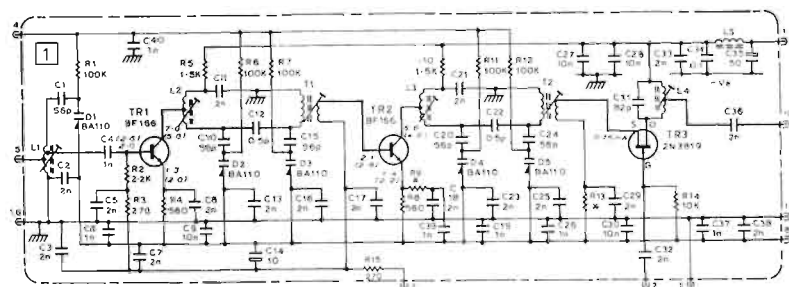
## Receiver mods

The receiver aerial filter was intended to filter out Band II broadcast signals, it will not tune to 70MHz and is not required on 70MHz in any case. The

receive aerial bandpass filter is removed altogether. Disconnect the coax lead from the filter to the RF board at the RF board end. Carefully disconnect the coax from the relay at the filter end and reconnect it to the input of the RF board.

Modify the receiver multiplier tuned circuits as follows; pull off the 3 coil cans. Locate three 56pF plate ceramic capacitors (one associated with each coil). Remove the 56pF capacitors by cutting them off just above the board. Fit new 27pF capacitors (plate ceramic or silver mica) across the ends of the main windings of the coils, then refit the cans. The receive crystal formula is now;  $(\text{sig} - 10.7)/2$ , this is the same as for a Westminster W15.

The tuned circuits of the receiver RF front end have to be modified to cover 70MHz. Remove the five large coil cans (they pull off). Locate the five 56pF plate ceramic capacitors as before, remove, and refit 15pF capacitors (Silver mica or plate) across the ends of the main windings of the coils. The coils will now tune



TOP VIEW

Receiver front end

## 'Getting started on a budget'

Review;  
DataPack - a low cost 'beginner's special' DataPack which adds multimode data capabilities to your station

Features;  
Getting Started on a budget - How to get on the air without breaking the bank!  
Operating the 1994 IOTA Contest - Steve Telenius-Lowe G4JVJG tells a tale of an IOTA (Islands On The Air) DXpedition

Projects;  
HF General Coverage Receiver - Raymond Haigh with part 2 of a receiver project and details of the PCB construction and alignment  
Pye/Philips MX296 Ex-PMR Conversion - Our conversion 'Guru' Chris Lorek G4HCL, transforms an ex-PMR rig into a 400 channel 70cm transceiver

plus  
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and much more!

If you missed this exciting issue, then back issues for the last 12 months can be obtained by filling in the coupon which periodically appears within the magazine, or by writing to; HRT Back issues, Argus Subscription Services, Queensway House, 2 Queensway, Redhill, Surrey RH1 1QS, Tel. 01737 768611.

## HRT BACK NUMBERS

ASP have been publishing a great many interesting and useful reviews, projects, and features within its pages over the past year. If you missed any of the action packed issues, then back numbers for the past twelve months can be obtained by filling in the coupon below.

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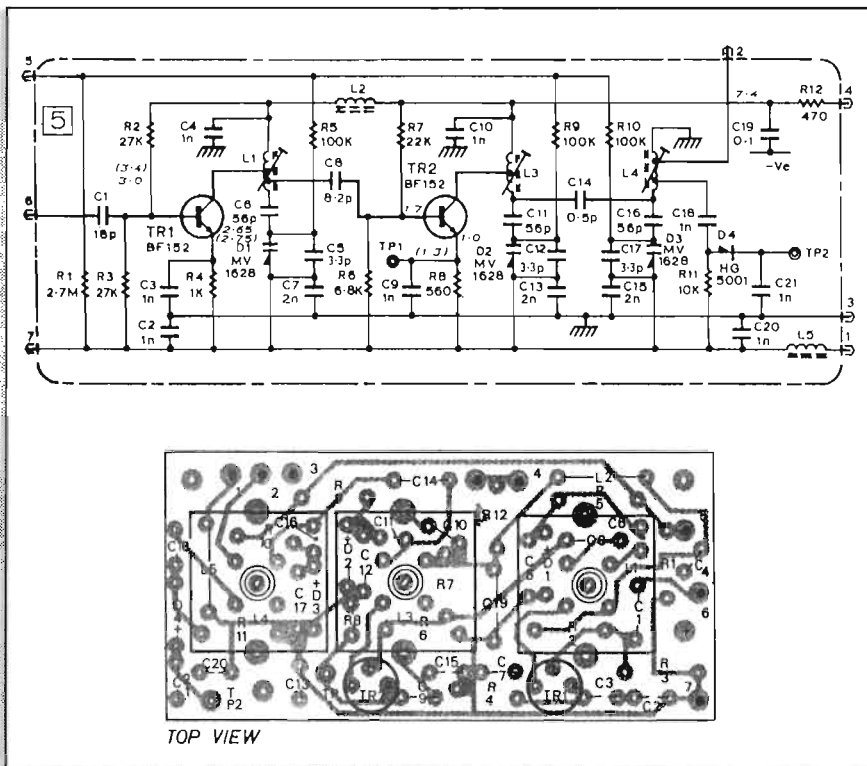
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Receiver multiplier

readily to 70MHz.

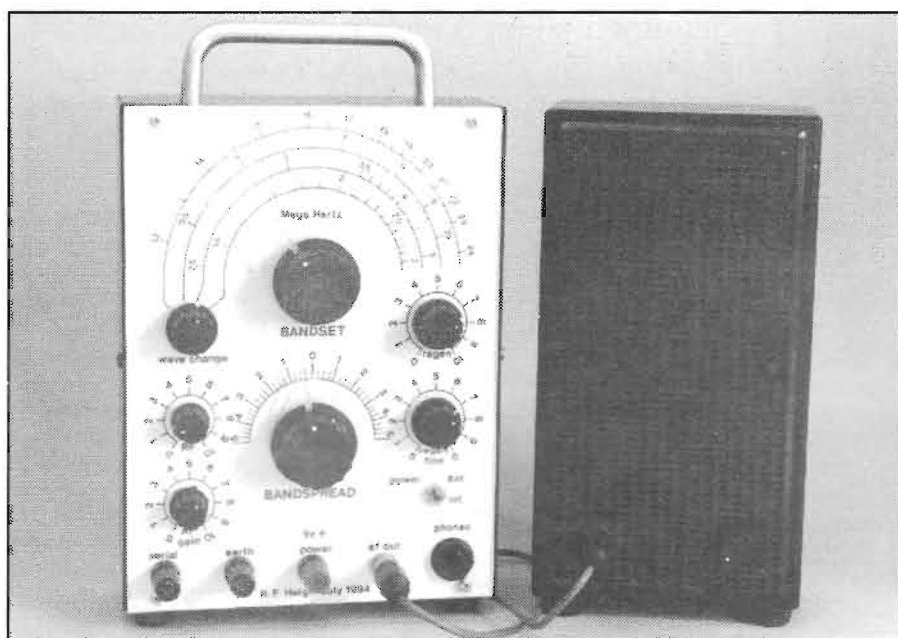
## Transmitter mods

No component alterations are required, but all varicap control pots are turned fully anticlockwise, i.e. to lowest voltage setting. The transmitter will now tune to 70MHz. Note; I have tried disconnecting the varicap bias voltage altogether, but the transmitter appeared to go unstable. This apparent problem will be investigated when time permits. The transmit crystal formula is sig/12, i.e. just under 6MHz, this is different from both the W15AM and W15FM.

Full alignment details if needed for the Whitehall have been available for some time in the 'Surplus 2-Way Radio Conversion Handbook' published by Argus Books (Tel. 01442 66551). For further details regarding this conversion you can contact the author, Peter Longhurst, at Garex Electronics, Station Yard, South Brent, Devon TQ10 9AL, enclosing a stamped addressed envelope, or telephone 0364 72770. Our thanks go to the publications division of Philips Telecom for permission to reproduce the circuit details shown here.

# Project - Amplifier and Speaker Unit

*Raymond Haigh describes an add-on amplifier and speaker unit for the General Coverage Short Wave Receiver project featured in last month's HRT as well as for general shack use*



Although intended for the General Coverage Short Wave Receiver, this simple and inexpensive audio amplifier is small enough to be incorporated into almost any equipment which requires a facility of this kind. Housed in a case with its own speaker, it becomes a useful addition to the experimenter's workshop.

The heart of the unit is the Philips TDA7052 integrated circuit power amplifier, which is available from Maplin and other advertisers. This device is able to deliver 1.2W into an 8 ohm speaker when fed from a 6V

supply; a performance which the designers have achieved by adopting a bridge tied load circuit for the IC's output stages. There are no components for attenuating high frequencies, gain is fixed internally at 40dB, and the usual output capacitor and Zobel network are not required. This reduces the off-chip component count to just two capacitors and the volume control. The device is a little more expensive than the more versatile TBA820M, but the reduction in cost and complexity brought about by the minimal number of additional components more than compensates

for this in most applications.

The IC is designed to operate with a 6V supply and an 8 ohm speaker, but it will function acceptably at supply voltages down to 3V. It should, therefore, be tolerant of a fair amount of battery ageing. The maximum permissible supply potential is 15V.

## The circuit

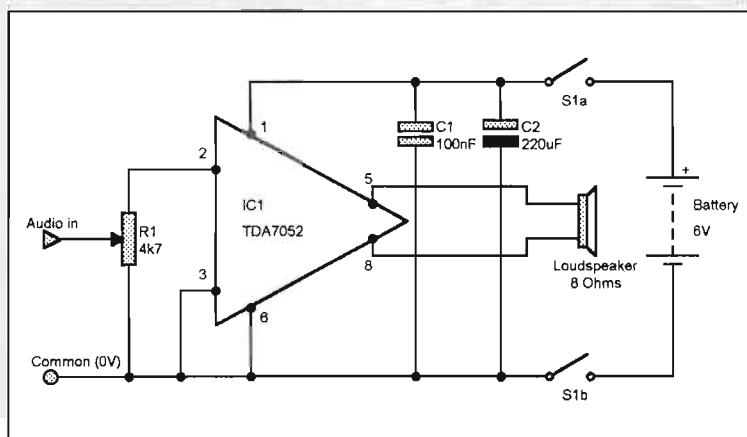
The theoretical circuit of the amplifier is shown, this also includes the pin connections for the TDA7052. Audio input is applied to pin 2 of the IC via volume control, R1, and the output is taken from pins 5 and 8. Stability is ensured by C1 and C2, which must be mounted close to pin 1. Signal and supply line ground connections (pins 3 and 6) are separated to avoid unwanted feedback, and audio and power leads should be connected as indicated later.

## Construction

The IC and its bypass capacitors are assembled on a small printed circuit board as shown. A holder is recommended for the IC, and Veropins inserted at the lead-out points aid off-board wiring. The PCB and volume control can be mounted on a small metal bracket, and the arrangement adopted for the prototype unit is shown. The standard double pole on/off switch on the potentiometer acts as a convenient anchor for the battery leads.

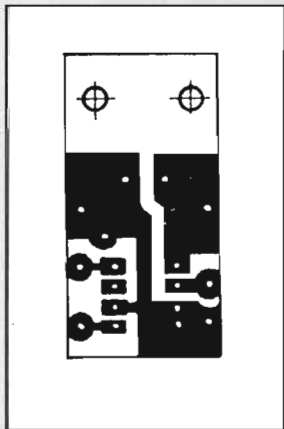
## Speaker and Cabinet

Suitable speakers can be salvaged from discarded TV and radio receivers, but make sure the unit has an impedance of 8 ohms. I've found the quoted speaker impedance is more or less the same as the DC resistance of the speech coil, so this can easily be checked if a multimeter

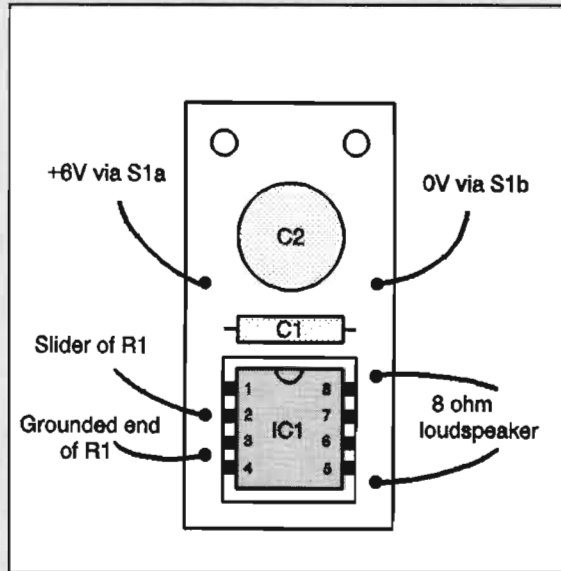


Circuit diagram

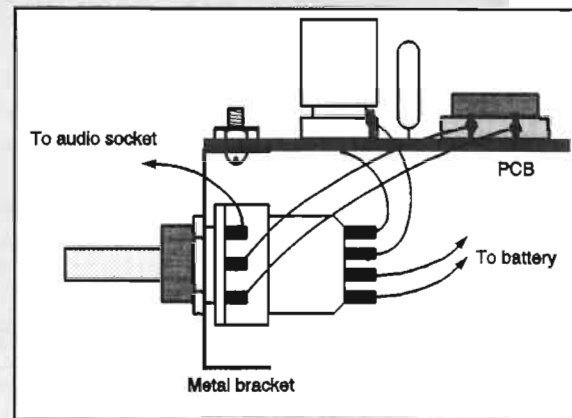




PCB pattern, foil side, shown full size



Component layout



The PCB may be mounted above R1 using a small bracket

with a low ohms range is available. If a speaker has to be purchased, go for a low cost replacement unit with a diameter or smallest dimension of at least 100mm. More expensive speakers intended for hi-fi applications can be less sensitive, and an extended audio frequency response is not desirable in this application. The rated bandwidth of the amplifier is 20Hz to 20KHz and there is no means of accessing the chip to reduce this.

Speaker, amplifier and battery can be housed in a small plastic or wooden case. Whatever cabinet is adopted, form rear vents at least equal in area to the speaker cone, or

the sound output will be reduced and its quality muffled. The cabinet I used is 110mm wide x 65mm deep x 203mm high to match the case of the general coverage receiver. I made this from small pieces of hardboard stuck together with PVA wood glue, and used masking tape to hold them in position until the adhesive hardened, plus fillets glued in the corners to strengthen the assembly. Three coats of cellulose based sanding sealer followed by an application of car spray paint gave an acceptable finish. The plastic speaker grille I salvaged from a discarded TV, but similar items can usually be purchased from motorists' discount stores.

## Performance

The manufacturers quote a distortion figure of 0.2% for 100mW output, and a sensitivity of 30mV. The audio quality is good and the output power and gain more than adequate. Equally important for this purpose, the noise level is extremely low.

## Components

### Resistors;

R1 4k7 log potentiometer with double pole switch.

Capacitors; 16 volt working or better.

C1 100nF (0.1µF) polyester or ceramic.

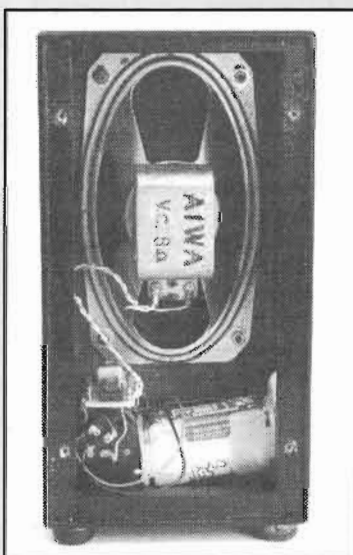
C2 220µF electrolytic, radial lead.

### Semiconductors;

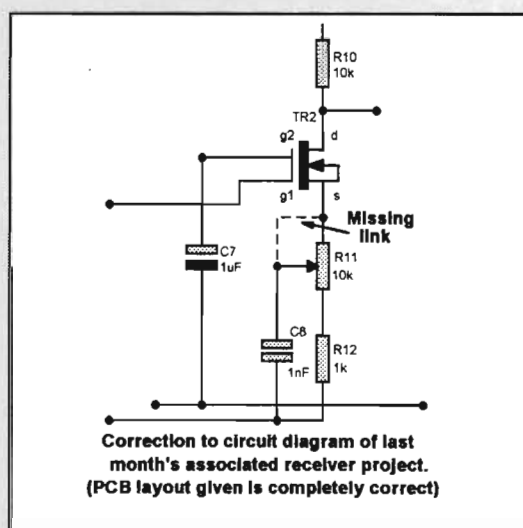
IC 1 Philips TDA7052

### Sundry Items;

Phono socket, control knob, IC holder, PCB materials, Veropins, hook-up wire, 8 ohm 100mm or larger diameter speaker, battery holder and connector, scrap aluminium for mounting bracket, nuts and bolts, case or case making materials.



Internal layout of speaker and amplifier unit



# The Metrewave Year

*Jack Hum, G5UM offers his customary annual retrospective review*

If, as was suggested here a year ago, 1993 was "The Year of the Handheld", (everybody but everybody seemed to have one) surely 1994 must be dubbed "The Year of Packet Radio". Its growth has been so explosive that there have been murmurings for more space to be provided for it within the metrewave spectrum, a reasonable suggestion where 144MHz is concerned, less so if the other available VHF/UHF bands are examined. Considerable packet allocations are in the band plans for 6m, 4m and 70cm. They should be used more.

Enthusiasm for packet has extended over all ranges of operator. One recently licensed G7 told your G5UM, that its fascination lay "...in seeing so many countries of the world come up on your screen". Packet indeed is the only reliable means by which B licensees are able to communicate beyond their island shores. But there are others, less reliable, that manifest themselves whenever anomalous propagation ("....there's a lift on") brings its occasional surprises. On 50MHz, for example, sporadic-E has brought excitement to its normal moribundity. There are few stations around who have topped the magic '100 countries worked on Six', achieved by observing GB2RS propagation forecasts, by a sixth sense that suggests that the band is likely to be open, plus plenty of spare time to be there when it does.

## Disenchantment

Disenchantment sets in when the 50MHz operator comes to realise that almost every DX contact is a 'rubber stamp' one lasting perhaps 53.5 seconds, not conducive to conversation. The real conversation on 'Six' occurs in the upper megahertz, but lamentably there is little of it. The 70MHz band seems to be the preferred option, not surprising when the relative size of aerial for each band is taken into consideration and the generally cheaper equipment available for 'Four'.

Remembering that activity begets activity, there should be many more 51MHz FM nets in operation than there are at present. A concerted effort by clubs to foster them might do some good, and encourage the purchase of 6m artifacts. But one disillusioned G4

said he was not prepared to do so; he had heard that, relating the likely number of QSOs on 'Six' with the cost of transceiver and aerial, the answer came out at ú5 per QSO. Surely, it need not always be that way.

## Better aeriels

The 50-52MHz band has exhibited the condition existing on the higher frequency bands; that you need two aeriels, one horizontal for long-haul, the other vertical for the conversational FM end. The longer-haul ones are invariably gainy beams, the short-haul ones exiguous verticals of minimal gain. Metrewave operators who have not essayed the delights of vertical directional aeriels might be surprised - though it's obvious enough - at the enormously enhanced talk-power that results. A resolution for 1995; replace that omni-vertical in the loft with something better.

## Talking abroad

It was remarked above that packet radio gives the B licensee (and everyone else) the freedom to communicate over long distances. If ever repeaters were to appear on 'Six' - a matter on which there has been some huffing and puffing over the last year or two or three - surprising returns might occur. Distant countries which happened to have repeaters on 'Six' would be workable.

Were this to happen, it should never be forgotten that a through-repeater contact is not a real QSO. To exchange cards would be a waste of time: the repeater has done the work and should be the logical recipient of any QSL. You wouldn't get one back: a repeater can listen and talk, but it can't write. Anyway, societies that offer awards for metrewave prowess rightly set their faces against through-repeater exchanges ('exchanges', not QSOs, please!).

## Satellite scene

Any reference to talking abroad on metrewave would be incomplete without a reference to the satellite scene; to do justice to it would fill the rest of this space. There are several guides for beginners in print, but what may be said without equivocation is

that the first contact made via satellite, holds the same thrill as the operator's first contact ever. To hear one's CW signal bouncing back to earth, slightly time-delayed, was an event to put in red letters in the log. Historically, it all began in 1961 when OSCAR (Orbital Satellite Carrying Amateur Radio) continuously circumnavigated the earth emitting the most basic of all signals *HI*. To keep up to date with satellite developments - and they are as profuse if not more so as packet developments - it is well worth joining the AMSAT-UK group.

## More about repeaters

Right from the commissioning of Britain's first 145MHz repeater GB3PI, the daddy of them all, more than twenty years ago, there has always been a considerable corpus of metrewave operators who object to them for various reasons ("They're not real amateur radio communication", or "You hear so many idiocies through them" et seq). Very reasonable objections they are. But they miss one point; that repeaters have their *raison d'être* to assist communication between mobiles which would be far beyond simplex range of each other. By contrast, to the fixed station operator simplex contacts should be the norm, and recourse to be had through a repeater only in extremis, i.e. when all else fails.

This is not altogether the way it is today. Many fixed stations use the local repeater "....because it is so easy". Understandably so and quite legitimately so, if the over-riding thought prevails that fixed stations have secondary priority on repeaters. Prime users; those mobiles. Another thing worth remembering is that the repeater service didn't 'just happen'. Right from the original GB3PI experiment it became clear that a repeater chain across the land would be an immense adjunct to the burgeoning number of mobiles who were appearing on the metrewaves.

Never is it possible to establish a repeater simply on the grounds that it would be something nice to have. To commission one is a slow and laborious task involving site clearance, allocation of a channel within the band-planned area for repeaters, geographical separation so that repeaters on a shared channel do not

# Next Month In HRT

Alinco DR-M06SX 6m mobile FM transceiver  
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Kenwood TH-79E dual band handheld  
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interfere with each other, and much else, before the application can be finally approved by the licensing authority.

This painstaking and often protracted work is the responsibility of the Repeater Management Group, which reports to the RSGB Council. Standing in the wings, as it were, is the International Amateur Radio Union (IARU) to which all national societies pay allegiance, for the very good reason that what is done in one country may well (or ill) affect operators in another. Without international co-operation chaos would reign on the amateur bands. You may be sure that the IARU will stoutly represent the amateur cause at next year's large professional ITU conference. All of which underlines the above comments that "...it is never possible to establish a local repeater simply because it would be a nice thing to have!"

## The Novice scene

Repeaters (you can't get away from them even though some people profess to wish they didn't exist) have proved to be a boon to Novice operators in giving them communication experience. The low power levels imposed on Novices

mean that through-repeater contacts provide conversation when all else fails. But does it? If that low power level is applied to an adequate aerial, preferably a directional one (quite small for Novices' 70cm band, less so for 'Six') talk power is increased so dramatically that recourse to the local repeater can become the exception rather than, as at present, the rule. Increasing numbers of Novices have come to realise this basic fact of electronic life.

At this writing, Novice B callsigns are into the fourth block (2E1D). The A licence equivalent, the 'two zeros', still languish in the first block. The old adage that telegraphy will get through when all else fails, has not yet penetrated the Novice fraternity. Morse need be no stumbling block: it comes easily to the young malleable mind. In other words, the longer you leave it, the harder it will get. Now, on the subject of telegraphy.....

## "Where have they all gone?"

Monday night is CW activity night centred on 144.05MHz. From the few stations to be heard most Mondays, you would think it to be *inactivity* night. It is a little better in the SSB slice of 'Two', and worse still on 'Six', 'Four' and 'Seventy Cems', except when

there is a contest on or a dramatic lift in propagation conditions. In this space last year I posed the question "Where have they all gone?". The question is still relevant. What can be done about it? If every club in the country held a VHF night, not wholly on FM, the barren parts of the bands might blossom. Such an activity might encourage club members who have not essayed the delights of metrewave communication to 'have a go', and to enjoy what was once called BBC quality, which is exactly what FM above 51MHz will provide.

## Seven random radio resolutions for 1995

- 1) When sending a CQ or initiating a contact, announce your locality, especially if you are a new licensee not in the callbook (What, no callbook? buy one now, the metrewave operator's best friend after the licence).
- 2) Move off calling frequency after QSO has been established.
- 3) Keep power level as low as possible.
- 4) Keep repeater overs short and, ever mindful of the wants of others, observe brief breaks between overs.
- 5) If your repeater conversationalist is audible on the input move to a simplex channel to enjoy a real QSO.
- 6) When on CW maintain your speed to that of the QSO partner.
- 7) If testing a transceiver at another's place use your own callsign followed by "Stroke Portable".

# Test Equipment - At No Cost!

*Andrew Howlett G1HBE shows that you might already have the signal generator needed to line that ex-PMR rig or homebrew HF receiver up with!*

I'm sure many of us turn green with envy when we read about the wonderful test equipment used in HRT equipment reviews. Great names such as Hewlett-Packard, Marconi, Racal and Rhode & Schwartz are enough to make us carefully inspect our bank balance. However, unless you carry out an awful lot of RF test and measurement work, the spending of huge sums of hard-earned cash on such instruments (even "previously owned" as it is referred to these days) cannot be justified. Over the years, I've begged, borrowed, made and even bought signal generators, frequency counters and suchlike, to carry out some of the more exacting jobs, but most of the time the sophistication of these instruments is not necessary.

## Got a receiver?

If you have a HF receiver and a wide range scanner in your shack, it's quite amazing what you can do given a little patience and the right knowledge. A calculator comes in handy, too. One example of this 'make do' approach is the use of the local oscillator radiation from one set to resolve an SSB transmission on another AM-only set

Just in case some readers are not familiar with this trick, a brief visit to 1965 may be in order. Picture the scene. It's Sunday morning, and you're idly twizzing on your 'broadcast' receiver around top band waiting for the regular 'old groaner's net' to start. Just up the band, on 1950kHz, is a funny quacking noise which you recognise as one of those new-fangled single sideband suppressed carrier transmissions. You know that all you have to do is replace the carrier that is being suppressed at the transmitter. But the old broadcast receiver has no BFO, but hang on, suddenly an idea flashes through your mind. Isn't the IF of domestic radio sets around 470kHz, and doesn't that mean that the set's local oscillator runs 470kHz higher in frequency than the incoming signal? A dash to the lounge, and you have in your hands the perfect solution - the transistor radio! Now then, you want to put a carrier on 1950kHz, so a quick mental subtraction shows that in order for the LO in the transistor set to generate this frequency, it should be tuned to 1950kHz minus 470kHz, that is 1480kHz.

After placing the new set near the aerial of the main receiver, you carefully tune around 1480, and you hear the SSB station's voice begin to sound human. A bit of fine tuning to bring the pitch of the voice to a more natural sound, and you're in business. It's not the proper way to resolve SSB but it works, and it's a lot better than nothing. Of course, all HF receivers worthy of the name have an SSB/CW facility fitted nowadays, so that old trick isn't quite as handy as it used to be, but it is worth knowing, as is the fact that all superhet receivers radiate their local oscillator signals to a certain extent. Also worth knowing is that most HF radios use a technique called 'up conversion' to reduce spurious responses. Instead of converting the incoming signals straight down to a low IF such as 470kHz, the first conversion is upwards to the low VHF range, typically 48MHz or even higher. This makes image rejection much easier, and it also means that the LO has to cover the range 48 to 78MHz, a very useful range as it includes two amateur bands.

## Ex-PMR alignment

Have you ever needed a signal to check your 6m or 4m converter or ex-PMR rig? Well there it is, lurking inside your Trio R1000 or Yaesu FRG 7700. Most other HF sets use similar frequencies, and usually leak enough LO signal to be very useful 'signal generators'. My trusty R1000 proved invaluable when I was called upon to set up a number of Pye Westminster on the 4m band. Scanners can perform the same function, sometimes up to several hundred MHz. The Icom ICR7000 receives over the range 25 to 1000MHz, (the 1025 to 2000MHz range is actually the same coverage with a down-converter switched into line) and up to 512MHz its first IF is 778.7 MHz, giving a LO that goes from 803.7 to 1290.7MHz.

The normal place for the LO is on the high frequency side of the incoming signal, but some scanners, particularly the lower cost ones with low IF's, use tricks like 'flipping' the LO from the high side to the low side in order to get extra coverage. This can be very confusing!

## From the lounge

Another cut-price signal generator has recently appeared on the scene in the shape of the satellite receiver. The outdoor unit converts the incoming signals down from the microwave region to a block of frequencies covering 900 to 1700MHz, and it is across this range that the receiver tunes. As the IF of most modern satellite units is around 480MHz, the LO must tune across the range 1380 to 2180MHz! The 'knob-tuned' type is the best, as they usually cover well above and below these limits, taking in the 23cm and 13cm amateur bands.

Staying with TV, even the humble goggle-box generates signals, apart



**You may already have a pile of test gear without knowing it!**

from the dreadful line time base noise which so spoils our short wave listening. First of all, there's the local oscillator in the front end. TV signals in the range 470 to 860MHz are converted down to the IF of 37MHz, with the oscillator on the high side as usual. That's an easy one to work out, and it's the signal that our beloved TV detector vans look for. Then there is the 'chrominance reference oscillator' which not only runs at 4.433619MHz and is held in tight phase lock in use.

Of course, measurement of things like noise figure, sensitivity and so on necessitates the use of properly calibrated and expensive instruments, but when you 'just need a signal' a little ingenuity can go a long way, and it's fun too!

# QRP

## Corner

*Dick Pascoe G0BPS offers a brief history of the G-QRP Club from the shack of its founder, and describes a half watt 40m transmitter for you to build*

I'm writing this sitting in the shack of Rev. George Dobbs G3RJV, just before the annual QRP Convention at St. Aidan's Church in Sudden, Rochdale. George was first licensed way back in 1962 when the RAE was a written paper, not the multiple choice one that I sat some 12 years ago. George has always been interested in building his own equipment, a look around his shack gives testament to his skills and interest in homebrew.

The main bench is split into two separate areas with the construction section being about two thirds and the operating area one third. The construction side shows the depth of his interest in building. Test equipment includes the standard multimeter, frequency counter, function generator, milliwattmeter, signal generator, oscilloscope, a Weller soldering iron and a very good quality spectrum analyzer. The last unit ensures that his projects are clean and without too many nasty harmonics.

The last item has a little history. Rumour has it that George was rummaging about in a friend's shed and found a rather nice looking box with several juicy looking knobs and a meter or two on the front panel, ideal for the proposed next winter project. The said box was placed on the shelf and promptly forgotten. Technical wizzo from large well known electronics company arrives to visit George, chew the cud and lo and behold, box was spotted by said wizzo bod. "Gosh, oh golly" and other technical phrases abounded. "Where on earth did you get one of those" he cried, "we have been looking for one for years, do you wish to sell it?". "Not really", replied George, and in his usual good natured way gave it freely to technical wizzo chappie.

His firm were rather pleased to find the unit, it was a very specialised tool that did one thing only, but extremely accurately. Techno bod being also very honest explained how he discovered it, and as a reward, arranged for George to receive one 'surplus to requirements' spectrum analyzer. Techno bod also ensured that he knew how to drive it well too.

Moving on.. sitting in the middle of

this area is George's main project that he has been working on for the past year, an all HF band, all-mode transceiver based on Ian G3ROO's Kitten II project from SPRAT. Scattered about are PCBs for other projects in various stages of construction. Some for British projects and several from abroad. On the shelves above are stacked over 50 units that he has built over the years, from the simple OXO transmitter designed for the club by George Burt GM3OXX, to a complex modular transceiver. George is very well known for his projects.

### G-QRP Club

Apart from his construction articles, George is perhaps best known for his work with the G-QRP Club, and for your enjoyment I offer a brief history of the Club. During the early 1970's George had noticed that several other amateurs had a strong interest in low power operating. In a magazine letter he invited like-minded folk to contact him, with a view to getting together. The G-QRP Club was subsequently born in late 1974. It will now be obvious that this year is the 20th anniversary of the club, next month I will give details of the annual convention and of our birthday celebrations over the forthcoming weekend.

It was agreed that a simple newsletter should be produced to keep these folk in touch. The first one appeared around Christmas 1974 entitled *SPRAT* (after an idea by Gordon G3DNF), which stands for *Small Powered Radio Amateur Transmission*, with of course other connotations. The front cover of the first *SPRAT* reads as follows: "Following recent comments in various... journals about the formation of a UK QRP Club - this humble little newsletter now appears as an introduction to such an organisation". The newsletter continues to offer the rules of the club which included... "Power limitation is a 'thorny point' (no pun) many ideas have been offered. I suggest a nominal 5 Watts.... however for true énlitist QRP the lower the power the better".

"The club may attempt some sort of annual get-together..." This last interesting point was eventually attained some fifteen years after this newsletter appeared. Although many club members have met at several events throughout the years, often putting a stand on at the bigger rallies, the HF convention and other national events.

There is no doubt that the club has come a long way since those days. This is the fifth QRP convention to be held, all in the small church hall of St. Aidan's Church. I have been to every one, met many hundreds of people and made some very good friends all over the world. Readers may be pleased to hear that although copies of the first *SPRAT* are as rare as hens teeth, a copy should be available for members for the 21st birthday celebrations of the club next year. Tony G4CMY has copied this first issue on his computer and using a similar font, has recreated the newsletter almost exactly as it first appeared.

### The Pipsqueak

I first saw this circuit in a US journal, there was no author credited but it works well on the band. Readers may see a certain similarity between this and the ONER transmitter, but there are only so many ways you can couple two transistors together to provide RF. The circuit is fairly simple and should provide in excess of 500mW on 40m, enough to work the world with a fair aerial.

The variable resistor on the emitter of TR2 permits variable power levels down to almost 100mW. Smoothing of the supply is carried out by the three capacitors on the supply line, with L2 providing the collector load of TR2. C1 should be tuned for 'maximum smoke', better known as maximum output from the PA. The oscillator, TR1 is controlled by the 7MHz crystal (the QRP operating frequency is 7.030MHz). The inductor 'pulls' the crystal slightly high and the variable capacitor then permits some shift of the crystal frequency low again, thus

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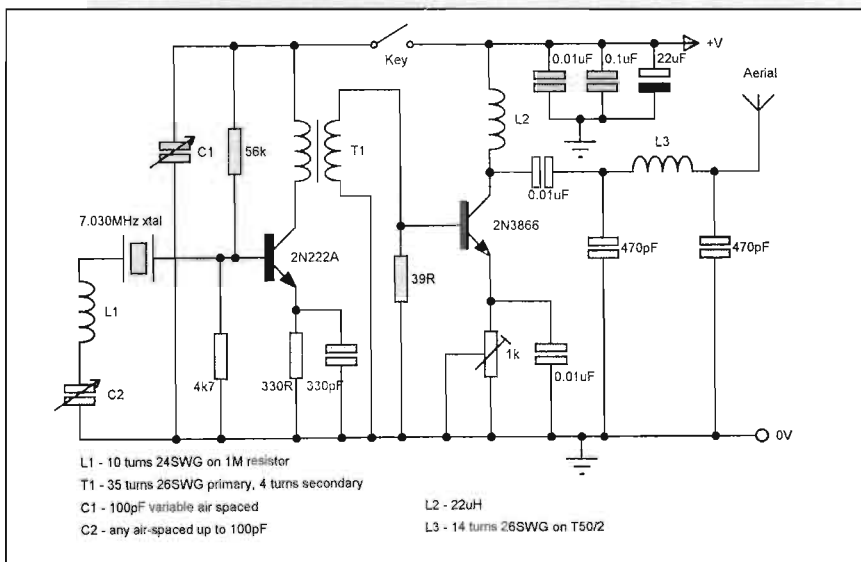
permitting some slight tuning across the crystal frequency. Ideal when the bands are busy. If a variable capacitor is not available, then switch fixed capacitors may be used to shift the transmitted frequency. The small inductor may be made by winding 10 turns of wire on a high value resistor such as a 1M. A further transistor (such as a ZTX751)

may be added as a switch to key the transmitter, but this unit will work as shown. The low pass filter is a simple three pole unit that will cut harmonics. This should not be excluded even if an ATU is to be used as well. Although a nominal 500mW output from the PA, TR2. This unit can be built 'ugly style', on Veroboard, or with a PCB.

## G-QRP Club winter sports

The time has come once again for the annual G-QRP Club winter sports, that time of year twixt Christmas pud and New Year resolutions, where all the QRPers get on the air to spread the word and contact other members. This is not a contest nor a competition, but logs may be sent in to Gus G8PG at 37 Pickerell Road, Greasby, Merseyside L49 3ND. The most interesting gaining a small trophy. The sports run from 26th December until 31st December inclusive, and contacts should be made in 'chat mode', contest style operating should be avoided. Needless to say power levels should be the normal QRP levels of 5W for CW, and 10W for SSB contacts. VHF contacts count too of course.

That's is for this month, news, views and comments to me via the Editor, on Email to Dick@Kanga.demon.co.uk, via packet to GB7RMS, or even by the snail mail to Seaview House, Crete Road East, Folkestone CT18 7EG.



The 'Pipsqueak'

# From My Notebook

## *Geoff Arnold G3GSR gives some hints and tips on static precautions and component soldering*

A subject which sometimes seems to worry newcomers to construction and maintenance of electronic equipment is the need to follow safe procedures in handling CMOS integrated circuits and other semiconductors using field effect technology.

In the early days of field effect devices, the warnings about the dangers of damage due to a build-up of static electrical charge were pretty dire. Nowadays, the manufacturers say that there is minimal risk of damage, as devices have built-in static protection diodes. Providing certain basic precautions are taken this is true, and many keen constructors will tell you that they've never had a FET or CMOS chip blow up due to static electricity. So what are the risks, and what are the precautions that you should take?

### **Soft-shoe shuffle**

Static electricity is naturally all around us. Any movement or friction between two insulating surfaces will generate some static charge, but generally it is so small as to go unnoticed. In some circumstances, that charge can rise to several hundred volts, and that's enough to demolish the input (gate) protection devices built in to modern CMOS and FETs. Clothing and furnishings manufactured from man-made fibres such as nylon are probably the worst offenders, but more traditional materials can cause problems, too.

From my seagoing days, I recall a particular radio office chair having good old-fashioned horse-hair stuffing in a leatherette-covered seat, which could generate painful levels of static from the simple act of sitting down in it. The chair had a tubular metal frame, and the radio room floor was covered in safety rubber matting, which provided extremely

good insulation between the frame and earth. Should anyone be so unwise as to bounce up and down on the seat when in areas of the world with very low humidity, such as the Persian Gulf, and then grab hold of a piece of radio equipment with an earthed metal cabinet, sparks would crackle between the chair frame and the occupant's bare legs (shirts and shorts were rig of the day thereabouts)! I couldn't

say now exactly how long the sparks were, but I would guess somewhere around 6-12mm. I *do* know that it *hurt*!

I didn't normally make a practice of bouncing up and down in the chair, of course, but it was sometimes necessary to leap up to adjust some piece of equipment which was just out of reach. The act of sitting down afterwards became painful. I got around the problem by connecting a length of wire between the chair frame and a fixing bolt on the nearby transmitter; that made an effective static drain.

Carpets woven from nylon and other man-made fibres can also generate considerable static voltages if you shuffle across them. Many of you will have experienced the shock you can get when reaching out to operate a light switch at home or work, the type having a plastic switch-plate secured by a couple of screws. The shock is sometimes put down to leaky switches, but in fact it is due to the static built up on your body from walking over carpets, flashing over to the heads of the switch fixing screws, which are normally threaded into metal lugs on the (earthed) metal box behind the switch. If you don't believe me, try shuffling across the room on a dry day, or when the central heating is on, instead of walking as you normally would, and see how much worse the shock is when you put a finger near the screw-head on the switch.

### **Anti-static defences**

If a significant static charge is built up on your body, and then discharged from your body to an earthed point such as I've just described, you will be the one who might experience a brief stab of pain.

However, if the discharge takes place to some static-sensitive component, it is likely to do that component rather more lasting damage. So it is good practice to avoid man-made fibres in clothes and furnishings in an area where servicing or construction of electronic equipment takes place.

Carpet specially treated so as to prevent the build-up of static charge, is widely available nowadays. Such carpet was first made for use in computer rooms, where a static discharge from an operator entering the room and sitting down to operate a computer has been known to generate spurious data. Its use later spread to the domestic scene, to overcome the shocking problem described above. Read the small print on the carpet sample labels if you're planning to lash out on carpet for your shack or workshop.

The risk of significant charges building up from clothing is pretty small, but if you have a fondness for nylon shirts, underwear, etc., it may be wise to avoid too much leaping about! On a more serious note, it is important to prevent a build-up of static charge on your body. Regularly touching an earthy point whilst working is one recommended method, alternatively wear one of the wrist-straps designed for the purpose. These consist of a conductive wrist-band, either elasticated or having a Velcro fastening, connected to an earthing cable. A series resistance of typically 1 to 4 megohms in value is incorporated into the earthing cable, to limit any current flow to a safe value. Even so, it is recommended that such a wrist-band should not be worn when working on live equipment.

When handling static-sensitive components such as FETs, CMOS devices or memory chips or modules, try to avoid touching the connections. Handle devices by their cases, and PCBs by their edges. Many such devices and modules are shipped in special conductive packaging, such as metallised envelopes or sleeves, conductive boxes, or conductive foam. CMOS integrated circuits are often supplied with their legs stuck into conductive foam. Discrete FETs sometimes come with a metal clip clamped around their lead-out wires. Whatever form the protection takes, leave the devices or modules in their packaging until the last moment before fitting.

The gate (input) terminals are the

vulnerable ones. For discrete FETs, it is good practice to connect the gate lead first when fitting a device, and disconnect it last when removing a device.

## Equipment earthing

There seem to be differing ideas on whether it is good practice, from an anti-static point of view, to earth a piece of equipment whilst you are working on it. I have seen it suggested by computer manufacturers that you should leave the mains lead connected but with the supply switched off at the wall socket, in order to provide a safety earth connection via the third pin on the plug. That's OK if you know that the wall socket is of the double-pole switched variety, or that it definitely has the switch in the live side if it's single-pole. Other manufacturers instruct that you should disconnect every cable from the computer before opening it up.

One solution would be to stand the equipment on one of the conductive mats which are now available, along with other anti-static products, from suppliers such as Maplin Electronics and RS Components (Electromail). The mat has a grounding strap which is connected to a suitable nearby earth point.

The requirement for an exposed earth point to be available, either to connect conductive mats, wrist-straps, etc., or so that it can be periodically touched by someone working on a piece of equipment, is somewhat at odds with advice I have given in previous articles to keep the workplace free of earthy objects, so as to reduce the risk of electric shock. Unfortunately, as is so often the case in life, there is no simple answer to this one, apart from having totally separate areas of a workshop to do live testing, construction, etc., a luxury few of us can run to. Otherwise, you just have to be careful.

## A real hazard still?

As I said earlier, it is often assumed that, just because modern field-effect devices have protection diodes, etc., built in to them, there is no need to exercise any particular care in handling. Also as mentioned earlier, many keen experimenters will tell you that they've never in their lives blown up a device due to excess static charge. It makes sense, however, to take

care, and apply the precautions in handling described in this article. After all, if there really was no longer any hazard, RS Components wouldn't devote a complete section (seven pages) of their catalogue to Anti-static Products for industry, with more anti-static versions of standard items to be found in other sections!

## Hot under the collar

In talking about safe handling of semiconductor devices, it is probably worth a few words about that other hazard - excess heat. The problem can come, of course, when soldering a device into circuit, and this is one of the reasons why sockets for integrated circuits are popular. The first and most basic essential for anyone installing heat-sensitive devices such as semiconductors is the skill to wield a soldering iron quickly and effectively.

It's worth restating the obvious, which is that the surfaces to be joined must be clean and free from corrosion; solder simply will not take on a dirty surface. We've all had the experience of holding an iron to one of those seemingly unsolderable solder-tags, scraping it up and down the surface to break through the oxide layer, while the wire to be joined to it (and the component that's attached to the wire) gets hotter and hotter! The moral is to clean the tag first, by scraping with a knife or file.

If the tag is firmly bolted to a large surface such as a metal chassis or case, and you're using a small soldering iron, you may never get the tag up to a temperature that will melt the solder. The secret is to unbolt the tag, or if you don't want it floating around in mid-air, at least slacken the bolt so that the thermal contact between tag and chassis is not quite so good.

A similar problem can apply to printed circuit boards with large copper areas such as earth-planes or wide, heavy-current tracks, where the board designer has not considered the need to get component attachment points up to soldering temperature (and down again) quickly. Anyone involved in electronic servicing or construction should have in their tool-kit at least one pair of heat-shunt tweezers. One pair is generally sufficient for work on pcbs or stripboard, because you will only be heating one connection at a time (unless you're using too large an iron). If you are working on tagboard or tagstrip based

equipment it's advisable to have several heat-shunts, which you can use to protect other components connected to the same tag.

It affects the darker colours most, black being the worst, and you will notice it particularly if you form the wire into a tight turn close to the end to be soldered. When you apply the iron to the tag and wire-end, the insulation will melt and try to straighten out, stripping itself from the wire like peeling a banana!

It's not feasible to use heat-shunt tweezers on the wire. If you have sufficient length of bare wire to clip tweezers to, you've stripped too much. Whenever possible, do not bend the wire that close to the tag; take it away in a straight line for a minimum of 15 to 20mm, especially for those darker colours.

Alternatively, solder the straight wire to the tag first, and bend it after the joint has cooled, hoping that you've not simply transferred the problem to the other end of the wire. If you can't do either of these, don't call me - you're on your own!

I would still be delighted to receive any suggestions for topics to be covered in future Notebooks. Please send them to my home address, 9 Wetherby Close, Broadstone, Dorset BH18 8JB. Alternatively come and have a chat with me on the Radio Bygones stand at a radio rally.



**Come and meet Geoff and Barbara Arnold on the Radio Bygones stand**



# VHF/UHF Message

*Geoff Brown GJ4ICD says "Watch out for the spectacular Quadrantids", and searches for Cape Verde DXpedition operators"*

Watch out next month (around the 2nd - 5th January) for the spectacular *Quadrantids* meteor shower, there could also be some winter 'ES' around. Looking back through the 50MHz logbooks, in 1992 the beginning of January was packed full of 'ES', and the whole of Europe was worked from the UK, plus C6A (Bahamas). Was this via 'ES'? Well, we don't really know, but at the time 'ES' was reported in the USA as well as Europe.

For newcomers to VHF, you might take a listen on 14.345MHz during December, mainly during weekends, and listen to the skeds being made for VHF meteor scatter tests. Then listen to the tests themselves to gain experience.

## Band reports

Alan, GJ4ZUK operated in the 144MHz Thorogood Trophy contest in September, and found conditions the usual poor ones with rain and winds battering the Island on the Saturday. Only 360 contacts were made in the 24 hours, but a good average was maintained at around 13 points per contact. Most of the contacts were in the first few hours of the contest, however, Alan did make several contacts with Spain, Holland and Germany, (no HB9's!), the best DX being a DL in JO42 at a

distance of 853km.

Conditions for Alan were much better while operating in GM during VHF NFD, as can be seen from the two maps of the squares worked from both GM and GJ.

50MHz opened early on September 5th. At 0700z, LA/SM TV was copied for a couple of hours on the south coast. A weak aurora was detected on the 7th, but only LA/SM TV was heard. Solar flux levels remained high during this period at around the 100 mark.

Steve, G4JCC reported a packet message from the 8th stating Dave W5UN was on 144MHz EME into Europe. Presumably Dave has now put up another monster array, after his other array was destroyed.

The 10th saw a return of sporadic 'E', and late pm brought the usual warning (DF0AAB on 28.276MHz and SK5TEN on 28.289MHz). Both these beacons were booming into the UK, and they were followed by SM/OZ TV on 48.250MHz.

Ela, G6HKM sent in a report that took ten days by post to get to Jersey! Ela reports August being a poor month, but at least she worked *something*. During the Perseids, Ela worked OY/G0WKN in IP61, on both 50MHz and 144MHz - Well done! She also claimed #9 of the UKSMG 60 *Countries* awards, Ken G4IGO having claimed #8 of the same award. If you think about it, it's quite hard to

obtain 60 Countries in Europe.

Refer to the check list in the August 94 HRT and add TA1(Turkey), which is in Europe and has been activated.

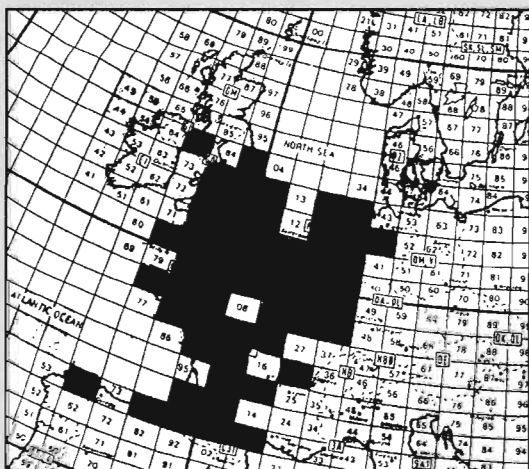
Information was passed on via packet that the USA had it's best ever 'ES' season during June. Over 3500 minutes of 'ES' were recorded over 88MHz, many 144MHz openings, and, even two 220MHz (a US amateur band) openings, the best for many years!

Mal, Z23JO in Zimbabwe reports another dead month (I know the feeling!). He states that the Zimbabwe 50MHz beacon Z21SIX on 50.052MHz continues to churn away, but no reports have been received. From Greece, Costas SV1DH reports that he made his 146th DXCC country on 50MHz with 4K6D in Azerbaijan. The latest DXCC news is that Peter, PY5CC has claimed 149 DXCC Countries on 6m, and LU3DCA also enters the awards at 102 Countries claimed.

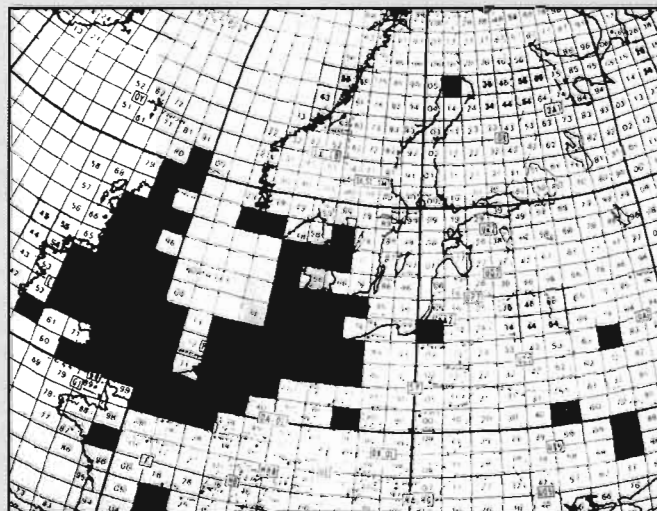
More activity comes from Lebanon on 50MHz, Samir, OD5SK has now been joined by OD5RAK who was worked by 9H5EE last Summer.

## 1995 VHF Convention

Don't forget this great event. Sunday the 19th February sees yet another VHF convention at Sandown Park, Esher, Surrey, with lectures and



Squares from GJ as GJ4ZUK



Squares from GM as GM4ZUK

many VHF goodies for sale. Again you will see that the convention is being held in February, this is probably not the best month for amateurs travelling from far afield due to usually poor weather conditions, but the date does stay away from contest weekends! See you there?

## Cape Verde update

There was a sigh of relief recently regarding the planned VHF operation from Cape Verde in June 1995. Plans seemed to be going well, until, a little bird told me that the DXCC advisory panel may well change the status of allowing other people to operate someone else's station. However, a vote was taken on the subject and the existing arrangements were passed by 8 votes to 6. This allows us to operate D44BC legally on 50MHz, as trying to obtain your own licence is very, very difficult for a holiday period. Our dates still look set at June 4th to 18th, and good operators are still sought. Any offers?

## QSL confirmation

In October's issue of HRT, the QSL route for ER5OK was given, this being via his QSL manager (I8YGZ) or direct to Moldova. Despite me receiving several letters from readers to say no QSLs have been received, I can confirm that both these routes are 100% OK (not intended as a pun!), as I have received QSLs from both sources. Mike, ER5OK runs an old military 1W radio (an R107) converted onto 50MHz and operates CW only, which is really unbelievable as his signal was S9+++ many times last Summer. Mike states he received his licence on 30/05/94, and commenced operating on June 1st. To date he has worked 391 different stations in 31 DXCC countries and 127 grids with 1W.

I can also confirm the recent QSL route for JY4MB, (P. O. Box 3236, Amman, Jordan), as being correct, as I have just received the card. You should however expect a delay as Mohammed is a very busy man.

## Silent key

I, and many friends, were very saddened to hear of the passing away of Leif, LA9ZV. Leif was a very active VHF'er, especially on 50MHz during cycles 21/22. A retired school

teacher, Leif used to frequent his holiday shack north of Oslo during the summer months, and I can even remember when he used to 'back pack' to his forest shack with his radio when special events were taking place, such as the UKSMG/USA EME trials.

Whenever 50MHz was open either via 'ES' or F2 Leif would always be passing information on 28.885MHz to benefit others. His voice will be missed by many, however, for those who still require a QSL from Leif then you will be pleased to know that LA9VDA (callbook address correct) has taken over the QSL situation.

## New 50MHz SSB/CW handy

Tokyo Hy-power are claiming a world first (VHF/HF) tri-band handheld radio, with their new handheld CW/SSB transceiver. This rig covers 50MHz, 7MHz and 21MHz, (notice I put 50MHz first!), and is powered by internal nicads or an external 8.5-15V supply. The power output is 3W on HF and 2W on 50MHz. It should be great for 50MHz 'ES' portable operation.

Also from Japan is the new 50MHz handbook. This book, with over 190 pages, is filled with the history of 6m, with graphs of the previous cycles, a collection of all 50MHz radios up to date with the new Icom 736, world TV listings, beacon lists, a brilliant amplifier design using a pair of 4CX350, how to modify your TL922 HF amplifier to 50MHz, aerials reviews with lobes and diagram

## The new Tokyo Hi-power tri-band handheld



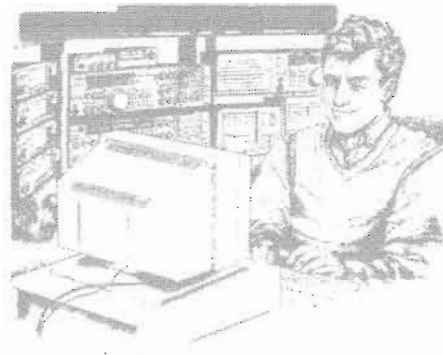
plots, up to date QSL lists, preamps and lots of famous names from around the world. I do not know how much the book is, as I received a complimentary copy, but if you are interested then you may like to contact JR3HED at his callbook address. Most of the book is in Japanese, but it's still worth a good look at.

Another month gone and nearly another year, and so I would like to pass on seasons greetings and a Happy Christmas and New Year to all readers. Let's hope for some great conditions in 1995, and just think, we may now be on the climb to cycle 23. Next month, courtesy of the UKSMG, I'll have a shortened version of the Jordan Expedition, the facts, equipment, the firsts and lots more. Good DX.

Please send news and views, photos etc to; Geoff Brown, TV Shop, Belmont Rd., St. Helier, Jersey. C. I. or phone/fax 01534 77067 anytime.



Part of the UKSMG Jordan Expedition team pictured with HRH Prince Raad; L to R; Geoff GJ4ICD/JY8IC, Mohammed JY4MB, Nick G3KOX/JY8OX, HRH Prince Raad JY2RZ, and Neil G0JHC/JY8JH



# Packet Radio

## Roundup

*Chris Lorek G4HCL finds packet goodies galore at the BARTG rally*

A few days ago, I saw an advertisement for the G4BMK PacTOR system, with a 'headline' that I thought summed things up pretty well. It said "When the going gets tough, the tough go digital". It's quite true that such digital modes, coupled with suitable processing power at each end (such as the 'Memory ARQ' system used for PacTOR) really *can* extract signals right out from the noise, where 'normal' forms of communication would be virtually impossible. This isn't just with data modes, because we're now seeing a number of 'add-on' digital signal processors for your receiver which can often do wonders in also cleaning up say, a speech or CW signal corrupted by band noise or QRM.

Which nicely brings me onto the next topic. In discussions with HRT readers and with the agreement of the Editor (*her word goes!*), this column will in the future cover not just packet and other text-based data modes, but will extend to encompass hopefully *all* digital forms of ham radio communication.

### New 'digital communication' column

Commencing next month, appropriately in the New Year's issue of HRT (which is published on the 1st Friday in January 1995), this column will be 'transformed'. Many amateurs are now already using digital generation and reception processing of what used to be 'analogue' modes. SSTV, FAX, and arguably RTTY are 'classic' examples of course, where most amateurs now use computers rather than analogue or, in the case of RTTY, mechanical, means for these. Recently, the 'JV Fax' and 'Hamcomm' programs have literally revolutionised on-air activity of such previous analogue modes.

It's also interesting to note that the proposed 12.5kHz channel spacing idea for 2m and 70cm has fallen by the wayside in view of future digital speech modes, with their ability to 'slot in' and possibly even 'frequency share' in the same way as packet does right now. We already have digital speech 'mailboxes' with auto-forwarding along the packet network. When higher speed becomes the norm, we could easily have digital videoconferencing links between amateurs as an everyday occurrence.

### The future is digital

If you consider 9600 baud packet, several digital voice 'channels' could happily co-exist on one frequency, all you need is a simple A/D (Analogue to Digital) converter IC between your mic and the TNC and a D/A converter at the other end. I'm sure future radios with such TNCs built-in will become more and more common. You can buy at least one such commercially-made rig/TNC combination 'off the shelf' at the moment, and PCs with a built-in transceiver and TNC are also on sale. Digital compression is the norm for getting data across in shorter 'bursts', and digital speech and video can be easily compressed in this way in 'real time' to achieve even greater spectrum efficiency. We already have digital GSM cellphones using these principles, so maybe this is a hint of what could be a good subject for HRT ex-PMR conversions in years to come!

### Sunpac 'Meet the SysOps'

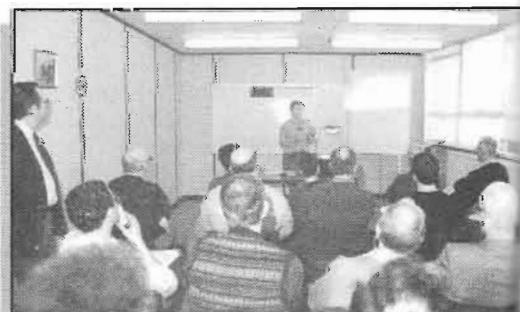
Coming back down to Earth, I must say a 'thank you' to the many amateurs who came to say 'hello' at the Sunpac 'Meet the SysOps' get-together in October. Unfortunately, I couldn't be present there for more

than a short time, as I'd just flown back into the UK a matter of hours earlier following a short trip to the Gulf (yes, during the time of the little 'excitement', although my visit was in a non-military capacity). So if you witnessed a rather tired and jet-lagged G4HCL, my apologies! However, from comments received, visitors to the event enjoyed themselves as well as learning a bit more about packet, from the many lectures, demonstrations stations, and video presentations covering a number of topics. See you there next year?

### CTRL-Z, End of Message

Tony, G0IAT @ GB7UWS.#32.GBR.EU, sent me a packet to say he was having problems in getting his MFJ 1278 TNC to YAPP transfer using the MFJ Multicom 3.1 software. So far he's had no success, so if any reader has managed to get the Multicom YAPP transfer to work, I'm sure Tony would like to know the secret of your success!

Until next month, with the new 'digital communication' column, it's 73 and happy Christmas from Chris G4HCL @ GB7XJZ.#48.GBR.EU. Please keep your packet messages coming, every one I receive gets a reply (eventually!), and you can also contact me by post c/o the HRT Editor at the HRT address.



**Jim GOOFE, SysOp of the GB7DXD DX Cluster, gives a talk on the DX Cluster system to a packed lecture room at the Sunpac 'Meet the SysOps' event**

# Satellite Rendezvous

Richard Limebear G3RWL with this month's AMSAT-UK news

Remember that we were told that FO-20's computer was dead? Well it isn't. A software reload was completed successfully in September and it was commanded into its digital mode of operation (Mode-JD). For a while, Mode-JD operation will be continued because the command station is concerned that the system may crash when mailbox is activated (the controllers noticed some failures of the command system during the reloading process). Telemetry reports will be very much appreciated if you capture it just before the any crashes. You can send your telemetry to JJ1WTK at his Internet address of qga02014@niftyserve.or.jp.

## AMSAT maritime mobile

On Sep 14th, an Argentine team sailed on an icebreaker carrying a portable Microsat station and two AMSAT volunteers, LU2AQO and LU9AFP. The objective was to demonstrate digital satellite communication including the transfer of images and data files to those stationed in Antarctica, with an aim of eventually placing permanent amateur satellite stations in Antarctica.

The demonstration was all the more relevant because normal HF communication between Antarctic bases and the South American continent are frequently interrupted, especially during this portion of the solar cycle.

## Oscar 10

This is a reminder that Oscar 10 is still operational in Mode-B. Despite good signals from the transponder, there are very few stations using it. It's currently available when in view but *please do not* attempt to use it if you hear the beacon or the transponder signals FMing. There are reports that AO-10 has started to 'FM' very badly at times.

## MicroSats

KAIST informed amateurs recently that, due to a continuous problem on the 145.980MHz uplink, they have closed down the service and opened the other uplink on 145.870MHz. Since there is a possibility that the old uplink can cause crashes at any time this action was taken before any notice in advance. They are not sure this will solve the problem completely but just have a small hope that it might delay the next crash.

After of being out of service since May, LUSAT-OSCAR-19's BBS is now working again. Last May, when proton events hit several spacecraft, the BBS crashed during a pass through the South Atlantic Anomaly. On Sept 11th the ground controllers were able to bring the BBS back on-line.

The IO-26 status as of 9th Sept is; After 40 days of stand-by, it was switched on by ground command and a full spacecraft checkout was performed by the control team. IO-26 is in excellent shape, the battery fully charged and the critical parameters in nominal status. A couple of test programs were loaded and executed without any problem. The reason for the long silence is due to the heavy workload of the control team (I2KBD also spent some time in Chile to help the CESAR team) and lightning strike that destroyed the main command station. The reload of the Integrated Housekeeping Task (IHT) code with improved capabilities is scheduled to be completed by the end of September to celebrate the first year in orbit of IO-26, so expect a couple more weeks of discontinued use.

## New software available

Ron G3AJJ at the AMSAT-UK office now has some new software available. *WINSAT*, from the USA, is a windows tracking program, and is priced at £29.63 plus postage (UK £1.25, overseas £2.50). Also available is *P3C Mark II*, which is an upgrade of the old AO-13 telemetry program but with new facilities, the price is the same as before.

Ron also has a new series of information sheets; including an introduction to simple orbit prediction & tracking (which is 6 sheets A4). Send a large SAE plus a donation of a pound coin or two if you'd like a set.

For further information about the group, contact: AMSAT-UK, c/o Ron Broadbent, G3AAJ, 94 Herongate Rd, London, E12 5EQ. A large SAE gets you membership info, SWL's are welcome., and all new joiners get the USAT-P tracking program on 5-1/4 disk.

### AO-13 Transponder Operating Schedule until Dec 19th

Mode-B : MA 30 to MA 150		-< S beacon only -< S transponder; B trsp. is off Alon/Alat 230/0 Move to attitude 180/0, Dec 19
Mode-B : MA 150 to MA 190		
Mode-BS : MA 190 to MA 218		
Mode-S : MA 218 to MA 220		
Mode-S : MA 220 to MA 230		
Mode-B : MA 230 to MA 30		
Omnis : MA 250 to MA 140		

Continuous up to date information about AO-13 operations is always available on the beacons, 145.812MHz and 2400.646MHz in CW, RTTY and 400bps PSK.

WINSAT is now available from AMSAT-UK