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HAM RADIO TODAY

MARCH 1995 £2.50

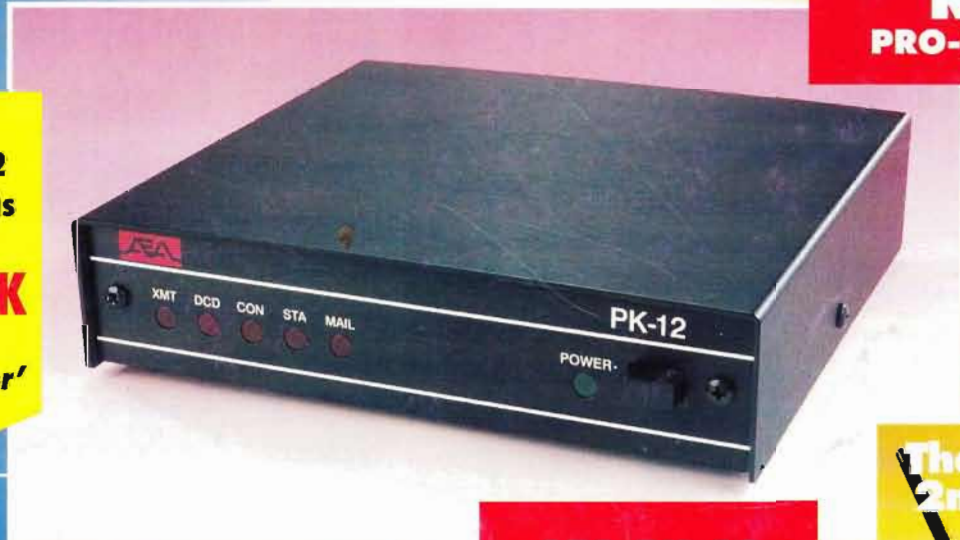
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CONTENTS

HAM RADIO TODAY

VOLUME 13 NO. 3 MARCH 1995

REGULAR COLUMNS

| | |
|--|-----------|
| HRT COVER DISK AND SOFTWARE OFFER | 6 |
| You asked for it, and here it is! | |
| SCANNERS | 20 |
| Bill Robertson discusses VHF/UHF frequency lists, and shows how to improve your listening station on HF | |
| QRP CORNER | 36 |
| Dick Pascoe G0BPS looks at QRP data modes, and shows how to build a simple dummy load and power meter | |
| FROM MY NOTEBOOK | 38 |
| Geoff Arnold G3GSR lends a guiding hand to help you in aligning a receiver | |
| VHF/UHF MESSAGE | 40 |
| Geoff Brown GJ4ICD recounts a fantastic opening on the higher bands | |
| DATA CONNECTION | 42 |
| Our resident packet radio SysOp shows what that 'mystery mode' of TCP/IP has to offer, and gives an update on weather satellites | |
| HF HAPPENINGS | 44 |
| Don Field G3XTT gives an insight into 40m activity | |
| SATELLITE RENDEZVOUS | 46 |
| Richard Limebear G3RWL with this month's AMSAT-UK news, including details of a new amateur satellite to be launched next month | |
| FREE READERS ADS | 52 |
| Helplines, For Sale, Wanted and Exchange, published free | |

REVIEWS

| | |
|---|-----------|
| AEA PK-12 PACKET TNC | 15 |
| Chris Lorek reviews a low-cost packet TNC ideal for beginner's and experts alike | |
| COM TALK GEE-890 2M HANDHELD | 18 |
| A high performance 2m handheld for less than £70?.....G4HCL investigates | |
| REALISTIC PRO-2035 BASE SCANNER | 22 |
| Chris Lorek finds his 1000 channels get filled very quickly with Realistic's new base scanner | |

FEATURES

| | |
|---|-----------|
| THE 'RADIO SHACK' BBS | 32 |
| The Editorial team describe a superb BBS for the radio amateur or listener, and it's totally free | |
| HAM RADIO AND THE INTERNET | 34 |
| Don Field G3XTT shows how you can get ham radio information in an instant | |

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CONSTRUCTION PROJECTS

| | |
|--|-----------|
| HAMCOMM AND JV FAX PC INTERFACE UNIT | 25 |
| Hugh Jones shows how to build a simple RS-232 interface, that transforms your PC to a radio data, fax, and SSTV communications system! | |
| THE 'PI' MAXIMATCH | 28 |
| John Heys G3BDQ builds a versatile HF matching unit for single wire, coax and balanced feed aerials | |

NEWS AND VIEWS

| | |
|---|-----------|
| CQ DE G8IYA EDITORIAL | 5 |
| Bandplan.....what bandplan? | |
| RADIO TODAY | 8 |
| The latest Amateur Radio news | |
| LETTERS | 12 |
| HRT readers have their say, no censorship here | |
| NEWSAGENTS COUPON | 57 |
| No more problems in getting your favourite mag, but if your newsagent doesn't want to stock HRT on the shelves then let us know and we'll give them a kick up the 'whatsits'! | |
| HRT SUBSCRIPTION OFFER | 7 |
| Make sure you get your HRT each month right through your door | |
| CLUB NEWS/RALLIES | 48 |
| Dynamic go-ahead clubs and voluntarily-run RAE course contact details. Is your club listed? If not, why not? | |
| NATIONAL SOCIETIES AND ORGANISATIONS | 50 |
| Contact details for the RSGB, Radiocommunications Agency, SSL, ISWL, and many more national organisations | |
| CLASSIFIED ADVERTISEMENTS | 55 |
| Your local dealers, component and kit suppliers, RAE courses, and reader's classified ads | |
| ADVERTISERS INDEX | 57 |
| Who's 'in' HRT, trader-wise | |
| WHO'S WHO AND WHAT'S WHAT IN HRT | 57 |
| Contact details for the people who put the magazine together | |



HRT
MAR
95

CQ de G8IYA

Editorial

Bandplan.....what bandplan?



"G4XYZ, G4XYZ, this is G0ABC calling"....."Please QSY, this is the RTTY data calling frequency" comes the reply. "Oh, sorry". I thought that was just a quiet 2m frequency, let's try this one instead; "G4XYZ, G4XYZ, this is G4ABC calling"....."QRZ?", this is G0DEF listening for calls from the county emergency communications office for today's exercise". "Oh, sorry". Now, let's try again....

Does this sound familiar? But where *do* you call, or QSY to? The 2m bandplan may shortly be changing, again, so it may be an even more familiar story soon. Some bandplans don't change very often at all, but try calling CQ on SSB on, say, 3.550MHz (which many amateurs say they're perfectly and legally entitled to do) and you'll probably get some dots and dashes in reply instead of the pleasant SSB ragchew contact you were looking for. It can, of course, be quite legal to use the 'CW' section of a HF band for SSB, indeed my Tech Ed in his last job used a DTI-issued G9 licence which specified he *must* use USB on a given 'spot frequency' in the 80m 'CW' bandplanned section. Also, several years ago, I learned (from the RIS, not from amateur 'gossip') of SU20, the 70cm FM 'calling channel' was being used by military base security guards in East Anglia with their FM handhelds. I can imagine some rather interesting contacts must have taken place!

If you read your licence conditions, you'll see that certain others do indeed have priority of using SU20. These admittedly are examples of extraordinary and possibly unique cases, but what about the rest of the time? "No, you can't use this frequency, this is the Outer Farthingdale Ferret Breeding net frequency, we'll be using it tomorrow afternoon, so please QSY". No-one *owns* frequencies, and as long as we stick to our licence conditions we can use whatever frequency we like, on whatever mode we want. But we must all live together, and not cause undue interference to each other as well as other services. So, voluntary 'bandplans' have been put together,

for the good of everyone. If we stick to them, we can each go about what we like doing best. But, of course, times change, modes become less or more popular, and bandplans change to keep up with these. They often change because some modes have been encroaching on adjacent 'territories' for some time, and the new bandplan just 'legalises' the situation! So, should anarchy rule? It's up to you.

What bandplan?

An common limitation amongst newly-licensed amateurs is not knowing what the bandplan is. The 'old days' of being a listener for some time before obtaining a licence are, like it or not, declining. The 'new breed' are buying transceivers, not receivers, as a 'first rig', This sometimes happens only after they've passed their RAE, and are thus ready to go on the air virtually straight away.

The Novice training course gives potential amateurs a 'hands-on' introduction to activity on the air. Some countries, in their written licence exam, test their potential amateurs on on-air etiquette, like what mode they would *expect* to find on such-and-such a HF frequency. The RAE doesn't. At the moment.

Various amateur radio reference books contain bandplan charts. There's also going to be a new way you can find out what's what.

HRT information service

In last month's HRT, I mentioned that a new reader's service would be put into operation. That of a 'fax-back' information service. This should be fully 'on-line' by the time you read this, complete with a voice bank information service with the latest news and the like. When, for example, new licence privileges are 'rumoured', and in fact every time a popular ex-PMR conversion is published in HRT, my phone often never stops ringing with readers

asking for information! Being a member of the press, readers naturally know that HRT often receives information well before it's disseminated in print anywhere due to the various timescales involved.

Voicebank 'hotline'

So, how about a pre-recorded voicebank 'hotline', which you can access 24 hours a day? And *without* it being a 'premium rate' number?

This *isn't* designed to be a minute-by-minute voicebank for readers to share information such as 'so-and-so DX station is on such-and such a frequency', nor for half-hour long recorded news scripts. There are already services like that in existence. But what if a major rally is cancelled, and you want to quickly check on the morning before you set off on a long journey, maybe at 5.30am when the rally organiser is either in bed or on-site? Maybe you've heard a rumour about a new licence condition coming into effect this week, and you want to check whether it's true without making yourself out to be a fool to all sorts of people?

This can of course be extended to a two-way service. Rally organisers, why don't you let us know the latest details on your event, I'll be pleased to give you a minute's worth of digitally recorded speech on, say, directions to the rally and the latest news. How about posting or preferably faxing me a direction map, I'll be pleased to digitally store this on our 'fax-back' service so readers can get it out on their fax machine with no loss in quality. As for bandplans, well, press a button and the new 2m bandplan pops out of your fax machine!

The number is 01703 263429. It'll accept faxes automatically, as usual, if you'd like to *send* us a fax such a readers ads, club news etc. But if you've a touch-tone (DTMF keypad type) phone, or a fax machine with a touch-tone keypad and handset, you may find it rather interesting. A hint is to keep the latest copy of HRT by you when you use it.

Construction Projects in HRT

Missed that weekend project? Here's a list of those we've recently featured

Project featured

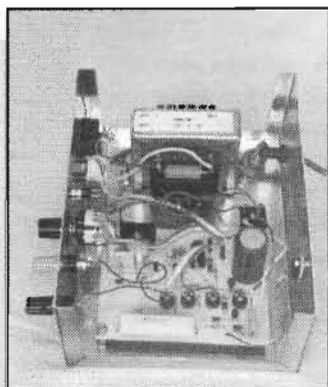
2m Receive Preamplifier *
 6m 50W Amplifier, part 1
 6m 50W Amplifier, part 2
 40m Shielded Loop Aerial
 40m QRP (low power) Transmitter
 80m Fun Rig (small transmitter)
 80m Transmitting Loop Aerial
 160m DSB Transmitter for the Novice
 New Aerial for the Burndept handheld
 Add-on BFO unit for HF Receivers
 Audible VSWR Meter
 Audio Processor, part 1 *
 Audio Processor, part 2 *
 Audio Processor, part 3 *
 Audio Processor, part 4 *
 BBC to PC Monitor Interface
 Channel Scanner for your transceiver
 Crystal Controlled Tone Burst
 CW (Morse) Ident Unit
 CW (Morse) Speed Meter
 CW (Morse) Text Generator, part 1
 CW (Morse) Text Generator, part 2
 CW (Morse) Transmitter Tester
 DC to DC Converter for Handhelds

Issue date

Oct 92
 Aug 93
 Sep 93
 Sep 92
 Nov 91
 Dec 91
 May 94
 Nov 92
 Oct 91
 Oct 93
 Jun 94
 Jan 91
 Feb 91
 Mar 91
 May 91
 Dec 92
 Apr 92
 Aug 92
 Nov 90
 Jun 93
 Sep 91
 Oct 91
 Jun 92
 Jul 92

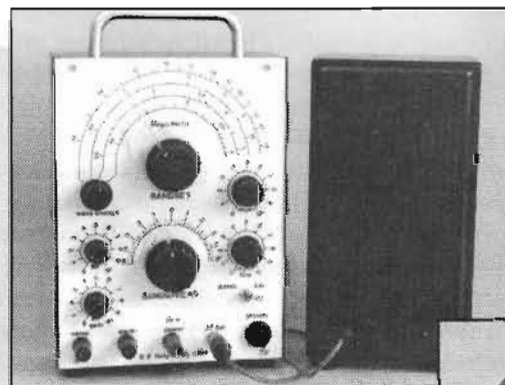
Direct Conversion Receiver for 7MHz *
 Effective HF Multiband Aerial System
 Fast Nicad Charger
 Halifax 80m Transmitter
 High Current 12V Power Supply
 HF Receiver Preselector
 HF Receiver, part 1*
 HF Receiver, part 2
 LW, MW and SW Superhet Receiver, part 1 *
 LW, MW and SW Superhet Receiver, part 2
 LW, MW and SW Superhet Receiver, part 3
 Multiband HF Aerial System
 Multipurpose Test Unit
 High Current 12V Power Supply
 'Parrot' Store and Replay Speech Unit
 Plug-in 1750Hz Toneburst
 Poky Toky Range Improvement
 Portable 2m Ground Plane Aerial
 Portable Aerial Support (simple)
 Portable Field Mast (24m/12m)
 Receiver Add-On Audio Amplifier and Speaker
 Silent Tune 'Gizmo' to remove tune-up whistles
 Speaker Microphone for Handhelds
 Versatile Impedance Matcher
 Versatile Shack Accessory

Jul 91
 Sep 92
 Aug 94
 Mar 92
 Feb 92
 Mar 94
 Nov 94
 Dec 94
 Dec 93
 Jan 94
 Feb 94
 Sep 92
 Jul 92
 Feb 92
 Apr 94
 Mar 93
 Oct 94
 May 93
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 Jan 95
 Jun 91
 Oct 93
 Feb 93
 Jul 92



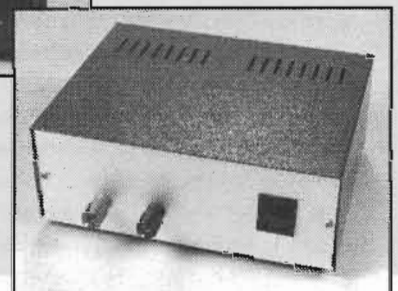
Fast nicad charger (Aug 94)

Speaker microphone (Oct 93)



HF Receiver (Nov/Dec 94) with add-on amplifier and speaker unit (Jan 95)

High current 12V power supply (Feb 92)



For articles marked with a '*', updates/amendments to the articles are available by sending an SAE to the HRT Editor, mentioning which project the update/amendment sheet is required for. All other enquiries regarding projects should be addressed to the project author in each case, either direct or c/o the HRT Editor, with an SAE for reply.

HRT back issues for the past 12 months are available at a cost of £2.40 per issue including UK p/p from our back issues department; Nexus Subscription Services, Ham Radio Today, Queensway House, 2 Queensway, Redhill,

Surrey RH1 1QS, Tel. 01737 768611.

Earlier articles may be available as photocopies from; Nexus Photocopy Dept, Nexus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST. The cost per article, regardless of their length, is £3.50 inc VAT, follow-up articles are £3.00 inc VAT, postage and handling cost; UK £1.00, overseas plus 30%, with a minimum charge of £1.50. Please note that projects published over several issues must be ordered as a series of individual articles. Cheques payable to Nexus, and allow up to 28 days from receipt of order for delivery.

LETTERS

Letter of the Month

Dear HRT,

I refer to Jerry G0FPI's letter in the December '94 HRT.

I received my B licence in March '94 and at the time knew only one (and that 'one' very casually) amateur radio operator. My experience, however, is quite the reverse of G0FPI's!

I have found the 'majority' of radio amateurs, whether A or B licensees, to be more than happy to talk to a newcomer on a variety of subjects without recourse to sneers or insinuations. For someone with no personal or professional background

in radio, electronics, aerials and the like, I was pleasantly surprised to see how many new and experienced G's were prepared to go out of their way to help me in the hobby.

It seems to me that what it all boils down to is; (a) Having the decency and patience not to muscle-in on groups ('cliques' as they are described) while they are having their regular QSOs and wait for a convenient time to introduce oneself;

(b) If you are new to the hobby..*then say so!* Personally, people have fallen over themselves to pass on their knowledge and memorable stories to a beginner and help in every way they can;

(c) Get involved. Most areas have clubs and run a regular net (you don't have to belong to the club to join in);

(d) Put out the occasional CQ call, or call out for someone you have spoken to before. No one is going to do it for you! Have you any idea how many people sit at S20 waiting for someone else to make the first move?

In answer to Jerry's question, the vast majority of radio amateurs I have known in the past nine months or so have been a thoroughly helpful, friendly bunch. Thumbs up for amateur radio, I say!

73 Paul G7RSG

Large or small dealer?

Dear HRT,

As some may well know, in the past I have really stuck it to Amateur Radio retailers, in the main my aim has been directed only at those retailers who are also the importers/wholesalers and not at local retailers. It now appears that the 'big boys' have come up with a new 'wrinkle' in their bag of tricks.

I came across this 'wrinkle' recently, due to my need for a replacement four pin plug for my HF rig's DC power lead. I tried a semi-local shop, they didn't have the item in stock. So I phoned their main outlet and yes, they had the plug in stock at £3.49 plus p/p.

When I tried to order the plug and pay for it on my Mastercard, I was told there was a £15.00 minimum order policy for mail order. It is fortunate, for me at least, that I required 15m of H-100 coax or I would not have been able to buy the plug on mail order.

Over the years the Amateur Radio Retailers (the 'big boys', not small independent shops) have been guilty, to my mind, of overpricing new and their secondhand equipment and of late, price fixing between themselves. They also complain that we amateurs expect too much for our gear in part exchange, as well as selling via adverts in HRT etc. It's also been said, by retailers in general, that they hardly ever break even when they go to rallies. I agree, but I have no sympathy for them, they seem to have forgotten the old and true saying, that the customer is always right. If I cannot bargain with dealers, if I cannot obtain, what I personally call, a fair price or deal, if I believe that the dealer is either lying or attempting, in some way, to cheat me, then I will not buy from them.

I personally will not be dealing with any of them unless that is I need more than £15.00's worth of gear. If they want us to buy from them, then they must sell without minimum order requirements.

John Bolton G4XPP

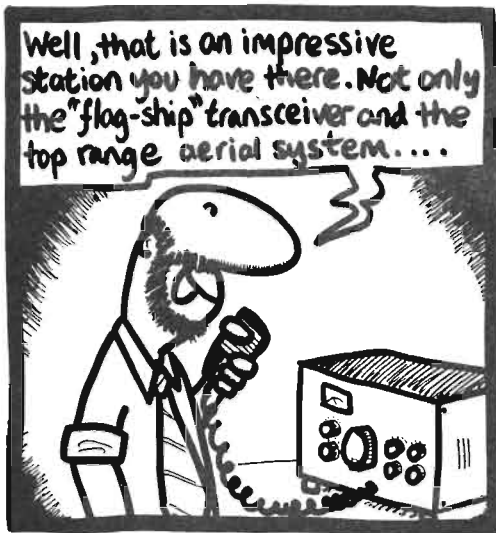
Editorial comment;

You pay your money and take your choice of course. At least the dealer did have what you wanted, straight away, when an independent may not have been able to supply 'from stock'. In our experience, 'big boys' don't get 'big', and stay that way, by offering poor service and high prices. Smaller shops can however offer a more personal service. We all have our tales of woe. Here's one of a young Short Wave Listener 20 years ago, now on the HRT Editorial team, who travelled over 150 miles by train and bus to visit an independent amateur radio dealer (a 'big boy' in those days) to buy an amateur bands receiver, having agreed by phone with them the day before and provided name, address, phone No. etc. as well as agreeing to bring the cash along to buy the receiver with. On arrival at the shop, the proprietor said he'd sold the receiver to someone else instead that morning. No apology, no nothing. This dealer is still trading, but he isn't a 'big boy' any more.

"TONE" BURST



by G6MEN
THE IDEA KALISKI



Belgian thoughts on UK activity

Dear HRT,

Having spent some time in England on holiday during the summer last year, I thought I would tell you about my first impressions of Amateur Radio in this country. Although I am British, I took my licence over here in Belgium, I had never operated before in England.

As I was going to be in England for about a month, I decided to bring just about my whole shack with me! This included my computer (a rather old and battered, but reliable, PC), and TNC of course, to operate packet.

I had set things up within an hour of getting there and tried to connect to a node. Unfortunately, even though I did have 50W, I was really in the middle of nowhere in my home town in the Cotswolds and my aerial system was rather primitive (a home-made 1/4 wave on 2m) which was situated indoors on the window sill. So I could not make it into any nodes, and there wasn't anyone around to digipeat through. Anyway, as I was tired and it was getting late I retired for the night.

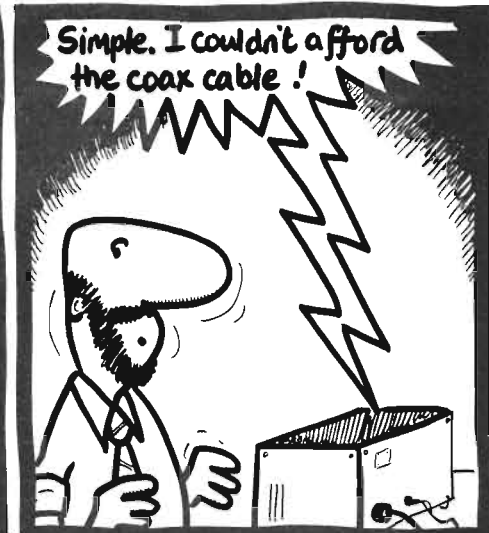


The next morning I found someone to digipeat through and sent some messages to hams back home, telling them I had arrived safely. I then decided that I should improve my aerial system to be able to get to a node. After some experimentation with a J-pole aerial made from twin feed-line, I found that my 1/4 wave worked best when hung from the window on a piece of string!

For the next few days, I spent time exploring round the country and also trying to aim for the LONNY wormhole in London, which I had heard so much about but couldn't get to from home (how come there aren't any user links to the continent?). In the end I never got to it from England either!

Of course I was soon pounced upon by people thinking that I was some rare DX packet station, and I was always rather disappointed to have to tell them that I was just down the road! But they were all very helpful in pointing me in the right direction for different towns.

As well as my packet operation, I also did some 2m chatting. I was a bit overcome by the number of 'squeakies' over there who disrupted quite a few contacts. I think what is also a shame is the way some hams reacted by trying



to key over them or hurling abuse back at them, which of course is just what the squeakies want us to do.

Having said that, I am assured that that particular repeater was an exception, and is well-known for its problems. Anyway I went home quite happy with my stay and impressed by the packet network, the number of repeaters, and also by the sheer number of 2m users over there. Well done!

By the way, I think the idea of giving away free software is excellent, but unfortunately it is quite expensive for me. I end up having to pay about £2 in postage every month. Would it not be a good idea to have a telephone BBS whereby you can download the software? This could also be used to send messages to the Editor and maybe advertise equipment etc....Maybe this service should only be offered to subscribers.

Simon Jones ON9CFF (Brussels)

Editorial comment;

Your wish has been granted
Simon, not only with software on the front cover of HRT, but also a BBS with several HRT discussion conferences!

£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, Nexus, Nexus 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

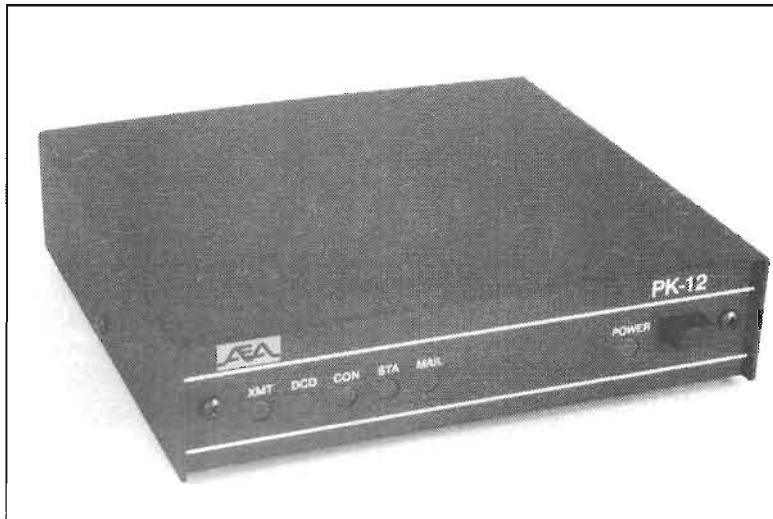
Review - AEA PK-12 Packet TNC

Chris Lorek G4HCL reviews a low-cost packet radio TNC that's ideal for beginners and experts alike

The firm of AEA have had a solid reputation in the data-over-radio field, their well-known PK-232 multi-mode data terminal unit for example is used throughout around the world.

A good starter

The new PK-12 is a 1200 baud TNC for VHF and UHF use, and in my mind is an excellent 'starter' to get going on packet radio with. Why? Well, besides the low price, which seems extremely good value, the supplied user handbook is one of the best I've seen. Most TNC instruction books give information on how to get the unit wired up, and how to have your first contact, and the rest is 'techno-speak' to the average beginner! What about all those TNC software commands, hundreds of them! But how do you use the unit to its best capabilities? How do you set up the personal maildrop for auto-reverse forwarding? What is automatic reverse forwarding anyway? Some of these questions may seem trivial to 'old hands', but it's a known fact that the many and varied TNC commands and functions are a great 'turn-off' to many potential users. No wonder amateurs pay extra and buy the manufacturers' custom software instead, to make life a bit easier! This type of software is of course available for the PK-12, for example AEA's PC-Packratt programs for either DOS or Windows are available if you want them. But this is the 'icing on the cake'. All you'll need with the PK-12 to get going is a simple terminal program on your PC, like the one on this month's



The AEA PK-12 TNC

HRT cover disk, or indeed just a dumb terminal connected to the TNC.

On the air

On switch-on, I only needed to type a '*' on my keyboard and the TNC adjusted itself to my terminal's parameters, such as the baud rate, parity, and so on. No need to worry about adjusting anything here. Before getting going on air however, you'll need to wire a suitable connector to the supplied TX/RX lead, to connect to your transceiver. Don't worry too much here, as the manual has connection details for over 400 different transceivers! It also has the connection pin functions printed on the bottom of the TNC case, should you lose the manual in years to come.

Once wired up, the manual then gives an excellent explanation on how to set the output level up to your radio by using the small adjustment at the rear, how to perform a 'loopback test', and then how to make your first 'connection'.

Commands

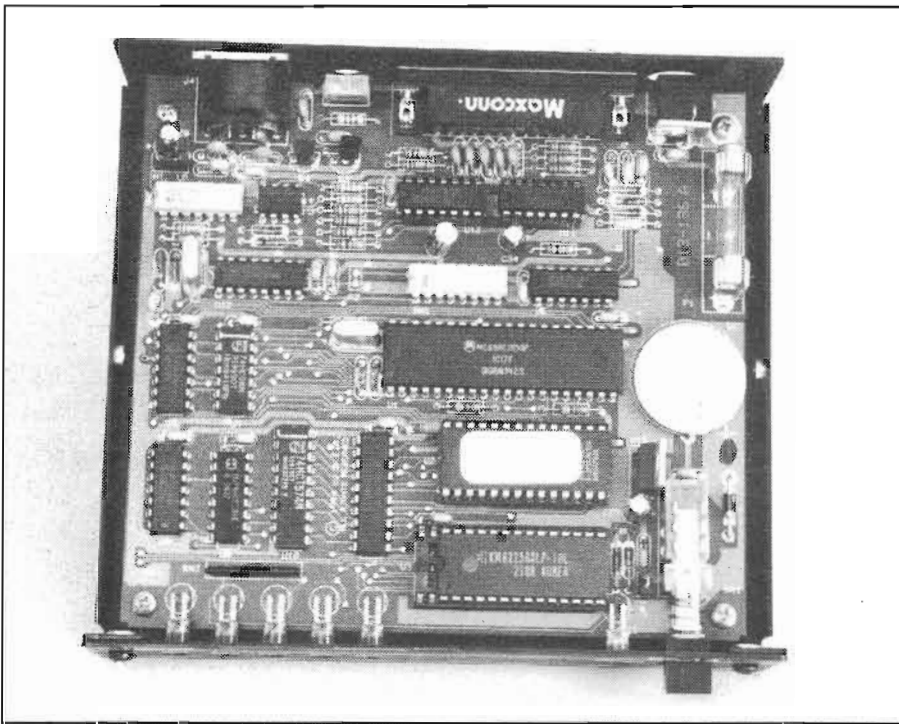
Although there are indeed a wide range of commands available, the 'default' settings should allow the TNC to work first time after you've entered your callsign. They did for me. If you try to enter something incorrect, or a parameter that might upset things, the TNC often doesn't allow you to! You need to be in the 'Expert' mode to do this, which means

you'll have had to look through the manual to have found out how to change to the 'Expert' mode itself. Quite a good idea, really!

Even though I'm active on packet myself, I deliberately attempted to try to find faults with the TNC and manual in helping me 'get going' as a novice. I failed. The TNC worked first time, and I had plenty of connections and message downloads/uploads. I didn't manage to corrupt anything, even when I deliberately tried to enter a wrong command like switching the gateway function on (it simply didn't let me).

Help your fellow man

This nicely brings me onto one of the advantages of packet radio, where you can use other stations as automatic digital relay point to increase your communications capabilities. They, in turn, can also use yours, if you let them. The PK-12 has the usual packet 'digipeater' function built in, but it also has a 'Gateway', or node, function with up



Inside the unit

to three two-way channels available. This facility allows other amateurs to use your station as a store-and-forward node, with the benefit of 'local acknowledgements' to aid packet throughput. No need to plug a special TheNet EPROM or whatever in. 'KISS' mode is also available if you'd like to run TCP/IP or a BPO node on your PC, and the built-in 'HOST' mode can be used with suitable external programs, like PC Packratt, running on your PC to provide more flexible control.

For the experts

If you're a keen packet operator, there are also some nice advanced features on the PK-12. Like a special packet meteor scatter 'Frick' command extension, for 'Master/Slave' polling over a long meteor scatter path. There's also an 'ACKprior' setting to implement the Priority Acknowledge scheme designed by Eric N7CL, which proposes to improve multiple-access performance on VHF/UHF channels with 'hidden terminals'.

The personal maildrop comes with 14k memory as standard, and you can upgrade this to over 100k if you're expecting lots of incoming mail to be automatically stored in your absence. There's a wide variety of maildrop commands, including a SysOp message 'edit' function,

together with various options for automatic forwarding and reverse forwarding to and from your local network BBS. I especially liked a note in the manual describing the need to ensure your station is switched on and on the right frequency for this; "If your packet station isn't on when the BBS tries to connect, mail won't be forwarded and its SysOp will mutter unprintable things. I know the feeling!

Technical matters

Looking inside the unit shows a good standard of construction, and for the whiz-kids the unit uses a Motorola MC68HC11D0P processor with 64K maximum ROM and 32k RAM as standard, expandable to 128k. A TCM-3105 demodulator is used (in common with many other TNCs),

with an output level of between 5mV and 1V RMS. Possibly best of all for portable use, or for when you leave the unit on all day, the current consumption at 12-14V is less than 80mA.

The PK-12 measures 147mm wide x 134mm deep x 34mm high, and weighs in at a light 340g. It comes supplied with a transceiver lead unterminated at the radio end, and a DC lead.

Conclusions

The AEA PK-12 in my mind is an excellent 'starter' TNC as well as a good-value TNC for more general use. I feel it would also be a good choice for a 'club packet station' TNC, with its built-in node gateway, maildrop, and easy-to-use features which won't get 'messed up' by club members issuing the wrong commands!

My thanks go to SMC Ltd. for the loan of the review TNC, price on application.

Sign-on message;

AEA PK-12 Data Controller
 AX.25 Level 2 Version 2.0
 Copyright (C) 1994 by
 Advanced Electronic Applications, Inc.
 Release 20,OCT.94
 Ver. 7.0
 cmd:

Available off-air Maildrop commands;

| | |
|-----------|--|
| A(bort) | Aborts the reading of a message |
| B(ye) | Log off from the maildrop |
| H(elp) | Help for the maildrop commands |
| J(log) | Sends the PK12's MHEARD list |
| K(ill) | Kill or delete messages |
| L(ist) | List the message directory |
| R(ead) n | Read message numbered 'n' |
| S(end) n | Send a message numbered 'n' |
| V(ersion) | Sends the PK-12's sign-on message |
| ? | Help for the Maildrop commands (same as H) |

Available off-air Gateway commands;

| | |
|--------------|--|
| B(ye) | Log off gateway |
| C(onnect) n | Connect to station 'n' |
| C n STAY | Stay connected to gateway when 'n' disconnects |
| D(isconnect) | Cancel a connect attempt |
| J(heard) | Display stations heard |
| L(isten) | Toggle monitoring |
| N(odes) | Display nodes heard |
| S(end) | Broadcast unproto |

Review - Com Talk GEE-890 2m Handheld

A high performance 2m handheld for less than £70? G4HCL investigates...



The Com Talk GEE-890 is a budget 2m, two channel crystal controlled handheld FM transceiver. As supplied it comes equipped for operation on S20 (the 2m FM calling channel) and S22 (a popular FM simplex channel), which are probably the two 'most useful' channels for most parts of the country.

A slide-off battery case is used, which accepts six AA cells, either standard or nicad, and a 'charge' connector on the side of the case lets you charge the nicads in-situ if you wish.

Together with the set-top BNC helical aerial, a telescopic half-wave whip also fitted with a BNC connector is supplied with the handheld, for use when the greatest possible communications range is needed. Also with the set comes a carrying strap and a metal belt clip.

With a 7.2V battery supply (e.g. from

6 AA nicads) the transmitter puts out just over 1W, and I found that plugging in a 12V DC supply to the 'charge' connector (with the nicads removed) increased this to around 3W output.

Controls and connections

The top panel has the usual rotary on/off/volume and squelch controls, plus speaker/mic connections in the usual 2.5mm and 3.5mm jack socket arrangement. Two slide switches control the operational channel, 'A' or 'B', and 'Hi' or 'Lo' transmit power.

There's a rubberised PTT bar at the side of the case, and below this is a small 'Moni' button which acts as a squelch override. A red 'transmit' LED completes the line-up, this also acting as a battery state indicator, glowing dim on transmit when your batteries are failing.

In use

From what you'll have read up to now, you'll see this should be a relatively 'easy-to-use' transceiver. It is! In fact, the supplied instruction leaflet contains just a few pages of information. Unfortunately it doesn't include any circuit details or electrical specifications, although I understand details such as crystal specifications and other such information is available upon request from the supplier.

On the air, I found the receiver to be remarkably sensitive, as well as being excellent in rejecting other strong signals on the band, including strong signals from a very local station just one channel away. I was most impressed, and I really would have imagined that, for what appeared to be a 'cheap plastic radio', that the RF performance would instead have been rather a compromise. Maybe its possible origins as being also intended for high-spec professional radio use may have something to do with this!

A minor 'gripe' I had was with the PTT button, which didn't seem to have a positive 'feel' or 'click' to it. The red

'transmit' LED at the front of the set did give me a clear TX indication, but not when the set was used outdoors in bright sunlight! Also, for packet use I had to figure out for myself the required TX and RX audio connections to the set-top connectors, although (sensibly) these were the same as on other handhelds such as Icom, Standard, and Yaesu types.

Lab measurements

The brief set of tests I performed, with the rig subjected to the rigours of my signal generators and the like, confirmed that the RF performance was indeed very good. Surprisingly good in fact for a low cost set like this, especially with regard to the receiver sensitivity and good strong signal handling. The transmitter operated well on 7.2V, but I did notice a power 'slump' during high power operation with a 13.2V DC supply attached.

Conclusions

The Com Talk GEE-890 handheld gives good RF performance, and should be quite a handy set for use when occasionally out and about. A typical example would be when visiting a radio rally, with talk-in operating on FM S22 it could save you quite a bit of time and fuel to prevent you getting lost! By re-crystalling one of the channels, S20 say, for your local repeater or your local packet BBS channel, it could make a good low-cost rig for general use both in the shack and outdoors. It's main limitation is the two-channel capability, so in all fairness I must say it's not an ideal set for the UK-wide traveller who wishes to operate on every repeater and simplex channel available.

The Com Talk GEE-890, operational on S20 and S22 and supplied with two aerials and a battery case (i.e. for you to use your own AA nicads and charger with), is intended to retail at £69.95, and my thanks go to SMC (Tel. 01703 251549) for the loan of the review transceiver.

LABORATORY RESULTS

All measurements taken using fully charged AA nicads in supplied battery case, high power TX selected, otherwise stated.

RECEIVER;

Sensitivity;

Input level required to give 12dB SINAD;

0.16 μ V pd

Squelch Sensitivity;

Threshold; 0.12 μ V pd (7dB SINAD)
Maximum; 0.24 μ V pd (19dB 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; 46.5dB
-12.5kHz; 42.3dB
+25kHz; 74.8dB
-25kHz; 74.4dB

Blocking;

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

+100kHz; 84.6dB
+1MHz; 88.9dB
+10MHz; 96.7dB

Intermodulation Rejection;

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

25/50kHz spacing; 56.5dB
50/100kHz spacing; 56.5dB

Maximum Audio Output;

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

2.51W RMS



TRANSMITTER

TX Power and Current Consumption;

| | 7.2V Supply | 12.0V Supply | 13.2V Supply |
|------|-------------|--------------|--------------|
| High | 1.07W/400mA | 3.03W/500mA | 3.72W/550mA |
| Low | 190mW/150mA | 190mW/150mA | 190mW/150mA |

Harmonics;

2nd Harmonic; -68dBc
3rd Harmonic; -67dBc
4th Harmonic; -73dBc
5th Harmonic; <90dBc
6th Harmonic; -72dBc
7th Harmonic; -81dBc
8th Harmonic; -88dBc
9th Harmonic; -77dBc

Peak Deviation;

5.27kHz



Intermodulation Rejection;

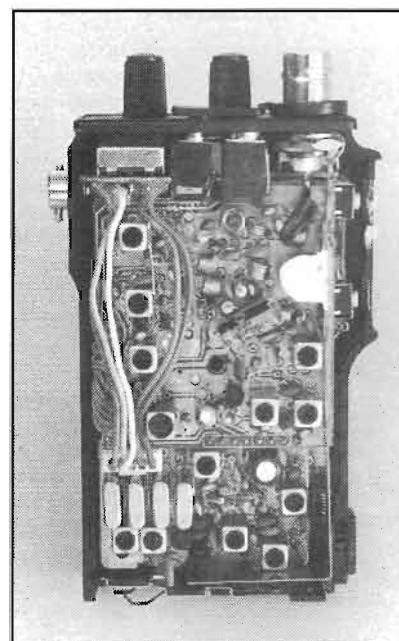
Increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product;

25/50kHz spacing; 56.5dB
50/100kHz spacing; 56.5dB

Image Rejection;

Increase in level of signal at first IF image frequency (-21.39MHz), over level of on-channel signal, to give identical 12dB SINAD signal;

75.1dB



SCANNERS

Bill Robertson discusses VHF/UHF frequency lists, and shows how to improve your listening station on HF

A great many HRT readers took advantage of the *PC HF Spectrum* frequency listing program and database offered in the December 1994 issue of HRT, which I featured in this column of that month's issue. Would readers like a similar database, but for VHF/UHF frequencies? Do let me know if you're interested, as a similar program to the 'Airscan 6' database (also offered, although some time ago) may be possible in the future through the HRT monthly software service, complete with plenty of interesting channels! Storage of a large number of frequencies, such as these, on a PC disk can be a very effective way of low-cost duplication and distribution with the 'at cost' service offered to HRT readers. It has the added advantage that you can edit the information to your own requirements, or even directly 'import' the channels into your RS-232 equipped AR-3000A or PRO-2006 scanner to save a lot of button pushing!

From the mailbag

Mr. Napier from Lincolnshire wrote to me, asking not for the *PC HF*

Spectrum disk, but for a printout of the disk information instead, as he doesn't have a computer. If you think about it, with the stated 65,000 frequencies and their users together with location, mode used etc., then at one line per entry and, say, 65 lines per printed page of text, this means 1,000 pages.



The UK Scanning Directory gives 'spot' VHF/UHF frequencies

Unfortunately it isn't possible to fit such a list into a small SAE, you'd need quite a parcel! Mr. Napier did however receive *something* nice in the post from the HRT Editor as a 'thank you' for the interest.

Ade T. from Enfield writes to ask if there are any books available giving UK spot frequencies on VHF and UHF. He says he has the 'UK Scanning Directory', but is puzzled in having picked up mobile communications in the 1178MHz band in NFM mode, and cellular telephones on the 714-754MHz band, on his AR-3000A scanner, these frequencies not being allocated to such uses. The latter case could be a case of 'image reception' of local and thus powerful cellular transmitters, especially considering the 'busy RF' location where Ade lives. But maybe HRT readers could offer an alternative explanation, especially for the 1178MHz reception? Please write in to me at this column, c/o the HRT Editor, if you can help, I'll be glad to publish any possible alternative explanations.

HF reception

A common problem found on HF (short wave) by owners of wide-coverage scanners, and even dedicated HF-only receivers, is that when an external 'long wire' aerial is connected the set, rather than hearing a lot more they end up with a 'mush' of indecipherable signals. This is often the case with sets such as the small Yupiteru MVT-7100 and AOR AR-8000 handheld scanners, which in all fairness are designed to be compact, self-contained sets primarily designed for use with their set-top aerial. Unfortunately, HF reception is often a little better than useless with this, so the natural inclination is to attach a 'purpose-designed' HF aerial, which is when the problems start! So, what can be done?

Switching in the set's built-in attenuator, if fitted, can often help tremendously, although this also reduces the strength of the wanted signal. For good 'out of band' rejection, some form of extra front-end selectivity is usually needed. You can do this by adding an external manually-tuned preselector. This fits in-line between your aerial and receiver, and can sometimes also

incorporate a matching unit to allow a high impedance 'long wire' aerial to be connected as well as coax-fed types.

There are a number of commercial HF receive preselectors available, from manufacturers such as Lowe, Daiwa, and MFJ, and preselector kits are available from UK firms such as Kanga, Howes, and Lake. HRT also recently published a HF preselector project, in the March 1994 issue (back copies available - phone 01737 768611 - Ed), which you may like to build.

Adding such a unit will often virtually 'transform' your wideband scanner's performance on HF. If you're in the market for an 'off-the-shelf' unit rather than building one yourself, why not take your receiver along to your local ham radio or scanner dealer, and try one of their units on their HF aerial system for yourself before committing yourself? You may be pleasantly surprised, and you'll probably be tempted to come away with a 'new toy'!

Realistic PRO-2039

Elsewhere in this issue you should see a review on the new Realistic PRO-2035 base scanner. No sooner was this launched, than hot on its heels comes its 'little brother', the PRO-2039. This is a 200 channel model covering 68-88, 108-174, 380-512 and 806-960MHz. It offers Realistic's fast 'Hyperscan', together with search, priority, lockout, scan delay and memory backup. The channels are arranged into 10 banks of 20 channels each, and the photo shows that it looks like quite a neat and well-styled base scanner, an indication of the way Realistic are 'going' today. If you'd like further details on the PRO-2039, contact Link Electronics, 216 Lincoln Road, Peterborough PE1 2NE, Tel. 01733 345731.



The new Realistic PRO-2039, a 'smaller brother' to the PRO-2035 reviewed in this issue

Review - Realistic

PRO-2035

Chris Lorek G4HCL finds his 1000 channels get filled very quickly with Realistic's new base scanner



The new PRO-2035 from Realistic is very much 'in the news' at the moment, in fact one catalogue I saw called it "our best". With 1000 channels, and a variety of scanning features including 'auto store' capability, it promises great things. Its modern styling also certainly 'looks the part'. I anxiously opened the box and connected it to my rooftop wideband aerial system, with all due haste.....!

Features

The PRO-2035 incorporates Realistic's fast 'Hyperscan' mode, which cycles through scan channels and search frequencies at anything up to 50 per second - very fast! The frequency coverage offered is continuous from 25-520MHz, and then from 760-1300MHz, in selectable 5, 12.5 or 50kHz steps, with reception modes of AM, NFM or WFM on any selected frequency. The set's 1000 channels are arranged into 10 banks of 100 channels each, and an additional 100 'monitor' memories are built in for temporary storage of frequencies you've found during a frequency search. These can then be moved to a memory bank at your leisure for subsequent automatic scanning. The usual 'lockout' function lets you skip any of your programmed memory channels during a scan, and a 'Priority

Channel' function can automatically check any channel briefly for activity every couple of seconds.

As well as a normal squelch system to pause the scanner when it finds a signal, a built-in 'Sound Squelch' may also be selected. Here, the set listens for audio on a signal and resumes the scan if only a 'blank carrier' is present. An 'auto store' mode also lets you perform a frequency search with the scanner automatically storing the frequency into successive memory channels each time the scanner finds a valid signal.

Together with direct frequency entry via the keypad, a large front panel rotary knob lets you cycle through either your memory channels, or up and down in frequency in your chosen channel steps, - useful for manually 'tuning around' a given frequency range.

A built-in memory backup keeps all your stored channel frequencies for three months with no power connected to the scanner.

Power

The scanner has its own built-in AC 220/240V mains supply, the review sample coming fitted with a European 2-pin plug, although this will naturally vary depending upon the country it's sold in. A rear panel socket also lets you operate the set

from an external 12V DC supply, a car battery for example, using an optional power lead.

The rear panel also has a fixed level output connector for a tape recorder, a 3.5mm jack socket for headphone use, a 10dB receive attenuator switch, and a BNC aerial connector for connecting an external aerial.

The PRO-2035 measures 232mm wide x 210mm deep x 90mm high, and weighs 2kg. It comes supplied with a user instruction manual and a screw-in set-top whip aerial for local monitoring.

On the air

The supplied 40 page instruction book gives a good account of how to use the scanner, complete with 'worked examples', and overall after having comprehended it I found the scanner quite easy, and fairly versatile, in use. Operation with a set-top aerial is always a compromise of course, although fitting this did pull in local signals quite clearly. Connecting my rooftop VHF/UHF vertical aerial certainly brought in a lot more activity, as I'd have expected.

I found the set a little less sensitive than purpose-designed amateur band receivers in these segments, and the PRO-2035 did seem to need a fully readable signal of good strength to raise the squelch even with this set to the 'threshold' position. I also found, quite often, when using an external aerial that I had further problems in receiving distant, and thus weaker, signals when stronger stations on nearby channels popped up, showing the scanner was being 'blocked' by these.

In 'scan' mode, the set was fast, very fast, it literally whizzed through the channels like lightning. I didn't miss much! Ever curious, I tried the set's 'auto-store' facility, leaving this on for a few hours over a given frequency range. Here, I was surprised to find that all the available 1000 channels

filled up fairly quickly. The reason for this was that the scanner didn't 'remember' what frequencies it had already stored, so I ended up with around 50 different channels with one frequency, 30 different channels with another frequency, 60 channels with another, and so on. Ah well!

I did however appreciate the facility of being able to select the receive mode from the 'default' mode for any given range. Some scanners designed primarily for 'mass market' countries limit AM-only reception to airband, and possibly also 27MHz CB if the scanner covers this. Here in the UK, AM is used on various other bands, and FM is used on 27MHz. Likewise, the UK/European version I tested didn't have the US 800MHz cellular segments excluded from its coverage, instead it gave continuous from 760MHz up to 1300MHz.

Laboratory tests

The results show that the set gave reasonable sensitivity across most of its tuning range, this just tending to 'tail off' towards the coverage edges. What was a disappointment though was the rather poor level of rejection of stronger interfering signals near to the tuned channel, echoing the results I found on air. A further check showed this to be limited by the set's VCO noise level, rather than any final IF filter selectivity. It looks like the 'Hyperscan' may have meant a compromise in terms of the set's synthesizer performance.

Conclusions

The Realistic PRO-2035 comes from the home of a well-established worldwide scanner distributor, and the set's wide availability will be the reason it should sell well. In use, I found it rather limited in terms of its RF performance. It was however quite versatile in operation, with a very fast scan speed to complement its large frequency coverage and 1000 memory channel capability.

The Realistic PRO-2035 is currently retailed at £329 by Link Electronics in Peterborough (Tel. 01733 345731), to whom my thanks go for the loan of the review scanner.

LABORATORY RESULTS:

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

Sensitivity:

Input signal level in μV pd required to give 12dB SINAD;

| Freq. | Level |
|---------|------------|
| 25MHz | 0.21 |
| 30MHz | 0.22 |
| 35MHz | 0.23 |
| 40MHz | 0.18 |
| 50MHz | 0.20 |
| 60MHz | 0.25 |
| 70MHz | 0.31 |
| 80MHz | 0.32 |
| 100MHz | 0.33 (WFM) |
| 120MHz | 0.37 (AM) |
| 145MHz | 0.41 |
| 165MHz | 0.36 |
| 200MHz | 0.36 |
| 250MHz | 0.51 (AM) |
| 300MHz | 0.34 (AM) |
| 400MHz | 0.30 |
| 435MHz | 0.26 |
| 450MHz | 0.27 |
| 500MHz | 0.40 |
| 520MHz | 0.53 |
| 760MHz | 0.30 |
| 800MHz | 0.25 |
| 93MHz | 0.25 |
| 100MHz | 0.34 |
| 1296MHz | 0.61 |

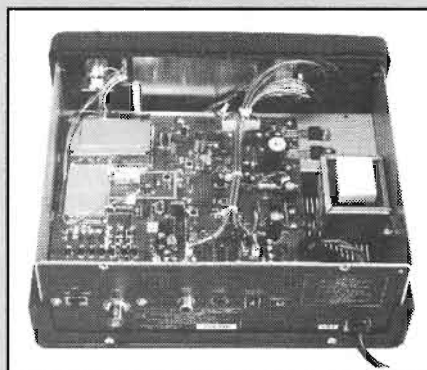
Maximum Audio Output

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

1.25W RMS

Attenuator Level

| | |
|---------|--------|
| 145MHz; | 11.2dB |
| 435MHz; | 12.3dB |



Squelch Sensitivity;

Level of signal required to raise receiver squelch

Threshold; 0.48 μV pd (15dB SINAD)
Maximum; 2.04 μV pd (31dB 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; | 9.0dB |
| -12.5kHz; | 0.7dB |
| +25kHz; | 24.9dB |
| -25kHz; | 24.2dB |

Blocking;

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

| | |
|----------|--------|
| +100kHz; | 55.4dB |
| +1MHz; | 78.2dB |
| +10MHz; | 88.6dB |

Intermodulation Rejection;

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

| | |
|---------------------|--------|
| 25/50kHz spacing; | 58.7dB |
| 50/100kHz spacing; | 56.7dB |
| 100/200kHz spacing; | 56.3dB |

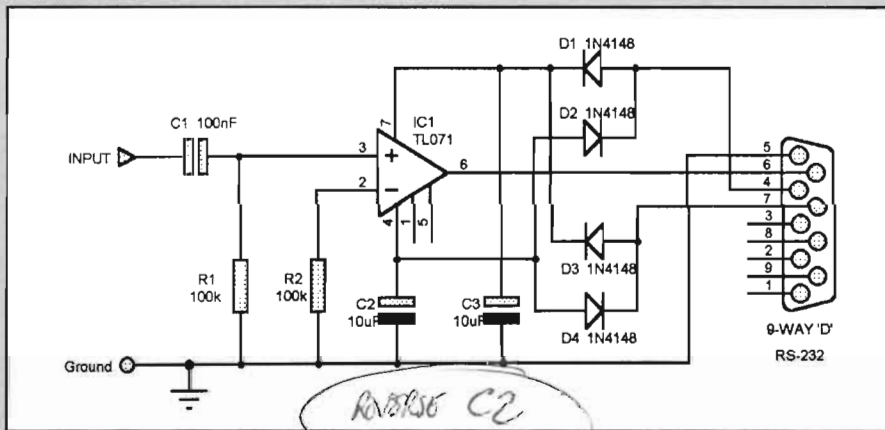
Image/IF Rejection

Difference in level between unwanted and wanted signal levels, each giving 12dB SINAD on-channel 145MHz FM signals;

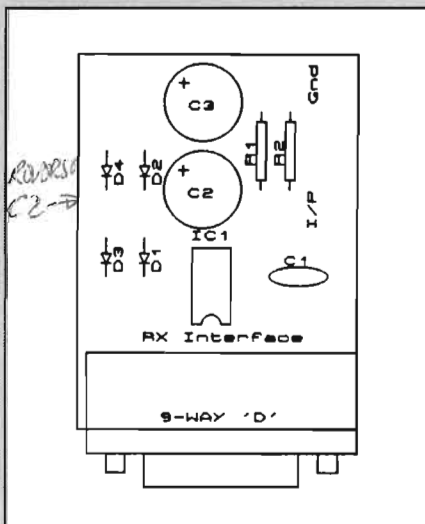
| | |
|-----------------------|--------|
| 1st Image; | >100dB |
| 2nd Image; | >100dB |
| 1st IF Rej (612MHz); | >100dB |
| 2nd IF Rej (48.5MHz); | 93.6dB |
| 3rd IF Rej. (455kHz); | 53.3dB |

Hamcomm and JVFAX PC Interface

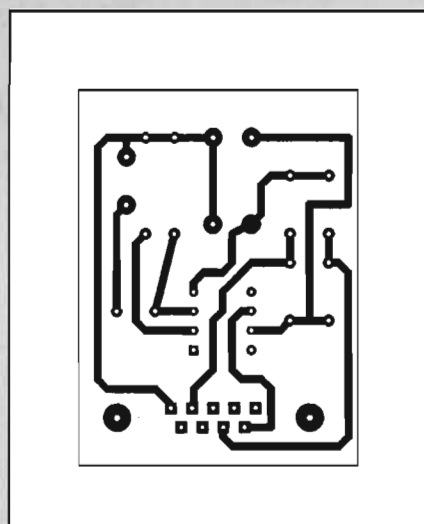
Hugh Jones shows how to build a simple RS-232 interface that transforms your PC into a radio data, fax, and SSTV communication system!



Receive unit circuit diagram



Receive unit component layout



Receive unit PCB, full size, track side

In chatting to the HRT Consultant Tech Ed one day, the subject of the popular JVFAX and Hamcomm programs came up. JVFAX V7, with its superb Fax and SSTV capabilities, has already been received by hundreds of HRT readers, and Hamcomm 3 by every single HRT reader. So what better construction project than a suitable interface!

I claim no originality whatsoever for the circuit arrangement, in fact it's the very same circuit as featured by the Hamcomm 3 author in his documentation file. My only input is the design, layout, and testing of suitable PCBs, and a few ideas regarding component types and voltages. Suitable interfaces are commercially available in kit form or ready-built, but for the home

constructor with a suitable component 'junk box' I hope these details are of use.

Circuitry

I've given two circuit arrangements here. The first, with fewer components, is for a 'receive-only' arrangement, i.e. where your receiver audio output *only* feeds the interface. The second is slightly larger with the addition of transmit circuitry for the PTT (push-to-talk), and a multi-section low pass filter to shape the harmonic-rich square wave from the PC into a 'cleaner' sine wave to feed to your mic socket.

You may use either circuit, or of course you can use the Transmit/receive and just populate it with the Receive components as shown. This allows for future 'expansion' to add transmit capability, for example when you obtain an amateur licence if you're currently a listener.

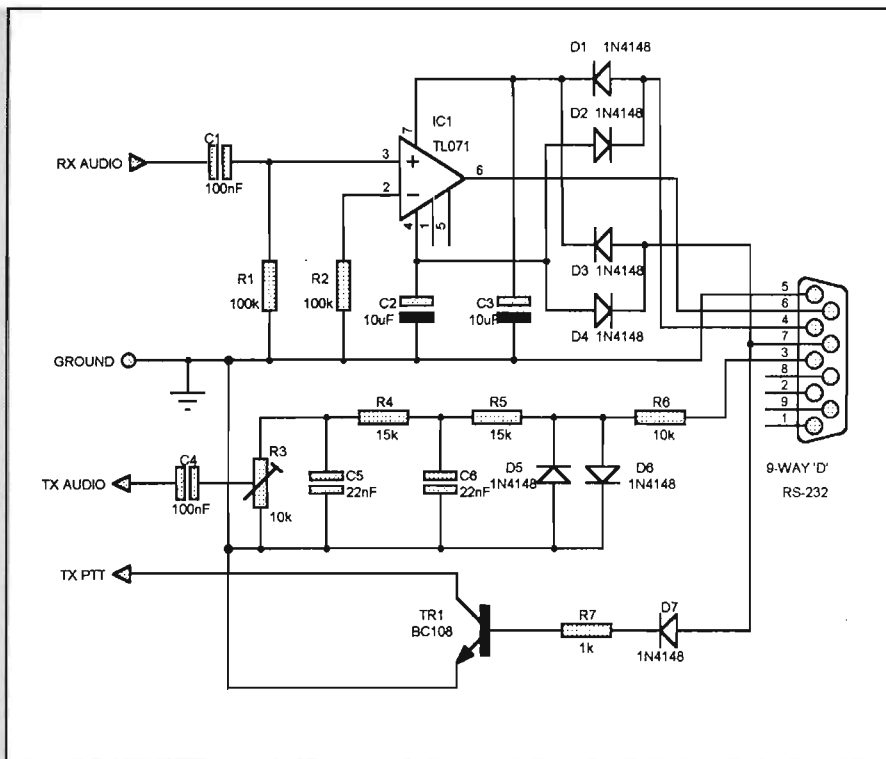
I've used a 9-way board-mounting RS-232 'D' type connector in this design, so the unit can either plug straight into the back of your PC or alternatively be fitted into a case and used with a standard RS-232 cable. If your computer uses a 25 way connector, a commonly available 9 to 25 way adaptor may be used, or you can easily wire up a 25 way connector as shown in Table 1.

Components

I've tried both 741 and TL071 op-amps, however I'd advise against using the 741 even though it's often more commonly available. This is because the serial card on some computers cannot supply enough current to drive a 741 - the TL071 has a lower current requirement and this is the type I'd recommend.

10 0 0 0 05
60 0 0 0 9

for G3HYH
C2 IS REVERSE IT SHOULD BE



Transmit/receive unit circuit diagram

using the interface with your program and PC system, refer to the comprehensive documentation supplied on-disk with the Hamcomm and JVFAX communications programs, there are plenty of hints and tips to be found there.

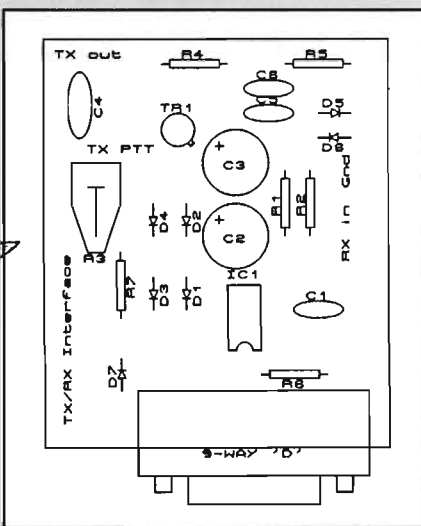
It just remains for me to wish you good constructing, and have fun on the air with your software!

(Any queries regarding the construction of this project should be addressed to the author c/o the HRT Editor at the HRT address, enclosing an SAE if you require a reply - Ed)

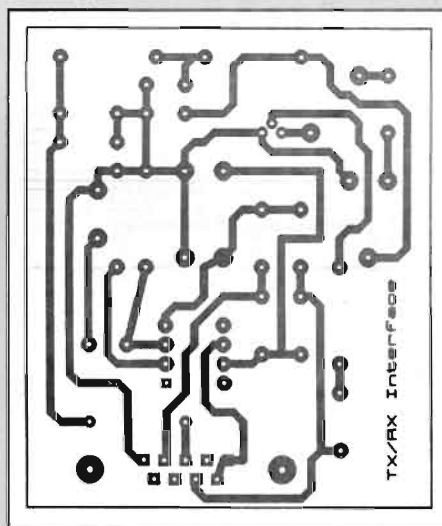
Table 1

9-25 way RS-232 connections

| Funct. | 9 way | 25 way |
|--------|-------|--------|
| TXD | Pin 3 | Pin 2 |
| DTR | Pin 4 | Pin 20 |
| GND | Pin 5 | Pin 7 |
| DSR | Pin 6 | Pin 6 |
| RTS | Pin 7 | Pin 4 |



Transmit/receive unit component layout



Transmit/receive unit PCB, full size, track side

Parts list;

All resistors 1/10W or 1/8W
All capacitors 25V working

Receive unit

- C1 100nF polyester
- C2, C3 10µF electrolytic
- R1, R2 100k
- D1-D4 1N4148
- IC1 TL071
- 9 way D type RS-232 connector

Transmit/Receive unit

Components as for the receive unit, but with the addition of;

- C4 100nF polyester
- C5, C6 22nF polyester
- R3 10k horizontal preset
- R4, R5 15k
- R6 10k
- R7 1k
- D5-7 1N4148
- TR1 BC108 or similar

Also, although some documentation specifies 16V capacitors, I'd recommend the use of 25V working types, especially

the electrolytics, to cope with maximum possible RS-232 voltage swings. The tolerances of the components isn't critical, but don't be tempted to use 'near-values' for R4, R5, R7, C5 and C6 as these give a defined filter response. I've specified a BC108 transistor, but any common NPN

switching transistor may be used in its place, such as a BC547 or similar.

In use

Before plugging the assembled unit into your PC's RS-232 port, do take a few minutes to check your solder joints *first*, being especially careful to ensure there are no solder 'bridges' between tracks. For more information on testing and

The 'Pi' Maxi-Match

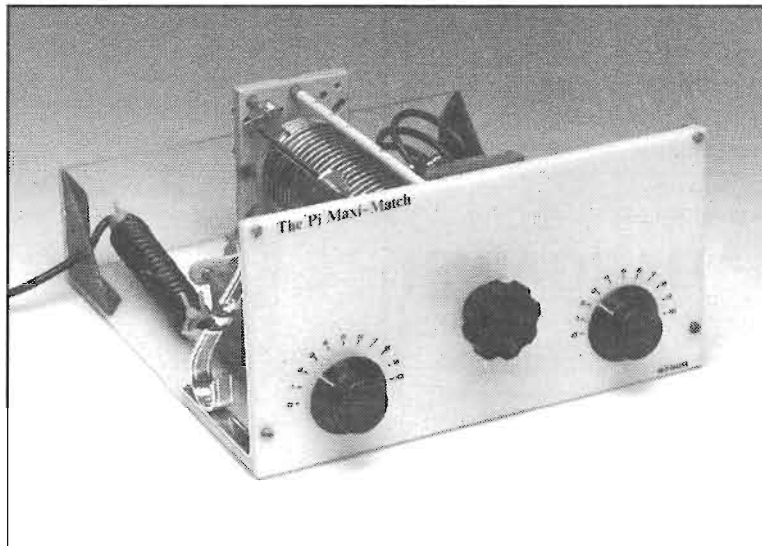
John Heys G3BDQ builds a versatile HF matching unit for single wire, coax and balanced aerials

Most of the aerial matching units (ATUs) that are offered on the amateur radio market are designed to work into an unbalanced load, i.e. coax fed or single wire aerials. If a balanced aerial feeder is used with these, one wire of the feedline must connect to earth at the ATU. When matched like this the aerial will still radiate, I have used the system myself, but its radiation pattern will be unpredictable. There will also be vertically polarised radiation from the unbalanced feeder, which can cause EMC problems.

Some amateurs use a 4:1 transformer balun at the output end of their ATU when balanced feeders are used, but this practice can create problems. A balun should only be used in this way with a 'flat' impedance feeder, such as 300ohm line from a folded dipole, for the balun cannot handle the wide range of impedance and/or reactance that may be present at the bottom of a tuned feedline. Such baluns will show their displeasure at being wrongly used and may overheat or suffer core saturation. A transformer balun rated at 1kW became too hot to touch when I used it incorrectly between a 400W transmitter and a dipole aerial.

If a balun is not used between the ATU and the aerial, a balanced matching unit must be used. There are several designs, usually requiring link coupling and sets of plug-in coils. The 'Z' Match circuit avoids these complications, but it is a compromise circuit that will not cope with every balanced aerial.

An article by Albert Roehm W2OBJ in the ARRL Antenna Compendium Vol.2, was the starting point in the design of the 'Pi' Maxi-Matcher. By having a choke balun between the transmitter and an unbalanced ATU, the matcher may be used with both balanced and unbalanced loads. Fig. 1 shows the RF currents along



satisfactorily connected to a balanced load. If a choke balun is placed on the coax close to the ATU, the unwanted surface currents will then be stopped and the coax will be balanced at the ATU end. It can then work into any unbalanced matcher that is connected to a balanced feeder.

For simplicity, I chose a basic Pi-section (Collins Coupler) ATU for my prototype, as shown in Fig. 2. The variable

input capacitor C1 is used to match the 50ohm impedance of the transmitter, so it does not require a high flashover voltage rating. A broadcast type having a maximum capacity somewhere between 350 and 500pF is suitable. On the other hand, C2 must have wide vane

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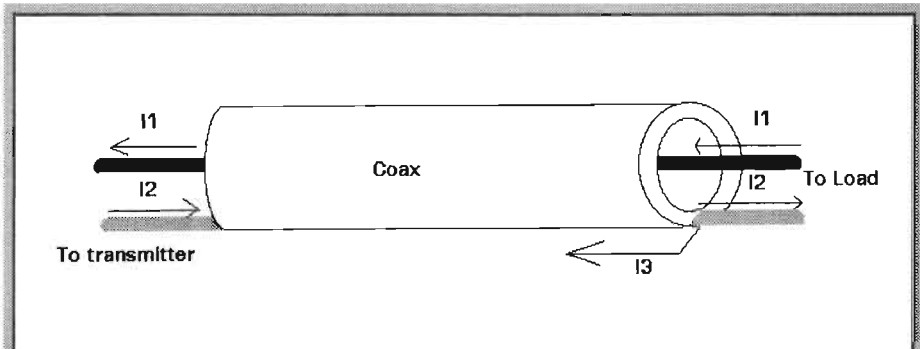


Fig. 1 - How a proportion of the RF current flows back along the outer surface of the coax cable. This can be stopped by using a choke balun on the cable

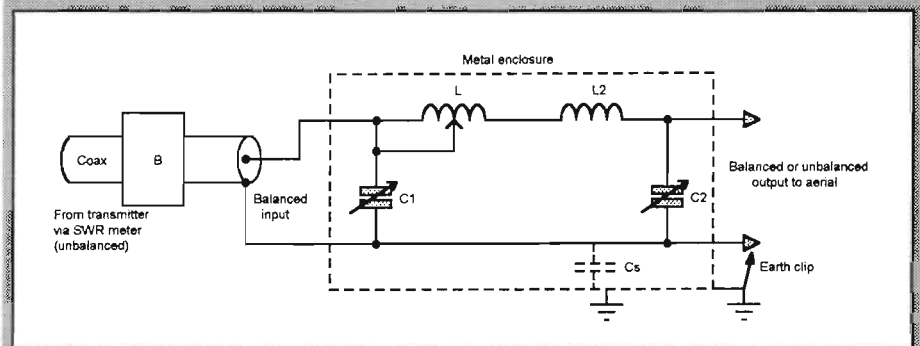


Fig. 2 - Complete circuit of the Pi Maxi-Match ATU. L2 improves the efficiency on 28MHz and a three turn coil of 14 SWG enamelled wire with an inside diameter of 32mm, 25mm will be suitable.

spacing to suit the power to be used, and must have a capacitance of between 250 and 300pF. The inductor L can be a tapped coil, or ideally one of the versatile 'roller coaster' variable inductors. A coil with a maximum inductance of 25m H will cover all bands from 3.5 to 28MHz, although it is best to use a separate small coil (L2) for 28MHz.

This ATU, when used into a balanced aerial load, **must** be isolated from earth. The components and wiring should not be closer than 100mm from earthed objects such as enclosure boxes or the base. My prototype was built around a rectangle of 7mm perspex, picked up as a 20p offcut at a local DIY merchant, and it was not enclosed in a case or box. Any stray capacitance to earth (Cs in Fig. 2) will cause imbalance at the output terminals and limit the circuits' effectiveness.

Insulated extension spindles are needed for the variable inductor and both variable capacitors.

In this circuit the choke balun (B in Fig. 2) is essential. It does not need a high current rating, for unlike the transformer balun types it does not have to carry all the transmitter power, just the unwanted currents on the coax cable outer shield. Core saturation is unlikely because of this.

I tested three types of balun. The first was an inductor using five turns of coax on a toroid, made with three of the ferrite cores normally used for EMC suppression. It worked well with powers up to 100W of CW, but at higher power levels it overheated. I made a second balun using a set of 50 ferrite beads over about 300mm of RG58 coax. This coax will cope with 600W if it is correctly terminated at each end, and the beads, supplied by Ferromagnetics,

are specially designed for choke balun usage. This balun overheated at higher power levels, but when the beads were spaced out over 1.5m of coax there was no problem. The third and perhaps cheapest choke balun that I tested was made with 25 turns of coax wound along a 153mm ferrite rod. This was a 'junk box' item from an old broadcast receiver, and was about 12mm in diameter, a bundle of thinner rods would work equally well. The winding was held down firmly at each end with tape, nylon cable ties could be used instead. This balun worked very well and showed no heating at 400W on any band. Two similar baluns in series would be effective on 1.8MHz.

Whichever choke balun is used, it must be positioned close to the ATU, for that's where the return currents on the coax shield are greatest.

I've used the Maxi-match with a variety of single wire fed aerials, and a couple of dipoles with open wire feeders. I've also used it as an unbalanced matcher with stout wire and a 'croc' clip to connect the rotors of C1 and C2 to earth. It then becomes a normal unbalanced ATU to match long wires, Windoms, W3EDP and similar aerials. In the balanced mode, some imbalance will always remain for it is impossible to completely remove all the residual stray capacity to earth (Cs), and balanced aerials are seldom truly balanced devices. In practice either feeder leg was never more or less than 20% unbalanced. To test for this, a pair of flashlight bulbs may be shunted over a few centimetres of each feeder, making sure that each shunt is at the same distance from the output terminals of the ATU. A neon bulb can be used to give a rough estimate of feeder voltage balance. The Pi-section ATU has an added bonus, for it is also a low pass filter which will reduce output harmonics.

For more information on transformer and choke baluns, you can study "Baluns: What they do and how they do it" by R. W. Lewallen W7EL (ARRL Compendium Vol.1). A look at pages 25-18 in the ARRL Antenna Book, Edition 15 1988, should convince anyone of the disaster area that surrounds their improper use!

(Any queries regarding this project should be addressed to the author c/o the HRT Editor at the HRT address, enclosing an SAE if a reply is required - Ed).

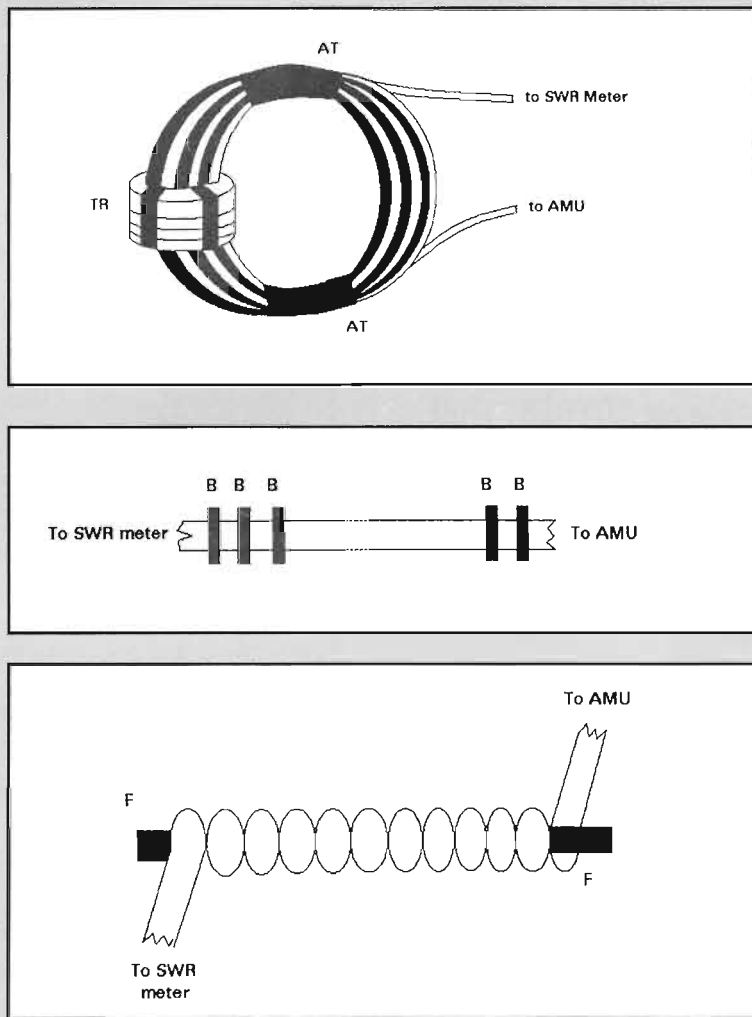


Fig. 3 - Three different types of current balun suitable for the AMU; (a) uses three ferrite rings through which are passed five turns of RG58 coax, (b) has 50 ferrite beads over a 1.5m length of coax, (c) has 25 turns of coax wound along a 12mm diameter ferrite rod.

Ham Radio and The Internet

Don Field G3XTT shows how you can get amateur radio information in an instant

The global Internet has been getting a lot of publicity recently, as newspaper editors start to wake up to its phenomenal growth and as more and more organisations offer connections to it. Indeed, there are now several monthly magazines devoted to explaining its intricacies.

The Internet was set up several years ago to serve the US military, and has been designed for resilience. The idea was that if several of the nodes were taken out by nuclear strike, messages would still get through. The protocols used, the Internet protocols (often referred to as TCP/IP, being the principal two protocols used on the network) are packet-based (some hams use them as an alternative to AX.25 for packet radio), and the whole network lends itself to the transmission of text, programs, still images, and even voice and moving images as more bandwidth is added.

I don't intend in this short article to go into any of the technical details, which are readily available in the computing press. Suffice to say the Internet is no longer the preserve of the military but has become a universal network, serving government departments, commercial users, and the public at large. It can be accessed with any personal computer, provided you have the correct terminal software, via a service provider, of which there are several in the UK. To get connected, once you have suitable software and a telephone modem, is quite cheap, with monthly charges typically around the £10-12 mark, regardless of use, plus whatever it costs you in telephone charges to connect to your nearest node.

But this is a Ham Radio magazine, so why talk about Internet here? Because, as you have probably guessed by now, there is a plethora of ham radio information available on the Internet. For example, the American Radio Relay League (US cousin to our own RSGB) has a server on the network from which you can download all sorts of relevant

information. And although you will read in the computer press about FTP (File Transfer Protocol) access to Internet, or Mosaic (a clever piece of software to help you interface to the more elaborate Internet facilities), the ARRL server and the other services I describe here, can all be used with simple electronic mail access (SMTP - Simple Mail Transfer Protocol), the most straightforward facility of all. Many of you will find your companies already have a mail gateway, and the Internet can also be accessed via other on-line services such as CompuServe (which also has a Ham Radio forum, by the way).

Let's suppose you wanted to access the ARRL Automated Information Server. Its Internet address is info@arrl.org. You send the message to that address, and place one or more commands where you would otherwise type the text. For example, typing the word *HELP* would cause the server to mail you the 'Help' file, with information on how to use the Information Server. You don't even have to tell the system your Internet address, as it can find this from the message header. Or you could use the *SEND* command to ask the server to send you a file. For example, *SEND RFIGEN.TXT* would cause the server to send you a file containing hints and tips on dealing with radio frequency interference problems.

What I find even more useful are the various Ham Radio Reflectors on Internet. Reflectors are so-called because they reflect messages to all subscribers. So, for example, if I have subscribed to the FT-1000 reflector, when anyone sends a message to that reflector I get a copy of that message mailed out to me. Similarly, if I send a message to the Reflector, it gets sent to all other subscribers. The FT-1000 Reflector, if you hadn't already guessed, is there as a medium for the exchange of information about the popular FT-1000 HF Transceiver. There is a host of similar Reflectors such as CQ-Contest (for contest enthusiasts), DX (mainly for HF DXERS), QRP (obviously for low power buffs), CT-

User (K1EA's popular contest logging software), Boatanchors (for enthusiasts of old ham gear, just in case you were wondering!) and even ham-space (for those who play with amateur satellites). In some cases it is easy to work out how to subscribe, in others more difficult. For the contest reflector, the one I use most, the normal Internet address for posting messages is cq-contest@tgv.com. For sending commands, for example to join, leave, or to get a list of recently posted messages, the address is cq-contest-request@tgv.com. Then put the command in the main text, for example *SUBSCRIBE*.

What I find particularly satisfying about these Reflectors is their immediacy. It is a bit like the packet radio network, but faster and more global. For example, following the November CQ Worldwide Contest, within 24 hours many participants had posted their claimed scores, often with a write-up of their trials and tribulations during the contest. This was much more satisfying than waiting the best part of a year to see the results and comments published in the amateur radio press. Indeed, Trey WN4KKN, who runs the contest reflector, has gone even further by sponsoring Internet Sprint contests. Participants in these short contests are requested to send their logs electronically to Trey via the Internet within, as I recall, two days of the end of the contest. He then uses a computer program to adjudicate the logs and posts the results on the Reflector by the following weekend. Certificates are even sent out electronically, to be printed on your own printer! Similarly, the ARRL accepts contest logs electronically over Internet, though the results continue to be published in QST some months later, but at least it saves on the postage.

Of course, many of these facilities have been available for some years now via dial-up bulletin boards, but this has often involved long-distance or international phone calls and rather slow data rates. Internet can be very

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fast, most people are within local telephone call distance of a suitable node, and most such nodes can work at high data rates provided you have a suitable modem. And, in my experience, mail can get halfway across the world in a matter of minutes. Indeed, as and when you graduate to the more advanced services such as FTP (File Transfer Protocol), it is quite realistic to download substantial programs or data files in real-time from the other side of the world. Many service providers are recognising the benefit of Internet over regular bulletin boards, especially as you can access many services over one network, rather than have to dial each BBS separately. One recent piece of news, for example, is that several UK amateur radio dealers are about to go on-line with Internet. For example, Lowe Electronics should be accessible at richard@lowe.demon.co.uk and Nevada Communications should also be available on Internet by the time this piece appears.

Let's just go back to Reflectors for a moment, as these will be the first port of call for many users (although using the Internet for person to person mail is also handy, provided you know the

Internet address of the person you are wanting to mail). There are a number of conventions which apply to the use of these reflectors, and by observing them you will avoid getting into hot water. Common sense dictates that the subject line gives a good indication of the content of your message, so others can quickly decide whether they want to read it (some folk still pay by the byte to read messages). Always, if it's a Ham Radio Reflector, sign off with your name and callsign, and preferably your Internet address as well, as some gateways to other systems strip this information away from the message header. When answering a question, it would be normal to reply directly to the person who originated the question, rather than replying to the Reflector, in which case it would be mailed out to everybody (I have seen people do this inadvertently, with rather embarrassing results). Praise in public and criticise in private, avoiding flames - i.e. being rude or unduly critical of others. Perhaps the cardinal rule is to wait a while and review what you have written before posting it off, in case you have second thoughts. Exactly the same as on packet radio, in fact. And, equally as in packet radio, do not use the Reflectors for commercial

purposes. While there will increasingly be commercial organisations on Internet, those who run the various Ham Radio Reflectors do so in a voluntary capacity, and do not take kindly to the Reflectors being used for advertising.

Not all the ham radio services on Internet are US based. Only recently, for example, I discovered an Australian radio newsgroup which contains, among other items, current ionospheric propagation predictions.

I hope this has given you a flavour of what is available on the Internet from an amateur radio point of view. Of course, there is a vast amount of other information out there. The US government has adopted Internet in a big way - you can even e-mail Bill Clinton at the White House!

I haven't tried here to give a complete list of all the Internet Reflectors, or even told you how to subscribe to all the ones I have mentioned. Here again, standardisation is somewhat lacking, though I am sure things will improve over time. If you have any specific questions, I will of course try to answer them. Write to me with an SAE or, better still, e-mail me at field@btq2ec.igw.bt.co.uk. Happy surfing on the Internet!

QRP Corner

Dick Pascoe G0BPS looks at QRP data modes, and shows how to build a simple dummy load and power meter

I am continually amazed at the leaps and bounds of technology, not only in our own hobby but in all aspects of the world today. As a child I was lucky enough that my father could afford a new fangled thing called a television, a rarity in the early fifties. Memories of us all, friends, neighbours and family crowded round the nine inch set with a bulbous front to fool us all that it really was a twelve inch one. These neighbours often rang the door bell to 'borrow' the telephone as the nearest public one was a couple of miles away (Dad needed one for his job). The number of times I had to run to a neighbour to tell them they had a call. This eventually stopped of course as Dad realised they were taking advantage. How did the local taxi firms work without radios in the early days in small towns such as Dover?

Little did we know in those early 1950's that in my own lifetime we would see a man land, and walk on the moon. That I could pick up that telephone and speak to my sister in North America with it sounding as if she is in the same room!

I even have a small clock sitting on my desk that locks on to a radio signal from Frankfurt to ensure it is completely accurate. You can even buy a wristwatch to do the same! Where will technology be in another quarter of a century?

We think nothing of sending a fax around the world or taking advantage of the information Superhighway to access a computer in another country. The first computer I ever saw was in Bracknell, I had a friend who worked for a large company there, and yes, both the company and the computers were large. On a visit to the company's HQ, we walked into a room to see the computer. When asked where it was, my friend told me I was standing inside it. The whole room was the computer! Tape discs of about 38cm diameter held the information with racks and racks of equipment filling all the available area. This room equated in power levels to the old ZX81 from Clive Sinclair. This was in the late 1960's, just 25 years ago.

With all these advances in technology over the past few years we still use 'outdated' modes for communication in our hobby. How often is the simple direct conversion receiver found today within the hobby and how often do we hear the Morse code on the amateur bands?

The huge increase in the use of digital modes of communications has opened up the hobby to those who have no interest in the usual 'preferred' QRP mode of Morse. The entry of modes such as AMTOR, Packet and PaCTOR have made low power communications much easier as they are almost 100% error free, but even these (*sometimes*, but not *always* - Tech Ed) cannot beat the human ear when it comes to Morse. With low power, signals are often marginal and at times almost impossible to hear, yet a simple 'on /off' sounding can be determined by the human ear.

QU-R-PE

The latest copy of the Spanish QRP Club's newsletter dropped through my letter box today complete with a list of members. Considering that this club only started last year it has come on in leaps and bounds, with a current membership of over 130. It includes 10 short wave listeners and 11 non-EA members. The four British members are myself G0BPS, Robert G0HXJ, Mel GM6JAG and Sheldon GW8ELR. The newsletter is very interesting for those who read Spanish, but still so for those who can read a circuit. The front page picture of the Index Laboratories *QRP Plus* looks good.

For more information on the EA QRP club, contact; EA QRP Club, Pau Abad 15 30 1a 08207-Sabadell Barcelona, Spain.

Circuit checking

I was recently asked how I checked out some of the circuits that I play with and often offer here for experimentation. Where do I get the boxes that I use? Some time ago in

this column I gave brief details of the 'dead bug' or 'ugly' style construction as opposed to using a PCB.

For the uninitiated, the 'ugly' style of construction is ideal to check out those unknown circuits and ideas. I was recently given an idea to make an Iambic keyer to fit onto a 25mm square PCB to match the ONER transceiver. I looked carefully at the circuit, but it didn't make sense. I grabbed the components from the shelf and threw it together, ugly style, and proved my first thoughts. It did not work.

Based on a single transistor, a few capacitors and two presets, I used beeswax to fit the transistor to a piece of card. The interlinking resistors were soldered in place with the whole lot hanging in space. At one point I needed a support, so I used a 10M resistor for this.

I've used this example to show that experimentation is easy with this method. Changing a component value is easy. No holes to suck the solder out of, and easy replacement of parts. After experimentation has been completed and the circuit proven, the printed circuit board may be laid out.

Another way of checking circuits is the use of the temporary board, often called breadboard or here in the UK the 'Blob Board'. They are not difficult to make and easy to use. They usually have just one side tinned and no holes drilled. But the pads are arranged in such a way to enable components to be soldered onto the board and other components fitted as though in a 'proper' circuit.

Cases are often a problem when the project is complete, I often have an eye open when being dragged around the shops (sorry dear, helping you with the shopping!) Often that food container for the latest 'XYZ fizz pop nibble' will be ideal for the next project. Check out the cookware section, often cases will be seen that are ideal. Even empty sardine cans can be used. Empty film cans are ideal for keeping your resistors available.

I am often also asked about coil formers. I always suggest the plastic



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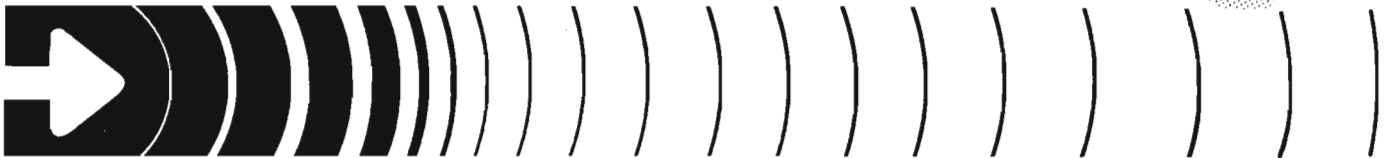
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type occasionally found at rallies for a few pence, but reading one of Doug DeMaw's articles again brought a smile to my face. I keep rare breed Bantams and am plagued by foxes. The addition of a gun cabinet and a couple of shotguns helps a lot. I only mention this because Doug suggests that empty plastic shotgun cases are ideal as coil formers. The 12 bore are 19mm diameter and 44mm long, my 410 gauge are of course smaller, 11mm x 50mm for the magnum cartridges I use. It is essential that expended, i.e. fired, cases are used. If the primer / detonator is knocked out (the small centre part of the brass case), then a small bolt may be used to attach the case to your PCB. If anyone would like a few, a stamped addressed small packet to me will suffice. There may be a small delay though.

Dummy load/ Power meter

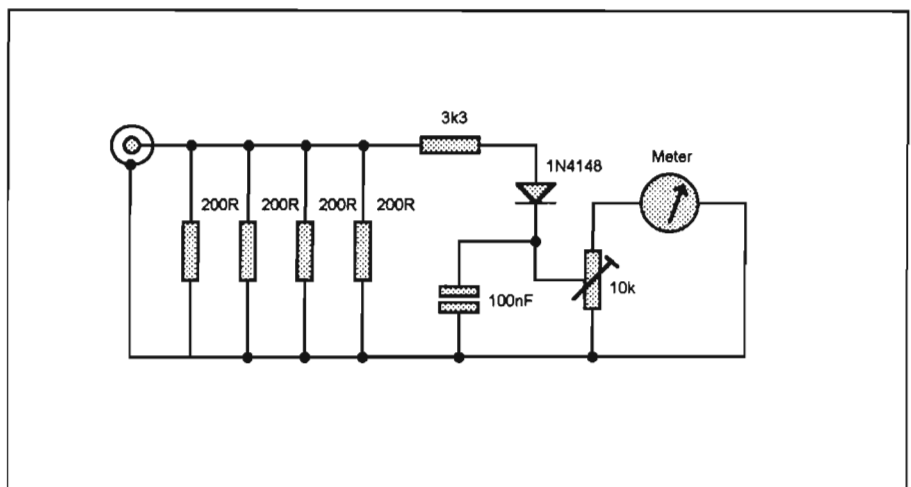
There is always a need for a dummy load and an RF power meter in the shack, especially a low power one for the QRP man. This version

has been around for some time and is fairly simple to build, either ugly style or even on a PCB. The four 2W, 200R resistors act as the dummy load showing 50 ohms to the transmitter. A sample of the power is taken via R5 and is fed to the meter by D1 and R6. All resistors should be carbon and not wirewound as the latter are inductive. M1 could be a 100µA or 200µA DC meter, with the input being provided by an SO239.

Setting up is not difficult. Ease off the front panel of the meter and

replace it with a piece of sticky paper. Set your transmitter to 5W out with a borrowed power meter and adjust R6 until you have full scale deflection on the meter. Reduce the power levels and mark off the 4W, 3W, 2W and 1W levels, then replace the front panel.

That's it for this month, news and views to me via HRT editorial, packet to GB7RMS, Email to dick@kanga.demon.co.uk or even by post to Seaview House Crete Road East, Folkestone CT18 7EG. TTFN de Dick.



From My Notebook

Geoff Arnold G3GSR lends a guiding hand to help you in aligning a receiver

As promised, this month I shall be talking about the alignment process for a simple medium wave superhet receiver.

Ideally, you will have access to at least a signal generator to help with your alignment process. However, providing it hasn't been too badly 'got at', it is possible in an emergency to satisfactorily trim up the alignment of a simple superhet using just signals received off-air. The only instrument which is more or less essential is some sort of output meter, basically an AC voltmeter (analogue variety, not digital, so that you can easily follow the direction of changes in level) to monitor the receiver output level as you adjust for maximum. The ear is not a good detector of small changes in sound level.

First the IF

As I explained last month, the 'tracking' of the signal frequency and oscillator tuned circuits - maintaining a constant frequency difference (the IF) between them as the receiver is tuned across a band - must be fairly accurate for optimum performance. When the receiver designer specified the components for those tuned circuits, he will have first chosen the exact value of intermediate frequency to be used.

If you are thinking about realigning the IF amplifier stages ('IF strip' for short) of a receiver, it's essential to do it at the correct frequency. It won't matter if you're a kilohertz or two out (unless the receiver incorporates a crystal filter in the IF), but if you decide, say, to line up a 455kHz IF strip on 465kHz, you're almost sure to have problems when it comes to doing the RF and local oscillator alignment, as you will find that you run out of adjustment range on the pre-sets.

How do you know what the IF of your particular receiver is? Unlike their modern counterpart, the ceramic or crystal filter, IF transformers don't often have their working frequency

marked on them. If you don't have the servicing details or at least the specification of your set, you may have to work by trial and error. If a previous owner of your set has been having a good 'twiddle', tightening up all the 'loose screws'

in the IF cans, you could be in trouble! Hopefully, that hasn't happened, but if it has you will probably have to adopt a more technical approach, with the aid of a suitable signal generator.

For the IF stages, it doesn't have to be a variable signal generator. A special-purpose IF alignment generator, having crystal control on the required frequency, is a useful alternative, and one that you can knock up for yourself.

In any receiver, the design of the IF strip is a compromise between a number of factors: 1. Adequate selectivity (rejection of unwanted, off-frequency signals). 2. Adequate bandwidth (passing modulation frequencies up to the highest used, without 'sideband cutting'). 3. Adequate voltage gain whilst maintaining stability (the amplifier must not turn itself into an oscillator, which would cause audio beat-notes as you tuned the receiver through each signal). 4. Cost. This last factor is governed not only by the component count and cost, but also by the amount of time which has to be spent on the factory production line in doing the initial adjustment of the tuned circuits. More than anything else, this is the reason behind the popularity of the modern ceramic IF filter in simple superhets.

In the traditional medium wave broadcast receiver, the juggling of all these factors will usually result in an IF strip which has simply to be trimmed for maximum output when fed with a test signal of the appropriate frequency.

More complex receivers may require 'stagger tuning' - offsetting the tuning of primary and secondary circuits in each IF transformer above and below the nominal IF to give a squarer, more flat-topped response (better achievement of factors 1 and 2 above). If the IF strip in such a receiver is simply peaked at one frequency, it is likely to 'take off' into self-oscillation. Obviously you need a signal generator with an accurately calibrated dial (or a frequency counter) to work on such a

receiver.

Adjustment of this type of IF strip will usually involve the use of damping resistors, typically around 20k in value, which have to be clipped across the IF transformer primary whilst trimming the secondary, and vice versa, in order to reduce the Q of the opposite winding. If you neglect to use the damping resistors, trying to find the peak becomes an impossible task - it seems to be running away from you all the time.

You will sometimes come across simple receivers (without stagger-tuned IFs) in which the alignment instructions also specify the use of damping resistors. In any such receivers that I've worked on, I've found that you can usually get away with not using them - if the set was not designed with after-sales servicing in mind, it can be well-nigh impossible to attach the resistors to the appropriate points.

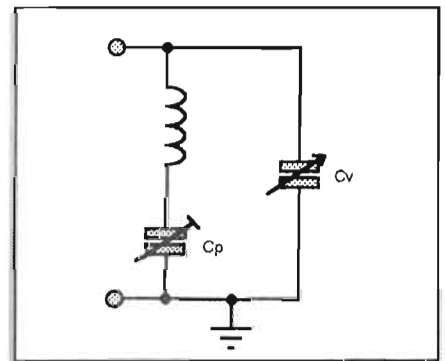


Fig 1

Injecting a signal

If you're having to use an off-air signal for alignment, you're up against the problem that it needs to be steady in strength, yet fairly weak, which are generally opposing properties. If the signal is too strong, it will activate the receiver's AGC system, which will try to compensate for every trimming adjustment that you make. If the off-air signal is varying in strength, then judging whether the change in receiver output is due to your adjustments, or simply to fading, becomes an impossible task. Even with a steady signal at the aerial, the receiver output will be going up and down with the programme modulation levels. All in all, realignment using an off-air signal is a very difficult process, and not really to be recommended.

If you are fortunate enough to have the use of a signal generator, then for

IF alignment it is normal to inject the sig gen output (set to the intermediate frequency and modulated with a 400 or 1000Hz tone) to the control grid of the frequency changer/mixer valve. The IF tuned circuits are then isolated from any damping effect of the signal generator, which might otherwise upset the alignment process. The local oscillator must be disabled, to avoid getting all sorts of spurious beating signals. Because the local oscillator and mixer stages are usually combined in one valve, you can't do this by just pulling out the oscillator valve. Instead, the disabling is usually done by putting a shorting clip-lead across the oscillator gang of the tuning capacitor. These remarks obviously apply to a valved circuit: if it's a transistorised set then you will need to sort out the corresponding circuit points.

If the IF strip in your set has been really 'got at', you may not hear or measure anything at the output when you inject your test signal at the mixer. If so, connect the signal generator instead to the top end of the secondary of the final IF transformer, and turn up the level of the sig gen output. An output from the receiver will then confirm that at least the detector and audio amplifier stages are in working order. You then work your way back along the IF strip towards the mixer, injecting the test signal at each stage in turn, and rough-tuning the IF trimmers for maximum as you go, before carrying out final alignment with the test signal applied to the mixer control grid. Watch out for HT on the IF transformer primary windings, and make sure the sig gen output lead incorporates an adequately rated isolating capacitor.

Adjustable L s

Back in the early days of superhets, all trimming adjustments in RF, oscillator and IF stage tuned circuits were by means of pre-set capacitors, the inductance of the associated coils remaining fixed. When adjustable dust-iron and ferrite cores became practical, the opposite approach of having tuned circuits using fixed capacitors and adjustable inductors became the norm. In time, these changes brought big benefits in component size and cost reduction, and in circuit efficiency too.

In local oscillator circuits, the introduction of coils with adjustable cores meant the end of the adjustable padder capacitor. Look for a moment at Fig. 1 (a repeat of last month's Fig.

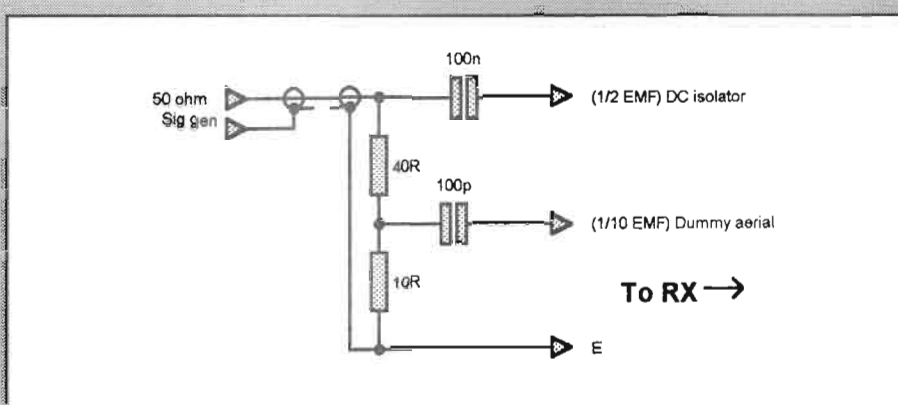


Fig2 (A)

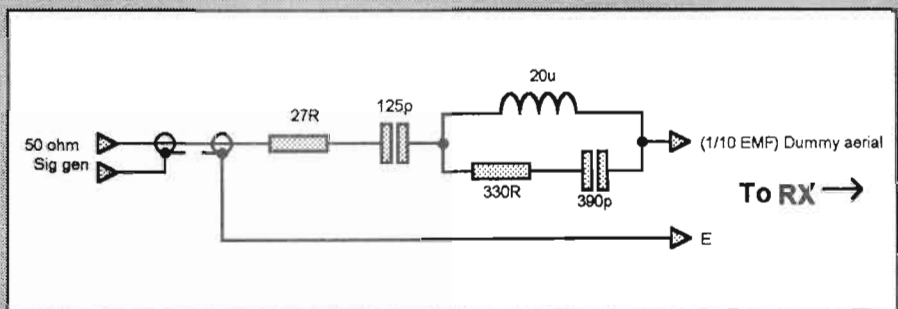


Fig2 (B)

1(b)). Another way of considering the function of padder capacitor C_p is to think of it as reducing the effective inductance of the coil - we could say that it is 'tuning out' part of the inductance (look back to *From My Notebook* in the Aug and Sept 1994 HRTs for a discussion on tuned circuits from a vector analysis point of view). It may worry you that the left-hand arm of Fig. 1 looks like an acceptor circuit. It is, but the values of L and C are such that it does not become resonant anywhere within the span of the medium wave band.

Changing the inductance of the coil will change the total span of frequencies which can be covered by swinging the tuning capacitor throughout its range, just as the padder capacitor did.

Oscillator and RF alignment

At last we are almost coming to the 'nitty-gritty', the alignment and tracking of the variable tuned circuits. I always think that it's easier to understand if the description is based on tuned circuits using a variable inductance plus a variable (ganged) capacitor with a pre-set trimmer capacitor across it, rather than having to cope with the concept of a variable and a pre-set padder capacitor in series, so that's what I shall do. I shall take it that we have already ensured that the IF strip is aligned at the correct frequency.

We begin by connecting our signal

generator to the aerial and earth sockets. The receiver will be expecting to be fed from a long wire aerial, which appears as a signal source having an impedance which is a mixture of L , C and R . Slapping our sig gen, with its resistive output impedance of 50 or 75 ohms, straight across the receiver's aerial and earth terminals could drastically change the performance of the input tuned circuit, making proper alignment difficult or impossible.

So, we should feed the sig gen through a suitable dummy aerial, a unit containing L , C and R in proportions intended to make the output impedance of the sig gen look more like that of the real-life long wire aerial. There have been half-a-dozen or so 'standard' designs for dummy aerials in use around the world, a couple of common arrangements are shown in Fig. 2. Your signal generator may well come with one as part of its accessory kit. If not, choose a circuit from Fig. 2 and put it together for future use, housing the components in a small plastic box on the end of a short length of coaxial cable, with terminals or very short flying leads for the output connections.

I've unfortunately run out of space this month, so I shall have to leave you to think about those questions until next time. You'll find some clues in last month's column and this, which should point you along the right track, so see what you can do. There's no better way of understanding something than by reasoning it out for yourself!

VHF/UHF Message

Geoff Brown GJ4ICD recounts a fantastic opening on the higher bands

VHF/UHF Message this month refers to the fantastic conditions in October, although a little late due to the Jordan story. I've decided to run over the events of October in detail as it turned out to be probably the best VHF/UHF/SHF month of the year.

Early October started off quite well with a good ridge of high pressure developing into an anti-cyclone over the central UK. Frank G3FIJ (Essex) worked Jersey on 50/144/432/1296MHz, and French stations from near the Spanish border were reported on 432MHz.

On the 9th, Joe GW3ZTH/P was out on the Welsh mountains and having a ball into France on 432MHz, as was Arnold HB9AMH/P in JN37. It is also reported that Arnold made a few UK QSOs on 10GHz. By the 10th things had gone back to normal, but, another anticyclone was slowly approaching the UK.

Pressure started to rise on the 11th, as can be seen on the barograph chart. This was turning out to be the classic situation of high pressure along with warm moist air (high humidity). On the evening of the 12th, pressure had increased to 1034mb and levelled. Beacons on 1296MHz were at good strength in Jersey, and knowing that Ken G8VR wanted to work GJ on 23cm, I made a quick phone call. The test with Ken, who was running 1 watt, was no problem at all with 559 reports both ways. But an hour later, the beacons were weak once again.

Watching the barograph like a hawk, I saw a 'Classic' opening. At 6.00am on the 13th, the pressure started to drop, so I left the wife Janet to look after the shop as it was time for a day on the air!

On checking the bands I found beacons from everywhere on 23cm. DB0JO on 1296.854MHz was S9+, GB3MHL on 1296.930MHz was also S9+. On 70cm, DB0YI in JO42XC was also S9+, and so were the PA and ON beacons. This was going to be *some* day!

From Jersey, strings of DLs were worked on 70cm and 23cm. Ela G6HKM in Essex was S9++ on 23cm, as was Alan G4FXW in IO93, clearly

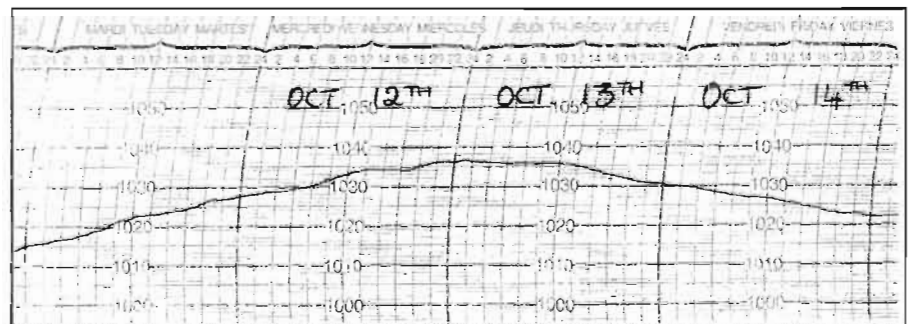
good ducting. By lunchtime things were very good, but everybody was at work, and so I decided to go and help my wife out back in the shop.

As evening came, the phone at work rang continuously with reports of some fantastic DX, reports have also been collected from various sources. The following are just a few of the contacts that took place, some on 10GHz are even UK records.

Tim G3KEU reports a two-way contact with an OZ in JO65 on 10GHz. Ken G8VR had great success on 23cm with his QRP, Ken had two ways with GU, GJ, OZ, and SM6. Another report was received in that G4CYA/P near Sheffield worked Poland on 1296MHz and also worked some SPs on FM on 23cm! G3JMY and G3FYX near Bristol pulled off what is thought to be a UK record on 10GHz using narrow band CW, they both worked Sweden. Wow!

away calling on the key. I called him, had a CW QSO, and then QSYd to SSB for a contact and another new one. Other SMs and new ones worked were SM6GXV (JO58, 1340km), SM6ESG (JO67, 1362km), SM6EAN (JO57), and SM6FHZ (JO57). Back on 70cm and OZ6CE (JO55) was S9++, SM6CMU, SM6FHZ, and SM6CEN were all rock-crushing signals.

My final DX of the evening was with SM7UHF (what a great callsign!), Lars in JO65, 1250km away. Lars had half of the UK calling him on 23cm, and it took me 30 minutes to get through the pile-up. However, it's true to say that with only the 40 watt amplifier I have on 1296MHz I worked everything I could hear. Apart from the beacons! Stations located at levels just above the sea reported very poor propagation, and said "everything is



Barograph for the Oct 12-14th period

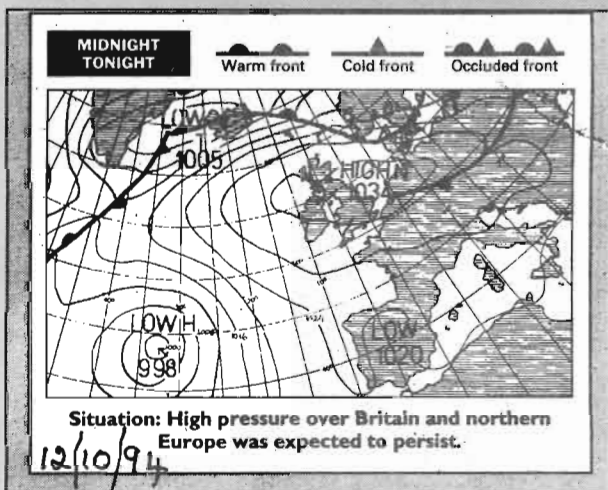
Arnold, HB9AMH/P (JN37) also worked the UK on 10GHz. Martyn G3UKV in Telford tried to concentrate on 10GHz, but couldn't resist 70cm and 23cm. On 23cm Martyn worked DLs, ONs, PAs and SM6FHZ in JO57. PA3AGS/JO22 was worked two-way on 10GHz, and a station in JO54 was worked one-way.

Tim G3KEU reports that Bob G3GNR in Devon had a two-way contact with PA0 on 10GHz. Bob also worked into Germany on the same band.

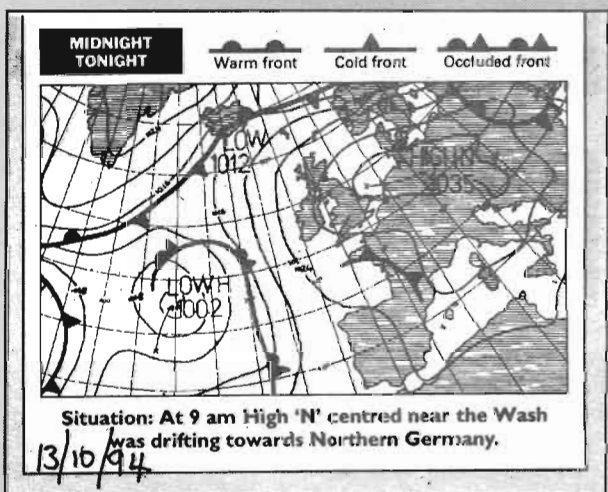
Down here in Jersey, Ole OZ2OE (JO45) was S9+ on both 70cm and 23cm, and I worked DL3YEL (JO41) on 23cm for a new one. At 1900z, I heard SK7QJ (JO76) over 1400km

going over our heads".

Meanwhile, over in Essex, and yes you've guessed it! Ela G6HKM wasn't far away from the radio. On 144MHz she worked SP3TYF/JO82, SP3SFN/JO82, and SP2NJI/JO92 at a distance of 1266kms. In a contact with DL8DAA, Frank told Ela he was copying the 'OY' 144MHz beacon, however, there was no activity from there. Ela slogged on to bag lots more on 144MHz, including: SM6MPA (JO67), SM7RYO (JO76) at 1019km, OZ9OF (JO45), OZ1LJZ (JO55), OZ3GW (JO56), OZ9EVA (JO57), OZ9AC (JO65), plus lots of SMs, the best being SM7URN/P7 in JO76 at a distance of 1059km. Well done girl!



Pressure chart for Oct 12th



Pressure chart for Oct 13th

Ela was also active on 432MHz and 1296MHz. On 432MHz Ela managed GD, GI, OZ, SM6 plus DL6NVC/P (JO73) and DL2NUD (JO63) for two new ones. 23cm was also very good for Ela, with G, GD, GI (lucky girl!), and GJ worked on the 13th. Later that night, things got better with DL3YEL (JO41), DL8BDU (JO43), SM6EAN and SM6FHZ both in JO57, SM6GXV (JO58, over 1000km), OZ6OL (JO65). Another new square was DL6NVC/P in JO73.

More to come!

Well, just after what was probably one of the best openings on the higher bands came a couple of good 50MHz openings.

Relayed from Bill GW6ZMN was news that Peter PY5CC had an opening on Six to the Caribbean on the 21st. This is interesting as, given the time of year, the propagation

mode looks like T.E.P. Peter has great success for PY, he seems to have T.E.P. 66% of the year, and he is always working something on 50MHz.

On the 23rd, the HF bands were in good shape despite a 'K' index of 5. However, during the day beacons on 28MHz were copied from Europe via 'ES'.

At 1830z a surprise opening came! Weak 49.760MHz TV was copied, a few minutes later and TV carriers were monitored from OZ, SM, and LA at S9+. By 1935z, OZs were copied on Six, Sporadic 'E' in late October! OZ7IGY was S5, weak German stations were also heard on 50MHz.

At 2030z, YU1QC (KN04) was 599 in GJ and had a good UK pile-up. Video continued to pound in at S9+ from YU and OK, and at 2150z 5B4CY (KM64) at 3163km was copied.

This has to be double or Chordal hop 'ES', and very rare for late October. Martyn G3UKV in Telford, Shropshire copied Italy on Six.

Ela G6HKM in Essex reported working GM0GLV (IO75), GD0TEP mode? Well, many reports were of short skip 'E', DL9USA (JO71), SP6RLA (JO81) via 'ES', and F5LJA in JO10 via tropo.

I went QRT at 2215z but video could still be copied coming from the C.I.S. States on 49.750MHz. Auroral 'E' or what?, as G4IFX reported LA5TFA in JP99 ('ES'), CT0WW ('ES'), and SM4POB via aurora. Dave G4ASR reported SPs, OKs, DLs and SMs all at around 1800/1900z via 'ES'. Aurora was also detected on 144MHz by Andy G4PIQ.

Not finished yet!

Another 50MHz double hop opening? Yes! On tuning around

28MHz in the early evening on the 29th, Chris GM3WOJ was spotted operating in the CQWW contest, and after a brief exchange it was time to look on Six.

To my amazement, Six was wide open. I7WAN (JN81, a rare square) was S9+, as were DLs and other Italians from the I3/ I4 region. YU1ABA and YU1IA in KN04 were both worked at S9. It was also interesting to know that this opening was not localised as I heard both 'YU' stations working all over the UK, as far north as G4KUX.

Within the next few minutes 5B4CY was copied, not very strong, but it was there at a distance of 3163km, which again must be double or chordal hop 'ES'. All three Yugoslavian/Slovenian beacons were S9+.

Going back to other things, as the 'K' index was reported at 5 on the 23rd, could there be a direct link between a solar disturbance and Sporadic 'E'? There really must be some connection when we have openings like these.

A GW first?

Bill GW6ZMN phoned with a question that I couldn't answer. He worked EA1DKV on July 9th on 23cm and wants to know if this was a GW 'first'. Can anybody beat it?

Do you have 80m? If so, you may like to take a listen some time between 0800-0900 local time on 3.718MHz +/- QRM weekdays, when the 'VHF and up' net meet. Famous names like G8VR, G6XM, G3KEU, G3COJ, G3HBR, and others discuss various openings, and equipment from VHF to light. Call in or just listen, you will be welcome.

Next month I'll look at a new way of detecting Sporadic 'E', visually. This great idea will allow you to monitor sporadic 'E' clouds and movement on your PC, and I'll show you, for the first time ever, visual scans of 'ES' clouds during October 1994.

My thanks go to the Jersey Met Office and the Jersey Evening Post for the weather charts, and all those of you who took the time and trouble to phone and write in, a bumper month!

News, views and photo's welcome please to: Geoff Brown, TV Shop, Belmont Rd., St. Helier, Jersey. C.I. or phone/fax 01534 77067 anytime.

Data Connection

I must say that I've been overwhelmed by the interest shown in data comms of late, not least the large number of amateurs and listeners now active on the Internet. Each day I commonly download over 100 email messages from the 'SWL' Internet conference alone! This issue I hope will satisfy a few 'data freaks' like myself, as not only is there a front-cover disk with Hamcomm software but a simple data interface construction project, an Internet article, and a feature on the 'Radio Shack' BBS with its HRT discussion conferences and free Internet email gateway.

G-TOR activity

Are you looking for someone to connect to on G-TOR? Well you can now connect to the GB7PLY BBS on G-TOR, which is currently operating on this mode as well as PacTOR and AMTOR.

SysOp Alan G3KFN says they've rewritten the gateway software to auto-answer in any of these modes, and the system allows users to connect to the packet network or the FBB Bulletin Board System. GB7PLY can be found on 7.04345MHz Mark and is available 24 hrs a day. For AMTOR users the selcall is GPLY, and you will be required to log in using your call. An example is *LOGIN G4HCL* followed by the 'enter' key. If you're accessing on G-TOR, use LSB and set the INVERT parameter on your KAM to OFF. You don't need to issue a 'changeover' command as this is done for you by the system software. Once you're connected to the node, you can enter *C 1 GB7PLY* to connect to the BBS, or *C ROBO* to connect to the BPQ node. You can get further details from Alan G3KFN @ GB7PLY, or email to 100025,2647 on Compuserve. He'd also appreciate any tests with local stations running a KAM Plus controller.

If you fancy some G-TOR DXing, the VK5RQ 40m system is now also running G-TOR in addition to AMTOR and PacTOR. It's active daily from 0600-1200 GMT, and weekends from 2300 to 1200 GMT, on 7.0305MHz LSB. KAM users should set 'space' at 2125 and shift at 170. On AMTOR, the selcall is VKRQ. The SysOp Joe says that it may be on-air on a 24hr basis if there's enough interest. Once connected, just type 'help' for a list of commands.

Weather satellite update

JVFAX users, and indeed any readers active in weather satellite reception, may be interested to know that the latest NOAA WXSAT, designated J, or NOAA 14, was due to have been launched on December 12th. It should be operational now, listen for it on 137.62MHz. This replaces NOAA 11, which recently suffered a major equipment failure.

At the time of writing, NOAA 9 is also operational on 137.62MHz, NOAA 10 is currently off, and NOAA 12 is operational on 137.50MHz. Meteor 2-21 is operational on 137.40MHz, Meteors 3-3, 3-4, 3-5 and 3-6 are off, and Okean 4 is operational on 137.40MHz, but transmitting on eastern passes only.

As for the Geostationary satellites, Meteosat 4 at 1 deg W is operational in standby mode, Meteosat 5 at 0 deg is operational but with a 3dB drop in output due to a slight aerial problem, and Meteosat 6 is operational although suffering from a number of problems. All the Geosats are on 1691 and 1694.5MHz. Next month's HRT PC software offer is planned to include an orbiting satellite tracking program, so you'll be able to accurately predict, to the very second, when each of these satellites are in communication range of your station.

If you're interested in weather satellites or any type of fax or SSTV operation, you may be interested in the Remote Imaging Group. This group represents the Amateur International Remote Sensing Community, with over 1946 members worldwide, and they publish a quarterly journal. If you'd like to know more, just send an SAE for a information leaflet to: The Membership Secretary, RIG Packet G3CQL, P.O. Box 142, Rickmansworth, Herts, WD3 4RQ. You can also contact Mark G3CQL on packet, G3CQL @ GB7NNA, or email m.clarke@bbcnc.org.uk.

BayCom V1.7?

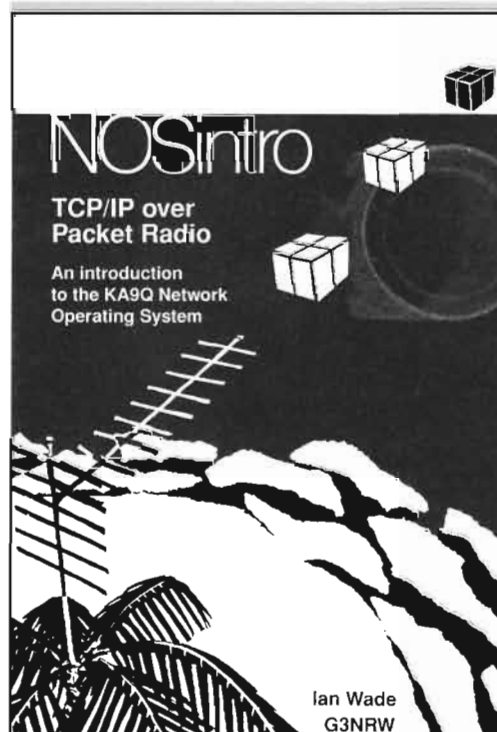
A packet message from Johannes, DG3RBU of the BayCom team (he's a regular HRT reader incidentally!),

Our resident packet radio SysOp reviews a low cost multimode data kit for PCs

says that he and the team have had several requests about a reputed BayCom version 1.70. He says that there is *no* official release 1.70, and that there will never be a version 1.70. He adds that the "1.70" circulating is a patched version of the old BayCom 1.50 with unknown origin, and even some problems with viruses on this "1.70". The current official software release is 1.60, so stay clear of any so-called 1.70! For further information, Johannes can be contacted with a message to DG3RBU @ DB0RGB.#BAY.DEU.EU, or by email to kneip@mst.uni-hannover.de.

TCP/IP

If you're active on packet, you'll probably have come across that strange-sounding thing called 'TCP/IP' and maybe wondered "What's it all about?". A number of readers have asked me if I'll do a multi-part guide to TCP/IP. I could indeed fill a book about it, but you can already get an



NOSintro
TCP/IP over Packet Radio
An introduction to the KA9Q Network Operating System

Ian Wade
G3NRW

NOSintro by G3NRW

excellent one, 'NOSintro' (ISBN 1-897649-00-2, published by Dowermain Ltd). It's written by Ian Wade G3NRW @GB7BIL.#27.GBR.EU, or email g3nrw@dircon.co.uk. Here's a very short 'taster' of what TCP/IP is;

If you're a keen 'node-hopper' on packet for one-to-one contacts, you'll no doubt have had the anguish of slow links and frequent disconnections over a long, multi-node path. TCP/IP differs from AX25 in that it automatically adapts to these delays, and as the network slows down, TCP/IP stations automatically lengthen their delays to match. This 'intelligence' gives a far greater robustness, and gives you a virtual guarantee that your data gets through with the greatest efficiency that the network is capable of. All network routing is 'taken care of' automatically according to the network address of the station you're contacting, indeed it's 'transparent' to the user.

It's also great for transferring files. Using the TCP/IP File Transfer Protocol, *FTP*, and you can even send and receive mail at the same time using the *SMTP* protocol, or chat with another station while your file transfer is taking place.

To get going on TCP/IP, you'll need a TNC operating in KISS mode, and a computer (not a 'dumb terminal') which handles the 'intelligence' side of things by running NOS (Network Operating Software). The only other thing you'll need is your own TCP/IP address. These are handled by local coordinators on packet - your local BBS 'information' or 'files' section may well have the contact details for the coordinator in your area.

If this has 'whetted your appetite', then why not get some further information? NOS software is readily available, but if you get stuck I can arrange for the HRT software service to copy this for you. Drop them a request in the post to NOS disk, Software Services, PO Box 400, Eastleigh SO53 4ZF enclosing a £1.00 cheque payable to Mr. S. Lorek (or overseas as per the usual terms on the 'Cover Disk' page elsewhere in this magazine) for a high-density 3.5in disk packed with information and software inc. p/p back to you. You must enclose the original corner flash from this page with your request as proof of readership (it's a 'cost only' service to you), which may accompany other disk requests to the same address if you wish to save on your postage!



DEC94/JAN95

MAXPAK DIGICOM NEWSLETTER

SEASONAL GREETINGS TO YOU ALL

A message from our Chairman.

As another year draws to a close, I would like to take this opportunity to thank you all for what I believe has been a very good year. It has seen the launch of the MAXPAK MAX-01 modem, the upgrading at some of our node sites, together with an upgrade to 486-DX2-66 for the GB7MAX BBS. Our attendance at the various 1994 rallies has taken the MAXPAK image to more and more amateurs. I send my very best wishes to you all for Christmas and the coming New Year.

GB7MAX BBS

A 9600 baud port is now available for end users. To accommodate this, Mick G1DKI has re-configured to BBS hardware linkup. He has moved the 70cms 1200 baud end user access link to the Perton site. This is now linked by radio to the BBS, all of 400 yards away! It was done to ease the number of 70cms radios operating in the same location. Only time will tell if this idea works!

NODE NEWS

WV NODES

WV11 70 cms is a 9600 baud node.
WV12 23 cms is a 1200 baud node.
WV13 23 cms is a 2400 baud node.
WV14 23 cms is a 2400 baud node.
WV15 23 cms is a 9600 baud node. *(Not yet on line)*

AP NODES

AP21 2mtrs is a 1200 baud node.
AP71 70cms is a 1200 baud node.
AP15 23cms is a 9600 baud node. *(Not yet on line)*

DY NODES

DY22 2mtrs is a 1200 baud node.
DY71 70cms is a 1200 baud node.
DY79 70cms is a 9600 baud node. *(Not yet on line)*

BNOR NODES

BNOR22 2mtrs is a 1200 baud node.
BNOR71 70cms is a 1200 baud node.
BNOR79 70cms is a 9600 baud node.

PP NODES

PP71 70cms is 1200 baud user access to GB7MAX.

Maxpak Digicom

1

Issue 16 (Dec94/Jan95)

Digicom, the newsletter of the Midlands AX25 Packet Group.

MaxPak group news

The latest BBS to add a 9600 baud user access port is GB7MAX, with its 70cm 1200 baud port now having been moved to a site in Perton and linked via radio to GB7MAX a few hundred metres away. Their Dec94/Jan 95 newsletter has listing details of a number 9600 baud-ready rigs that are available commercially in the UK, plus details of the new Kantronics KPC-9612 as featured in the Nov 94 HRT. You can get further details on this active group with a message to their Secretary Richard G1NZZ @ GB7MAX. or Tel. 0973 (not 01973) 262287 19.00-22.00 weekdays or 10.00-22.00 weekends.

'Lonny' link to the south

Following the announcement in HRT last year about a possible 'wormhole' packet link to London from the Southampton area, Phil G3WEG says this is now possible for early 1995, but not without cost.

Several local stations have donated equipment to enable this link, however there are still charges to be met to provide the service. If you'd be willing to help by way of donation to facilitate the provision of a landline circuit, which would provide extremely fast access stateside, or indeed would like further information, contact Phil G3WEG @ GB7XJZ.#48.GBR.EU.

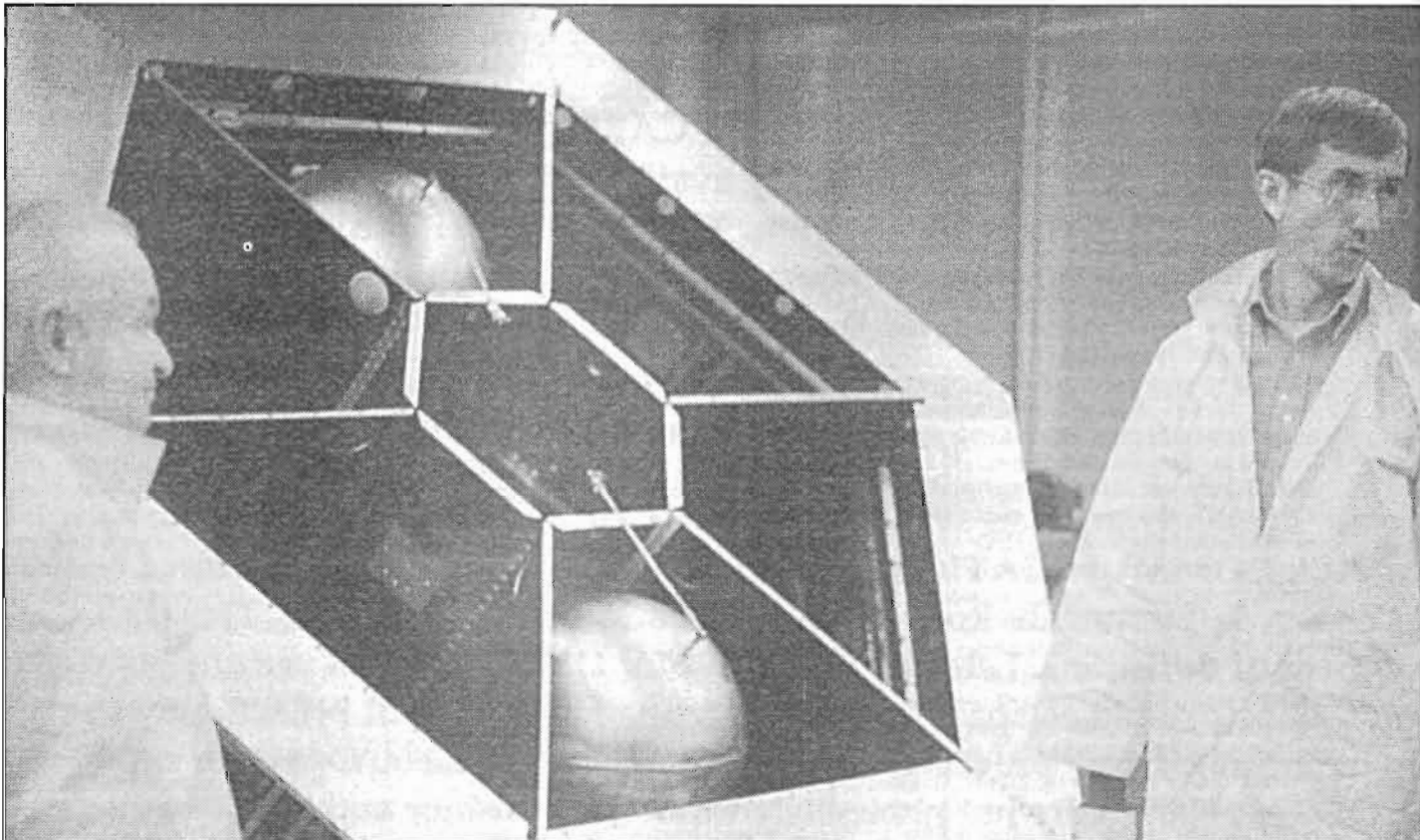
CTRL-Z, end of message

Many thanks for all your messages. Please do keep them coming, every message I receive always gets a reply, I'm especially interested in what you'd like to see in this column. If you're a member of a local, or indeed national or international radio data communication group, do get in touch also, I'll be pleased to 'spread the word' on your activities. You can contact me with a packet message to G4HCL @ GB7XJZ.#48.GBR.EU, email to chris@radshack.demon.co.uk, or post c/o the HRT Editor at the HRT address. Until next month, it's 73 from Chris G4HCL.

Satellite Rendezvous

The launch of Gurwin-1, the Israeli satellite, has been set for 25th March. The orbit details are not available at the moment but it's flying piggyback on a Russian Resurs (remote sensing) flight; these flights used to go to about 82 degrees, 89 minute period, and about 230-240km altitude (so it won't last long). The communications payload of Gurwin will be a flying BBS at 9600 bps (Pacsat protocols) with a 70cm downlink and six uplinks, three on 2m and three on 23cm.

Richard Limebear G3RWL with the Amsat-UK news compilation, including details of a new amateur satellite to be launched next month



Phase 3D Integration Team members Chuck Hennessey W4AT (l) and Stan wood WA4NFY (r) perform a fit check on two of the spacecraft's six propellant tanks (AMSAT-NA photo by Keith Baker KB1SF, courtesy of Oscar News, AMSAT-UK)

Phase 3D

Some of the Phase 3-D Design Team met in Marburg in October 1995. This series of detailed meetings included a 'top-to-bottom' review of progress on all the satellite's systems and sub-systems. During the discussions, team members also bench-tested a number of items of flight hardware and set the final operating frequencies which will be announced soon.

The RUDAK-E experiment will not be available and therefore will not fly. However, good construction

progress has been made on RUDAK-U, the user-oriented digital communications system, as well as its special relationship to other onboard high-speed data experiments, such as the SCOPE cameras and GPS experiment.

KD4ETA, the SEDSAT Project Manager says that the Mode A transponder has been delivered. He planned to put the transponder on the air for testing (in Alabama) in the during the month of November to ascertain its real world operating parameters and conditions as well as to finish 'infant mortality' testing

of the components. The frequencies of operation are:

Uplink; 145.915-145.975MHz

Downlink; 29.350-29.410MHz

This shows that the transponder uplink falls totally within the downlink passband for OSCAR 13. In preliminary testing they have already heard OSCAR 13 mode B downlink signals on the ten meter output of the transponder.

No more Oscar 21

Leo UA3CR says that, on 16th Sept, the command station for the

main Informator satellite suspended active thermal and attitude control, and a total shutdown of the AO-21 equipment occurred on Oct 12th or 13th (the primary payload completed its mission and was turned off some time ago). The reason for the shutdown was stated to be cost-related. Leo also indicated that several other non-profit space objects that only create headaches for the Military Department share the same destiny.

Mir activity

It's beginning to look like future amateur activity aboard space station Mir will be greatly curtailed, or even non-existent! A top Russian official said the six cosmonauts on board would have to ration electricity for several months after the craft's solar batteries were unexpectedly drained when a powerful piece of electrical equipment unexpectedly turned on last month. The accident shut down part of the station and discharged four of the six batteries.

G4BDW has been appointed by Leo UA3CR to act as the QSL Manager for the R0MIR and U-MIR series callsigns in the UK.

MicroSats

The modulation problems on *WO-18* have improved, according to a recent report; the phasing control for the Raised Cosine Transmitter has been altered. Spectrum analysis showed this to have only a slight effect on the signal, but copy of data has definitely improved with the change. Imaging and spectroscopy work will continue normally.

The *DOVE S*-band transmitter has been turned-on; in order to do this it was necessary to slightly reduce the power of the 2m transmitter. The intent is to adjust 2m power and duty cycle so as to enable the S-band transmitter to be kept on, but this may take a little time. Furthermore, the S-band transmitter may be OFF at times, as the satellite's power budget is adjusted. There is no information as to how long S-band may remain in this state, but the command station will try to keep everyone informed as things change. The nominal frequency is 2,401.220 MHz and reception reports are welcome.

IO26 had its digipeater turned on

recently, but apparently its been turned off again. Watch that space; they 'beacon' the latest status.

AMSAT on the Internet

AMSAT-NA have announced the availability of World Wide Web (WWW) services on the Internet. This new pilot project will make available a variety of hypertext documents, pictures, video, and audio materials related to the amateur satellite program. Users will need a computer with an Internet connection and a special browser program. The Web presents a very friendly, easy-to-use interface to a wealth of information on AMSAT's new server and on thousands of other servers worldwide. Graphical browser programs such as 'Mosaic' are freely available for many popular computers, including the PC running Windows or OS/2, the Macintosh, and UNIX machines using the X Window System.

Most of the documents published through the Web server will also be available by anonymous FTP, for those with Internet access but without WWW capability. In addition, the FTP server will be a repository for all sorts of freely distributable programs and documents related to amateur satellites.

To access AMSAT's Web pages, point your browser at <<http://www.amsat.org/amsat>> To access the AMSAT archives by anonymous FTP, ftp to [ftp.amsat.org](ftp://ftp.amsat.org). Use the username "anonymous", and use your real email address as the password. The files are in various directories under "/amsat".

Ski trek

Remember the ski-trek? In March this year, a team of six will set off on a four month trek from Russia to Canada across the North Pole. Departing from Severnaya Zemlya on March 5th, the team hopes to observe Earth Day, April 22, at the North Pole and complete the last two thousand mile leg to Resolute by July.

The purpose of the expedition is to study the environment of the Arctic, especially the effects pollution has had on it. They plan to keep in touch with school students in various parts of the

world using a combination of the various store and forward Amateur Radio satellites and the Internet.

Macintosh software

G00AN has made a Macintosh Amateur Radio software library available on Internet via anonymous ftp from: [ftp.demon.co.uk/pub/ham/mac](ftp://ftp.demon.co.uk/pub/ham/mac). It includes the following satellite related program; *BROADCAST v2.0*.sea 150K Broadcast protocol packet program for use with PACSATs. *EZ DOVE v.002*.sea 55K EZ Dove decoder (v.002). Appl and Basic source, decodes Dove telemetry data.de N5KOB. *KISS_TLM*.sea 50K For decoding KISS data from MICROSATs. *MacSPOC v1.1* demo 188K MacSPOC, flew on the Space Shuttle for the third time in October 1992. MacSPOC keeps users apprised of the Shuttle's current location on a world map and updates several displays, such as mission elapsed time, in real time. *ORBITTRACK* (2 versions) 514K This is one of the best shareware programs I have ever seen. If you are interested in tracking satellites you need this. It comes in two versions, one for use with Macs that have an FPU processor installed and one which will run without a FPU for those that don't. *SatTrack*, 185K, Satellite prediction/tracking programme. *SatLink*, 78K, HyperCard database of amateur satellite info, includes uplink/downlink frequencies etc.

Amsat-UK news

For further information about Amsat-UK contact: AMSAT-UK, c/o Ron Broadbent, G3AAJ, 94 Herongate Rd., London, E12 5EQ. Big SAE gets membership info. SWL's are welcome. All new joiners get the USAT-P tracking program on a 5.25in disk.

A printed copy of the latest Keplers for amateur satellites is available for an SAE marked 'Keplers', together with the corner flash from this page, sent to the HRT Editor. If you've a fax machine with a touch-tone phone handset, they are also available on the HRT fax-back and voicebank information line, 01703 263429, together with further information on Amsat-UK and the Phase 3D project.