

HRT

**Incorporating
SCANNERS**

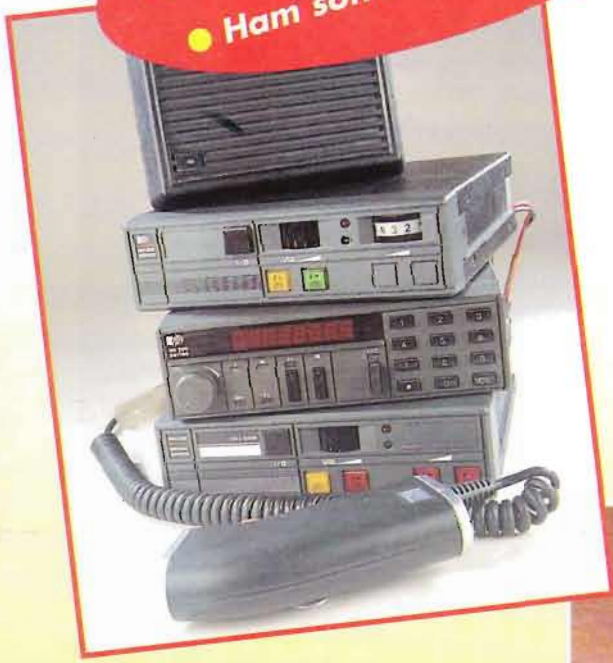
HAM RADIO TODAY

DECEMBER 1994 £1.80

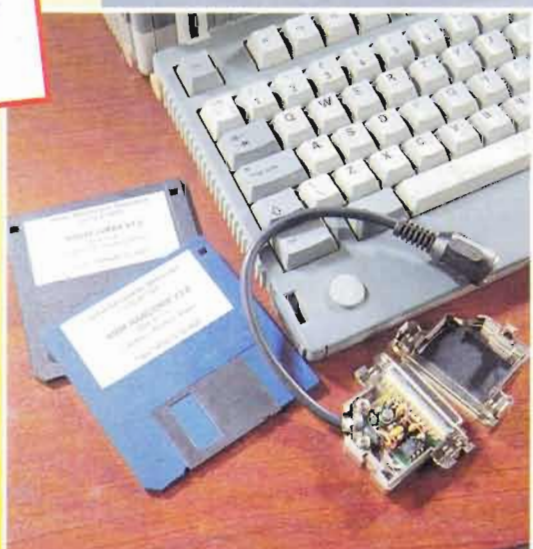
GETTING STARTED ON A BUDGET

**How to get on
the air without breaking
the bank!**

- Hundreds of second-hand bargains in our free reader's ads
- Ham software copying offer



**PYE MX296
CONVERSION
TO A 400 CHANNEL
70cm FM RIG**



**A LOW COST
START
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SSTV AND FAX
RECEPTION**

**OPERATING IN
THE IOTA
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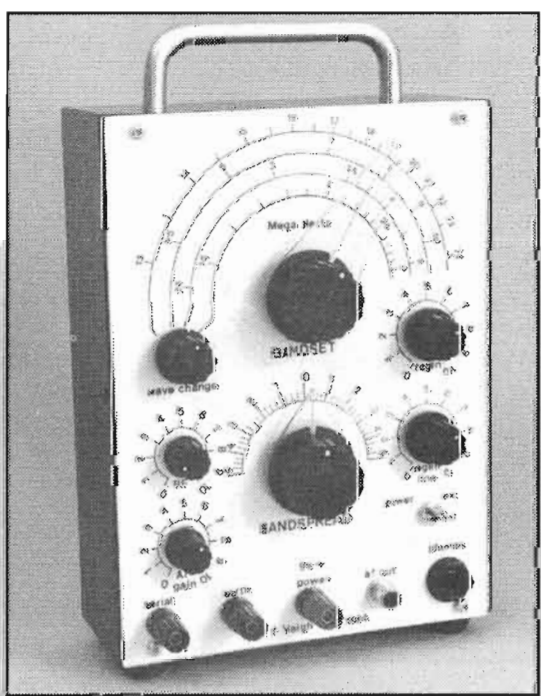
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CQ de G8IYA Editorial

Will TV reception problems be a new money-spinner for the legal profession?

If you're reading this after seeing our hobby 'live' at the *Live '94* exhibition at Earl's Court, then *welcome!* I hope you'll find ham radio interesting, and if you're a newcomer and you'd like a bumper pack of information, then just drop me a large SAE in the post. If you're 'into' computers, then let me know as well, I've a few surprises for you!

Getting started

The theme in this month's issue of HRT is *Getting started on a budget*. No reviews of multi-thousand pound transceivers, no suggestions that you need to be a millionaire to get started. Instead, there's a way to get onto 70cm with a rig for a few pounds. Yes, I've often been asked "When is the 70cm 'follow-on' to the MX294 ex-PMR rig conversion coming out?" This month's issue has a conversion for the MX296, transforming this into a multi-channel 70cm FM rig, including details of how to make it OK for UK Novice use with 3W output. Following the MX294 conversion, literally hundreds and hundreds of amateurs took advantage of these surplus transceivers 'doing the rounds' at low cost. In fact, after a few months the most common query I received was "Where can I buy one from?", as radio hams had stripped surplus dealer's shelves! Maybe the same will happen with the 70cm version? I've a couple of them sat here in the office, both happily working on 70cm (one on my semi-local 70cm repeater, the other on packet), and each cost less than a fish-and-chip meal for my family. Ham radio *doesn't* need to be expensive.

Problems

We all have problems. Some, more than others. Mine, I imagine, are fewer than some, although regular readers may have noticed a few 'odd things' with the magazine's text layout a month or two ago. Yes, we introduced a new desk top publishing system at the HRT head offices up in Hemel Hempstead. Wonderful new computers, massive high-definition colour monitors, and an instant 'backwards step' until everyone got used to them! Strict printing timescales don't of course allow extra time for all this, but hopefully by now things should be 'back to normal'.

She hopes! With such problems having 'settled down', watch out for an even brighter, better HRT in future issues, which I hope you'll be impressed with.

TVI, what TVI?

Do you suffer from breakthrough problems? Do your neighbours (wrongly?) accuse you of 'mucking up' their telly when you're on the air? Yes, I know that domestic equipment in the future will supposed to be manufactured to be immune from radio transmitter signals, in line with the *EMC Directive*, if you weren't aware of it. But even now, if TVs, computers, Hi-Fi systems and so on receive our signals and cause the equipment to suffer from 'interference', the domestic equipment affected *must* be at fault. It's *not supposed* to pick up amateur radio signals, *is it?* If it does, there's something wrong with it!

There's been an interesting new development on the horizon. Someone built a fairly large building in London, called Canary Wharf, and it happened to upset TV reception for a number of people who'd been happily watching it before. As I write this, there's reportedly a court case going on, instigated by said people who used to be able to watch telly OK before, but are now getting problems. I wonder what the outcome of this will be? Does *anyone* have a *right* to problem-free TV reception in the UK? A TV licence doesn't say you have. That's an interesting one! Thoughts of 'Human Rights' spring to mind, just like we hams have a right to freely impart and receive information using our transceivers. Our licence says we can do that. Maybe the EMC Directive will be the 'answer to radio amateurs' prayers'. Or maybe, with the need for commercially-available amateur equipment, and even kits for home-construction, to be 'EMC compliant' with the costs of this, our hobby will be likely to cost us rather more.

I think I'll carry on promoting the HRT construction projects and ex-PMR conversions. They're 'EMC exempt'!

This month's PC software

This month, I'm offering a copy of *PC HF Spectrum*, which is a 'freeware'



program produced by Geoff Brown GJ4ICD's son, and comes with a huge ready-programmed database of HF frequencies and their users. You can use this to search out frequencies, even add your own favourite details including amateur radio 'net' frequencies and so on. See the 'Scanners' page in this month's issue for more information.

The other program on this month's disk is the latest release of *Hyperlog*, which is an extremely comprehensive shareware ham radio logging program. As well as having many QSO 'search' facilities and the capability of QSL label printing, it can also keep an eye on your local DX PacketCluster for stations you need for awards, whether you're 'connected' to the cluster or not! It even has an 'Autopilot' mode to get you started without a lot of work on your part.

As usual, to get this month's collection which has been copied for you free of charge, all you need do is to send a £1.00 coin sellotaped in between a couple of pieces of card, together with your name and address and the 'corner flash' from this month's 'Contents' page, to; *Software Services, 6 Wyre Close, Chandler's Ford, Eastleigh SO53 4QR*. There's no other cost to you, like an SAE, disk or whatever. In return within a few days you'll receive a high density 1.44Mb 3.5in PC disk in the post, packed full with the above programs. Overseas readers can send two US \$1.00 notes plus an IRC for their disk, or an Eire Punt plus an IRC is OK. All this just covers the cost of the disk plus return p/p to you, and is an 'at cost' mail order *only* service to HRT readers, as a 'thank you' for reading!

There will of course be a further disk offer next month, with some *very* interesting software. If you haven't yet subscribed, why not call the subs hotline on 01737 768611 to make sure you get the chance of *every single* software offering for at least the next 12 months!

LETTERS

Letter of the Month

A Novice Instructor's Problems!

Dear HRT,

Regarding the issues relating to the Novices you raised in your September Editorial, I have found similar problems with the Novices I have been teaching. I am a registered instructor and have helped around 30 Novices through the exam. From these, only three quarters have applied for a licence. Those that have remained active number around 8! In order to improve the situation, I have tried extending the course to cover the period between the exam and obtaining a licence. During this period we concentrated on Morse and discussions covering the acquisition of suitable

inexpensive equipment for a Novice's first station. I am aware of some cases where the cost of a 70cm handheld has caused problems for a younger amateurs parents. Maintaining a young person's interest over protracted periods (months) is difficult when there are so many other exciting and instantly available things to do. The long wait for the exam result and a further long wait for the licence, creates an obstacle which can dampen interest. The more mature students have tended to become licensed and a larger proportion than the under 21's have remained active.

One of the most serious impediments to a young Novice remaining active is the acceptance of the new licence by some of the more well established amateurs. Few will respond to a Novice call through a repeater. I have heard stories of Novices being told to "come back when you have a proper licence" and one amateur expresses his view over the air, quite forcefully saying he doesn't hold with the idea of this 'easy to get Novice licence'.

This attitude to change does not help us bring new blood to the hobby. It takes a confident Novice to persist in an environment where he or she feels an outsider.

There is no great need to dramatically change the Novice licence concept. A speeding of the examination result and licensing process would help. Also a change in the attitude of many older amateurs towards a more supportive approach may be all that is required. It is no good training Novices if the education process does not embrace the whole amateur community. The RSGB needs to be more active in this area, and perhaps radio magazines such as HRT, should continue to press home the positive aspects of the Novice scheme and the long term benefits to the whole amateur community.

Keep up the good work in your excellent magazine.
John Fuller, G0OIO

Club Talks

Dear HRT,

I am writing to you because I have discovered why so many amateurs decline from giving talks at their local radio clubs. At my local Radio Club, I was asked to give a talk on satellite communication, as this is my main interest. Having agreed on doing this talk with three other amateurs, we decided to take it one step further and give a live demonstration on Oscar 13.

The date was set for the night of the 5th September 94 when we would undertake this difficult task. We spent the whole of

the week dismantling our much loved equipment, we built a stand for the beams and I prepared my talk. At 8 o'clock many amateurs assembled, coming from miles around to participate in this rare opportunity on how to use satellites on amateur radio.

I began the talk with a bit of history about the first amateur satellites. Having got started, a fellow so called 'amateur', a class A I might add, started disrupting the demonstration. Not only did he annoy me, but this so called amateur upset the entire audience. When I asked him whether he wanted to try the radio, he said "I'm not interested in satellite communication". If this was the case,

what was he doing there? Just because he did not agree with it, he tried to ruin it for everybody else.

I would like to take this opportunity to say there are many means of communication within amateur radio, be it satellites, packet, CW or just the FM simplex channels. It is what each individual amateur gets his or her own enjoyment from. The thing to remember is, this is a hobby.

I know the next time I will think twice about agreeing to give talks or a demo, as there was no need for this behaviour. "Each to their own".
73 all,
Andy, G7MLT.

Rally 'Bring and Buy' Problems

Dear HRT,

I thought you would like to know what recently happened at the Blackpool rally. I

bought at the bring and buy counter a Realistic 2004 scanner priced at £100, entered by someone by the name of Dave Potter (SWL). There was no address or callsign details. Anyway getting home and testing said scanner - inoperable. First off tested fuse, OK, opened up box and low

and behold said scanner had been *attacked* and I mean *attacked*. The scanner was beyond

repair, this chap obviously *knew this*, hence sale at the rally.

Well I suppose I should know the saying "buyer beware!" All it had on the scanner was the price and coverage, no details at all.

Bill McManus, G7LPU

No problems in GM land

Dear HRT,

At risk of being an IQ zero myself, I have to admit I had not noticed the bands to be as afflicted with such characters as G4XPP finds them, perhaps because in GM land we do not hear many signals either. Much of what he describes seems

to me symptomatic of a high degree of frustration, and I can think of one thing above all which has thus afflicted many radio enthusiasts, including myself. Somehow, even for a chance of reforming some 'nasties' by allowing them something better to do, I can not see some people welcoming trial of the obvious measure. Nevertheless, following that line of thought and having regard to the lack of occupation of 10 metres, on which Don Field G3XTT now remarks,

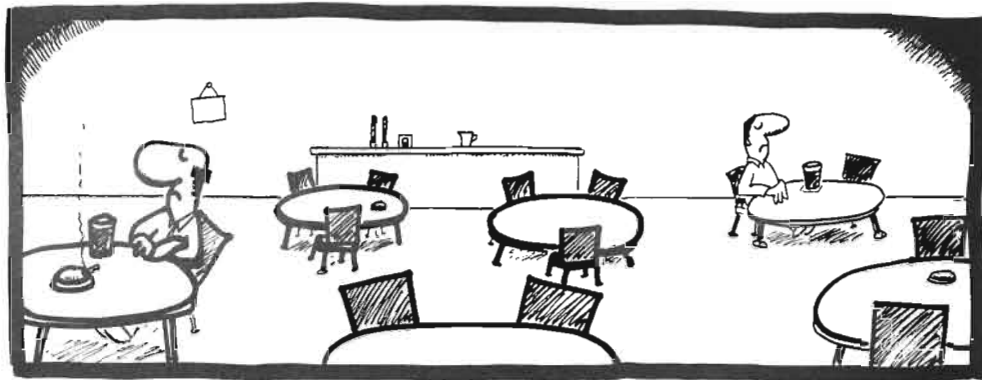
about 11 years ago in response to similar expressions of concern, I attempt as G6KKP, to suggest to the RSGB that such as myself would be delighted to help occupy the band? Perhaps, bearing in mind that as an SWL from 1938, I may not be available next time round and that even in the States a similar thing is now allowed, I may be permitted to revive the proposal now.

Sandy, GM0IRZ

"TONE" BURST



By GEMEN



Ham Cliques?

Dear HRT,

I would like to try to answer the letter from Mr. J. D. Bolton G4XPP (Oct 94) and to give my views on one of the reasons why the so-called "IQ Zeros" do what they do. Sadly, my own experiences of operating on 2m FM (the only band I can transmit on at present), is that 'G' Radio Hams can be divided into three categories:

1) *The majority*; this group comprises of 'cliques' of people, who are always only willing to talk to members of their own small group of

friends, and on subjects only they know about. These people will always totally ignore any newcomer calling them, or reply with a very cold, unfriendly answer. This has happened to me on many occasions, on one such time when I called-in, one of them said "we've got you-know-who again!"

2) *A large number*; This group of people is made up mostly of G3's and G4's, who, when called, look down on the newcomer as a substantially lower form of life.

3) *A small handful*; These people are always willing to make a newcomer welcome, either on the air, at club meetings, or to help with technical problems, regardless of callsign number, sex, age etc. etc...

Question; When a newcomer is met with the response of the nature as in groups 1 and 2, why are you surprised when they want to stop these people from enjoying the hobby, when their own enjoyment has been ruined by snobbery and prejudice? I would like to challenge any station to answer my question, and I also ask them to honestly tell me: What category do you belong to; 1, 2 or 3?

If ever I have talked to a French or Belgian station, when the band is open, I have found them to be friendly and courteous, and I honestly believe they can teach most G stations a bit about good manners!

Jerry Spence, G0FPI

Educated or idiots?

Dear HRT,

J. D. Bolton, G4XPP, he hits the nail fully on the head, there was only one mistake he made i.e. Cretins (English dictionary interpretation: Cretin - deformed idiot), of which they are not. Thick as a brick, thick as two planks, motormouths, little people, those who think that only they are right, those who wish to dictate to other people how things

should be i.e. their way, people who want to be the sole of attention, the reasons are endless why they do this on radio, whether it be CB or Amateur Radio.

One such person remarked after being caught was "the only way the authorities would stop him was to put him in jail, where he could not have access to buy radio equipment, cost was of no consequence". I propose when caught that their identities should be known, also their QTH, he has already stated on the local repeater that he will be at Picketts Lock to air his views. Why oh why cannot the RIS come down on them

like a ton of bricks, or is there a motive somewhere to let them carry on regardless, then blame the genuine radio amateurs for not policing the airwaves enough? I was always under the impression that 'if you bought a dog, the dog barked, not it's owner'.

I pay £15 a year licence, I'm also a member of the RSGB, I am entitled to use all the permitted frequencies without some person telling me to go to certain places etc. They are educated people, not I hope idiots.

J.H. Clifton, G0UIU

Changes over the years

Dear HRT,

I read with interest the letter penned by G4XPP in October HRT regarding CB/amateur band abusers. As an amateur radio enthusiast for over 20 years and a SWL before that, I have noticed changes happening over the years, which I believe could be highly significant when looking for reasons which have given rise to the present misbehaviour.

Firstly, let us try not to kid ourselves. Throughout all walks of life, there always was, is, and always will be a tiny minority of people who get enormous pleasure annoying others in the pursuance of their chosen pastime, whatever it may be. Wherever there are stones for them to crawl from under, you will undoubtedly find them. One of the best opportunities for them has undoubtedly been CB radio. No-one who has listened to CB can deny the problems people have with the abusers on this service.

This leads on to my second point. Years

ago, the natural progression in radio as a hobby usually started with an individual's casual interest to short wave listening, and then on to study and take the RAE.

Nowadays, quite a high percentage of people coming into the hobby have done so via CB, consequently amongst the multitude of new radio amateurs, there will most certainly be one or two of the minority faction filtered through.

Thirdly, let us consider changes in radio technology which have taken place over the years. There were far more experimenters and home constructors building their own radio equipment, they knew their stuff inside out. Today it is a totally different story. Nowadays, it would take a very highly skilled engineer indeed to design and build anything as complicated as some of the latest high-tech radios which have overtaken the amateur radio hobby. The days when it was common to listen in on a QSO and hear any number of amateurs holding an interesting discussion, are long since gone.

So let us now bring all these factors together. As I see it, we have amongst the modern amateur radio fraternity, a number

of substantially non-technical ex-CB radio operators, who, entranced by the glittering commercial 'black box' packages offered by the retailers, purchase all their transceivers, aerials, automatic ATUs etc. etc., take it home and plug it all in, and away they go..

Of course, I appreciate that the majority of the new licensees go from strength to strength, and discover interests within the many facets of our fine hobby, and soon develop into fine radio operators in their own right. But the tiny minority, with their limited scope for furthering their interests within amateur radio, soon get bored with it all, so their only 'pleasure' left for them is to spoil the pleasure of others.

So who's to blame for all this? Well it seems to me that the blame should be shared by those who introduced CB, allowed the commercial manufacturers to take amateur radio from the kitchen table into the high-tech age, and the radio licensing authorities whose job it is to locate and bring to justice these lawbreakers of the Wireless Telegraphy Act.

Mr. D. J. Walters, G4DFV

£10 for the Letter of the Month

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

Getting started on a Budget

Hugh Jones says "You don't need to 'break the bank' to get started in ham radio"

Would you like to get started but don't have an endless source of funds? Many of us have seen photos of huge arrays of expensive equipment, aerials, and towers. These might be OK if you've a deep pocket, but for most of us, myself included, this isn't the case! This brief article aims to give a few 'pointers', which I hope will also be useful to those wishing to extend their ham station capabilities as well as those on the 'first rung' of the ladder.

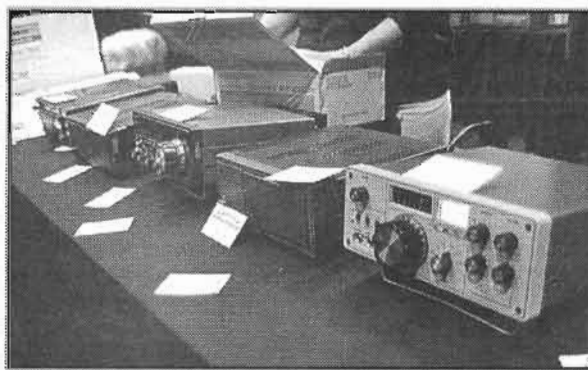
What do you want?

It may seem obvious, but it's worth stepping back and asking yourself "which aspect am I interested in?". There's little use in going the 'whole hog' with equipment for every conceivable band and operating mode, only to find you don't like it! For example, if your interests are HF, then try having a listen around or having a 'go' on air first, maybe using equipment down at your local radio club, before you put your hand in your pocket. Likewise for VHF/UHF, or packet radio. People learn a lot by making mistakes, so while you're down there why not seek the advice of those already active, take advantage of their experience, many will be pleased to share this with you. They may even be able to point you in the right direction of some secondhand gear. Some clubs even have an 'equipment loan' facility, which you could make use of.

This would, in my opinion, be the best advice for someone 'starting out' in the hobby. Try it out first! Most clubs will welcome you with open arms, and HRT gives a comprehensive 'club diary' each month of club activities, many of which also have 'on air' nights.

Newly licensed?

If you've just earned your licence and are looking for a 'first rig', then don't be overawed by all the latest 'high tech' gear you see. You know, the type you think you need. You



Secondhand rigs shouldn't be dismissed

often don't. This is often for the 'dream station', the one you might have eventually. It's often also the stuff that depreciates very quickly. Automatic scanning and umpteen memory channels may be nice, but these don't usually help you put a better signal out. Look around the dealer's secondhand shelves, and through the HRT Free Readers Ads. When you do eventually 'upgrade' to newer gear, you won't have lost nearly as much, or anything at all! For example, the old FT-200 and FT-101 HF transceivers have steadily held their secondhand prices for many years. The FT-101 is a popular choice for many HF 'beginners on a budget', it may be manually tuned, and have a valve PA, but it's certainly 'held its own' throughout the years.

Homebrew?

It's possibly a sad fact, that it's very rare that you can save money by building your own transceiver, with a similar specification to that which you could buy, especially secondhand. Yes, you *might* get fun building it, and a great degree of satisfaction in using it on the air. But if you need to

eventually sell it to 'trade up' you'll be very, very disappointed.

Accessories, however, are well worth building. Things like an SWR meter, CW keyer, audio filter and so on, the 'little things' that cost so much if you buy them new. Likewise, a simple receiver (e.g. in *this month's issue* - Ed) for HF SSB and CW reception can be built very cheaply to 'get you going' as a beginner. All this can also give you good experience

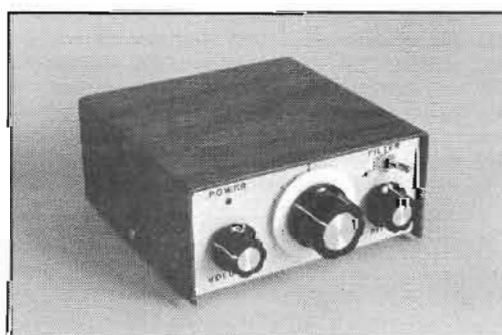
in simple electronic assembly and faultfinding, and you may eventually save yourself a great deal of cash by then having the confidence to attempt some repairs when needed on your equipment, rather than having to pay expensive workshop prices.

Aerials

One addition to your station that is well worth 'doing yourself' is the aerial. You can build, say, a 2m beam for about £5 where a commercial type with similar electrical specifications would cost upwards of £50. Likewise with HF aerials, on an even larger scale! Remember, your aerial doesn't need to be made of aluminium tubing with traps galore and a fancy-sounding name to give you a good signal. If you want a good signal on 20m, a vertical ground plane made out of £2's worth of wire will put out just as good a 20m signal (and sometimes better!) as a commercial multiband trapped quarter wave vertical costing over £100. A good aerial book with construction details can pay for itself many times over.

VHF/UHF?

Once considered the 'esoteric' bands, 2m and 70cm are now undoubtedly the most popular bands which new licensees to start out on. Again, don't be too tempted by the latest rigs full of

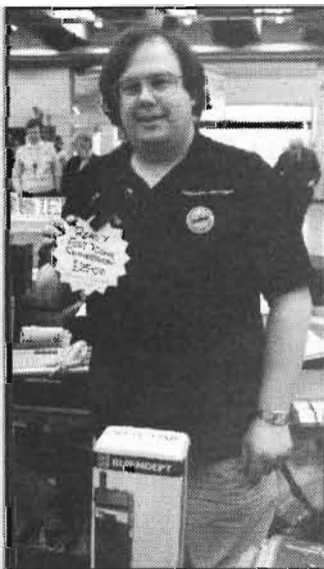


Home made accessories can be worthwhile

'bells and whistles'. There are plenty of secondhand bargains about. Don't dismiss crystalised transceivers, they're the ones with just a rotary knob and channel number display, not a digital frequency readout on an LCD. The big limitation is that they *do* need crystals for each frequency, which can be expensive. So if you don't want a big bill, check the set's already got the channels fitted to 'get you going', like *your* local repeater(s), S20, S21, S22 and so on. You don't need every 2m or 70cm channel to join in on the air, and when you eventually 'trade up' again you'll not have lost out.

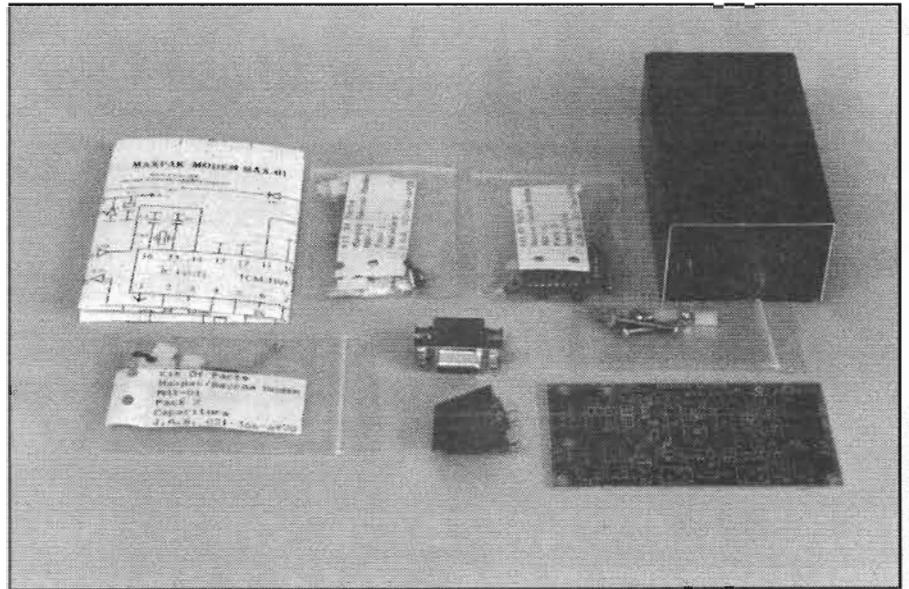
Ex-PMR

Years ago it was 'war surplus' gear that got you on the air on a budget. Now, it's ex-PMR gear, and HRT have gained a solid reputation of being 'the' magazine for these! For just a few pounds, you can get on air with a rig that can often give better technical



Ex-PMR rigs are useful to get you going on VHF/UHF

performance than any oriental amateur 'black box'. With the proposed move to 12.5kHz channel spacing on 2m and 70cm, a 12.5kHz spacing ex-PMR rig, as most are, will get you up and ready to go without you ever having to re-fit expensive filters! Many earlier such rigs are crystalised, so do take into account the cost of these as more than one or two sets of crystals can really put the end cost up. However, there's plenty of synthesized rig conversions around (see this month's issue - Ed), and you can end up with a 2m or 70cm rig packed full of every channel you could ever want. Even the required plug-in EPROMs for amateur channels are



A packet modem gets you started at low cost

usually available at very low cost, and this makes the 'conversion' a *lot* easier!

Data Modes

Data, and packet radio on 2m and 70cm in particular, holds a keen interest in newcomers. Mature amateurs are now also using this as a 'means to an end', for PacketCluster and 'electronic mail' activities for example. Again, it needn't cost a fortune. You *don't* need the latest all-mode terminal unit linked to a 486DX2/66 PC with colour monitor to get going! A group of German hams came up with the 'Baycom' system, which uses a simple modem which you can build yourself, which can plug into the secondhand XT PC you've bought for under £50. Using Baycom software, the PC emulates the power of a packet TNC, using the one-IC modem purely as an audio/digital interface to your rig. In the UK, Maxpak sell kits for this, and Siskin sell a ready-made unit that's built into an RS-232 plug.

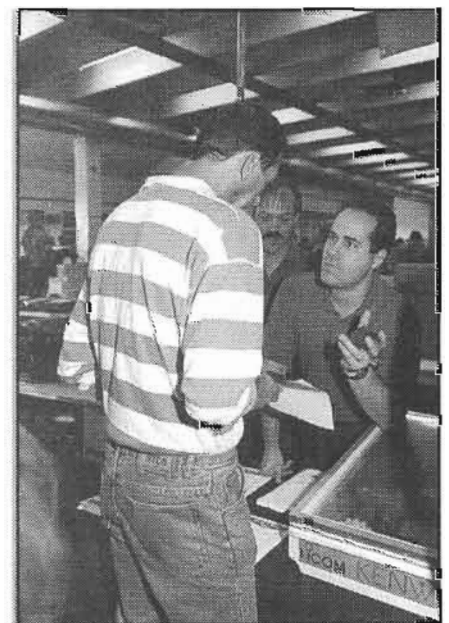
For HF AMTOR, SSTV, and so on, again an all-mode terminal unit is nice, but a simple interface linked to a PC is all that's needed to get you on the air with 'JV Fax' and 'HamComm'. Badger Boards sell a simple low cost kit for receive use, and Venus Electronics sell ready-built units.

For the 'Old Hands'

I hope the above has given you some 'food for thought'. Some of this

may be obvious to 'old hands', but experience isn't something shared by newcomers to *any* subject'.

So, as an 'end note' here's a final tip on saving even 'old hands' some cash. While you're wandering round the rally, or dealer's shop, looking at all the gleaming new rigs, remember to ask if a 'deal' is possible. You won't lose anything, and you might walk away with an extra accessory, or a higher discount than you first thought, or interest-free credit rather than having to pay a percentage on your credit card bill. You only need to ask....



Don't be afraid to ask for a 'deal'

DataPack Review

The HRT Consultant Tech Ed tests a low cost 'beginner's special' DataPack which adds multimode data capabilities to your station

You may have heard the various 'noises' of AMTOR, SSTV, and the like on the bands. How about being able to see the colour pictures that amateurs are sending each other? How about sending your own pictures back? For less than £50, the system reviewed here lets you do that. You'll need a PC and a receiver or transceiver, apart from that the DataPack comes with all the software and hardware you need.

Software

The 'bundled' software includes *HamComm* version 3.0, which supports reception and transmission of RTTY (Radio Teletype) and CW (Morse), with available modes of Baudot, ASCII, AMTOR both FEC (Forward Error Correction, as in broadcasts and 'CQ' calls) and ARQ (as used in one-to-one QSOs between stations), SITOR A/B (Simplex Teleprinter Over Radio, as used commercially) and NAVTEX. The latter is extensively used for shipping forecasts, and weather reports in both 'ship' and 'synop' formats can be decoded.

The other program is *JV Fax* version 7.0, is also a multi-purpose program, this time allowing reception of both weather chart and photo-style fax. For amateur use, there's also a fax transmit option, together with both black and white and colour SSTV (Slow Scan TV) transmit and receive capabilities.

Finally, a disk with a selection of

colour 'GIF' graphics files is also provided, to get you started with 'ready-made' pictures.

This isn't a review of the software however, as the programs are supplied on a 'shareware' and 'freeware' basis respectively, i.e. they cost you nothing apart from the disk and any modest copying charge made by the supplier, so you can try them yourself to your heart's content! *HamComm* has a 30 day 'trial' period, after this you're asked to pay a US\$30 or DM40 registration payment to the German author, DL5YEC. The *JV Fax* author, DK8JV, says there's no payment required to use his program but asks that you let him have some kind of acknowledgement if you like and use the program frequently.

Hardware

Both of the programs use the same hardware interface unit, this connecting between your rig and computer. It's encased within a 25-pin D type RS-232 connector, which you plug into the serial port of your computer. The tiny electronics inside the connector are sealed up, although for the curious types this month's HRT front cover photo this month gives you an idea of what's inside! A 5-pin DIN connector lead is supplied which connects to this interface, this is wired in exactly the same connection format as a *PacComm* and *MFJ TNC*, with lines for RX audio, TX audio, ground, PTT and optional 'DCD' squelch (the latter not being

used in the DataPack).

Finally, a short introductory leaflet is supplied giving software configuration hints and interface connection details.

Connecting Up

Although the leaflet that comes with the DataPack is just a folded A4 sheet, it's probably all that's needed, as very comprehensive documentation on using the programs is contained on the disks. These amount to 41 pages for *HamComm*, and 51 pages for *JV Fax* - virtually everything you'd want to know! Although you can read these 'on screen', it does rather help to have a printer connected to your computer (with a copious supply of paper) of course, to print these out so they can be referred to while you're setting up and using the programs.

So, armed with your self-printed manuals, for receive only you just need to connect your receiver's speaker output to the interface, and off you go! For transmit, a couple more lines (TX audio and PTT) and the reverse happens - simple as that.

Conclusions

I could go on and on about the fun to be had with the supplied programs, but that's not what's being reviewed, as noted you can try the software out yourself without buying anything. But the boxed 'complete bundle' of the required interface, programs, connecting leads and initial picture files, is a nice and well thought-out arrangement. It'll give you a beginner a low-cost start on AMTOR, RTTY, SSTV, FAX, CW, without the need to fork out several hundred pounds for an arguably better performance all-mode stand-alone terminal unit. Remember that the software itself is not free, and for *HamComm* you're expected to pay a further fee to the author if you wish to continue using it.

The DataPack is currently priced at £49 plus £3 p/p, and my thanks go to Venus Electronics (Tel. 0252 837860) for the provision of the review sample.



The DataPack 'bundle' of disks, interface, leads and leaflet.

Here is an example of what you can send and receive



SCANNERS

Bill Robertson says "Get your frequency list here!"

One of the most common things I'm asked for is *frequencies*. I could fill several copies of HRT with these if the Editor would let me! There are, of course, plenty of fairly thick books with a variety of frequency listings available, which could fulfil this need. But with, say, HF, many services change frequency depending upon the time of day or season to cope with propagation changes. Thus, searching through a 'common' volume of all sorts of HF frequencies to find, say, a given aeronautical or fax station you'd like to receive can be a very lengthy job.

1994 PC HF Spectrum

The HRT Editor recently gave me a copy of the *1994 PC HF Spectrum* program, which has been designed to help you replace all those books you purchase each year. It's written by Geoff Brown GJ4ICD's son, who tells us it contains over 15,000 Broadcast, marine, military, aeronautical, utility and other interesting frequencies, and that many years of hard work and confirmation of used frequencies are now at your fingertips and not on your bookshelf!

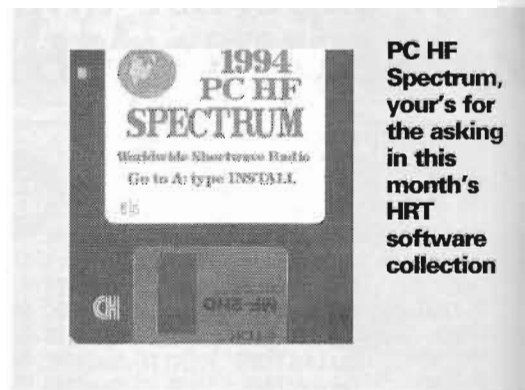
The basic idea of the program is to search a frequency which is received and find out which station it could contain. However, other searches are available such as station name and mode (USB, LSB, CW, AM, SITOR, RTTY and other modes). Also included is a mode '*' search for current broadcast AM transmissions plus a full Country search and full frequency search. You can also add

frequencies, alter frequencies and delete frequencies.

Best of all, you don't have to pay anything for the program itself! It's featured in this month's HRT software offer, all you need send is a £1.00 coin on a piece of card (to just cover the cost of the 1.44Mb HD formatted disk and return UK p/p to you) together with your name and address and the 'corner flash' from this month's contents page, and you'll receive it in the post! My copy was up-to-date as of mid-August 1994, and it's totally 'freeware', there's no requested 'fee' by the software author for using it after any given period.

Which Scanner?

One other thing I'm commonly asked for is "what scanner would I recommend?". My thoughts are that it all depends upon personal preferences in terms of what your listening interests are, and of course the amount of money you want to spend! The recently published book 'Scanners 3' by the late Peter Rouse (available from Argus Books, Tel. 01442 66551 as well as from specialist dealers) has a comprehensive section detailing virtually every current scanner available, together with the real technical results which these sets achieve on air. HRT and earlier 'Scanners' sections of the mag have also contained plenty of full reviews of scanners, an SAE to the HRT Editor will get you a full list if you'd like more information on a particular set. If you'd like to write me a letter to



PC HF Spectrum, yours for the asking in this month's HRT software collection

enclose in the same envelope, I'd be very pleased to answer any questions you may have through this column!

Scanner modifications

My scanner 'mods' file is growing bigger and bigger each day, my thanks go to Dave, Rod, and Ian for the recent mods you kindly sent me. So, let me know what *you're* interested in and I'll get something into this column, possibly on a regular basis. How about a 'mod of the month'? Write in and let me know what you'd like!

On this subject, US scanner users seem to be having a even harder time recently. The US customs are now getting into the habit of seizing scanners coming into the country which are capable of 800MHz coverage of their cellular bands, either as standard or with an internal modification. They're also reportedly seizing 'add-on' converters for these! Apparently there's a good market across the US/Canadian border for these, and I've even seen a Canadian ad informing US customers their cash will be refunded if there's any customs problems. In other words they *know* they may not get through! Of course, it's quite OK for US citizens to buy receivers and to use them to listen to their local police, FBI, drugs squad, military, national guard etc, but not the cellphone user down the road!

Bill Robertson invites your letters and questions, which he'll answer through this column - write to; Bill Robertson, c/o HRT Editor, ASP, Argus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST

Rec no	Frequency	Station	Mode	Country
1	0.117.4	OFFENBACH/DCF37	FAX	GERMANY/METEO
2	0.119.3	PRAGUE METRO /OLT21	FAX	CZECH/METEO
3	0.134.2	OFFENBACH/DCF54	FAX	GERMANY/METEO
4	0.144.5	MOSCOW METEO/RCG	FAX	USSR/METEO
66	2.342.5	GRENGEL METEO/DHJ51	FAX	GERMANY/ 2.822KHZ
67	2.374	RN LONDON/GYA	FAX	UK/RN LONDON/METEO
111	2.618.5	BRACKNELL/GFE25	FAX	UK/24H/METEO
113	2.720	SAMARA METEO/CIS	FAX	USSR/METEO
117	2.815	MOSCOW METEO/RV076	FAX	USSR/METEO
118	2.822	GRENGEL METEO/DHN37	FAX	GERMANY/120-576
127	3.170	BEIJING/BAF	FAX	CHINA/METEO/120/576
164	3.235	MENSK/USSR/RSR71	FAX	USSR/METEO/90/576
165	3.250	KHABAROVSK METEO	FAX	USSR/60-576/RXB70
166	3.280	TASHKENT METEO/RBX70	FAX	USSR/60-90/576
167	3.289.5	BRACKNELL/GFA21	FAX	UK/24H/METEO/2.618.5
275	3.360	KIYEV METEO/RPN71	FAX	USSR/CIS
276	3.365	TOKYO METEO/JMJ	FAX	JAPAN
277	3.377	ANKARA METEO/YMA20	FAX	TURKEY METEO
278	3.365	NOVOSIBIRSK/RCK77	FAX	USSR/CIS/METEO

more -

A screen's worth of a typical 'FAX' search from the PC HF Spectrum program, included in this month's HRT software offer

Pye/Philips

MX296

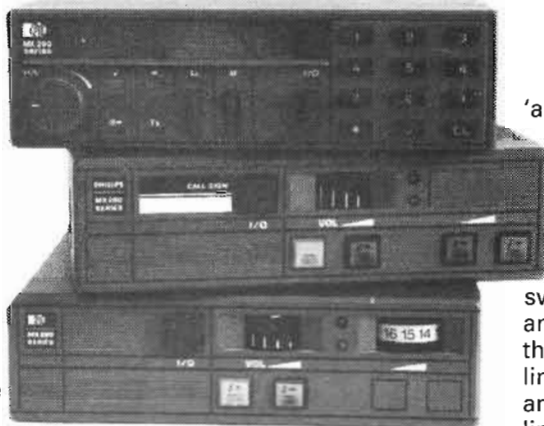
Conversion to 70cm

Our conversion 'Guru' Chris Lorek G4HCL transforms an ex-PMR rig into a 400 channel 70cm transceiver

The MX296 is a car radio sized synthesized UHF FM transceiver, capable of around 10-12W RF output. It's used in a variety of forms on the commercial market, with varying front panels to suit the application. These range from a 16 channel manual channel control version, 40/80 channel with LED display, right up to fully computer-controlled versions, some even having keypads for automatic signalling. But if you look at the rear panel, and it has 'MX296' engraved on the serial number panel, then if you open any of these units you'll find virtually exactly the same transceiver RF unit, on a single 'main' PCB firmly bolted onto the chassis. Any additional selective signalling PCB, which slides out of the set and is attached to the front panel, you won't need at all. In fact you should remove this for 70cm use and maybe just save the electronics on the PCB for a source of components in your future projects! You'll now be left with a chassis with probably a large plain metal screen covering the RF circuitry. Undo the numerous M3 screws securing this to the chassis, and lift it off - you should see something like that in the accompanying photo. There will be a square-shaped VCO (Voltage Controlled Oscillator) unit with its own small screen, this should be left in place in use on-air, with firmly tightened screws to prevent microphony in use, although the overall 'main' screen can be left off in use for our purposes.

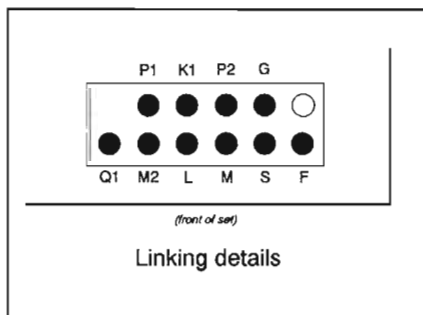
Channel switching

Depending upon the type of channel control, you'll either have a 16 way rotary knob, or a plug and socket arrangement where this would otherwise be. If your front panel has a 40-way knob and accompanying channel display, maybe even with a '40/80' switch (quite rare, as most have a 16 way manual switch), you're in luck. If not



The MX296 comes in a variety of forms

then don't worry, because by adding a pair of low-cost BCD thumbwheel switches to your EPROM's address lines (my switches came from Maplin at a couple of pounds each), you'll have a multi-channel set with direct channel readout, with every standard simplex, repeater, reverse repeater and packet channel. Add a further thumbwheel switch and with a suitably programmed EPROM you can have a 400 channel set, i.e. every 25kHz channel across the whole of 70cm! If you use the set's 16 channel switch and add a couple of toggle switches to the front panel, these addressing the A7 and A8 lines of your EPROM, then you'll instantly have extra 'groups' of 16 channels each, for reverse repeater, simplex, and so on.



Preliminaries

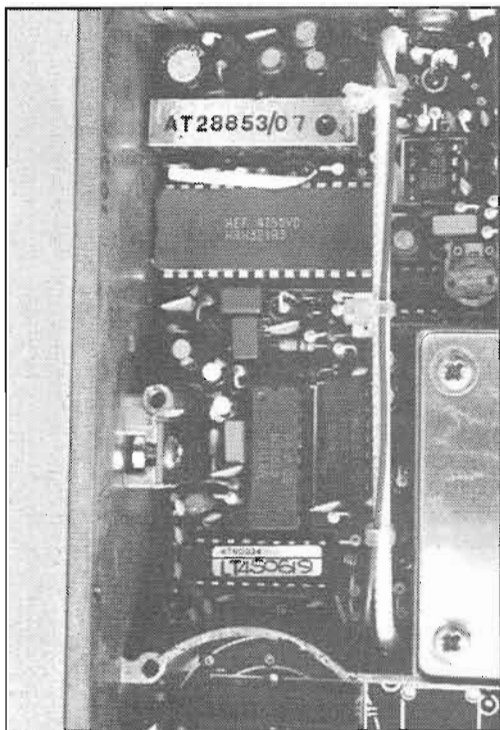
If your set came with no such 'additional' electronics fitted, you can skip this part. Otherwise, you'll need to make a couple of simple links to bring the set 'back to normal'. Depending on what signalling was fitted, this may have controlled the receiver audio switching, transmitter PTT keying and disable, and so on. Referring to the accompanying diagram, make links to join pins S to F (RX audio), and pins K1 to L (TX PTT). The linking points are small gold-plated pins on a 'header', and you'll probably see small 'bridges' fitted to these. Any other links should be removed, and *only* the two links above made and left in place.

Testing

If you have a manual channel control, if you now connect 13.8V DC to the power leads (the red and black flying leads (*not* the blue and brown lead - these you should connect to a 3-8 ohm external speaker if you want to hear anything) and press the on/off switch, the set should switch on and the red 'lock' LED illuminate when switched to a programmed channel. If not, then check the original 16 or 18 pin PROM, IC8, is plugged in. This will normally have a white label on it identifying the code associated with what's programmed into it. The red LED means the synthesizer is OK, and you may even be able to check for correct transmit and receive operation on its original frequencies if you've suitable test gear to hand.

Programming for 70cm

The frequencies the set operates on are stored in the plug-in fusible-link TTL PROM. This PROM is not alterable, and it isn't erasable, it's *not* an EPROM. However, for our



The synthesizer and TTL PROM

conversion I'll show you how to use a low-cost and readily-available '27 series' EPROM and show you how to calculate the codes required to program it for 70cm use. Many amateurs have such programming facilities, possibly using a hardware add-on for their PC. The HRT Reader's Services department has ready-programmed EPROMs available at £9.99 each, with all 400 channels plus quick-access reverse repeater, suitable for 16-way and 40/80 way switches as well as thumbwheel controls. Each EPROM comes with full connection details, and a 'channel list' for various channel switch arrangements. We like to make things easy for you at HRT, don't we?

EPROM connections

As EPROMs have 24 or 28 pins (the supplied EPROM is a 28 pin 27C64 type), i.e. more pins than the existing 16 or 18 pin PROM, you'll need to make up a small 'linking' interface, wired as per the accompanying table. Note each MX296 has 18 pin IC socket connections on the PCB, regardless of what IC is fitted, and the connection details indicate these pin connections. Your interface can be simply made on a piece of Veroboard with a 28 pin IC socket fitted, or even to the pins of the IC socket itself if you're careful with insulation between them.

Code calculations

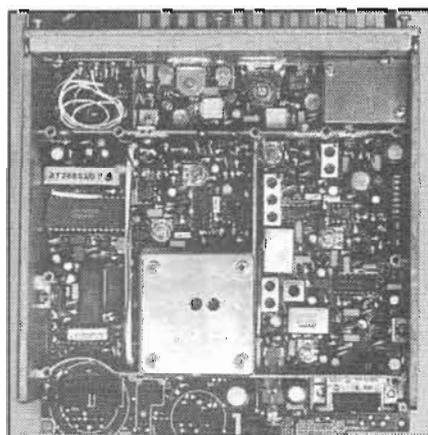
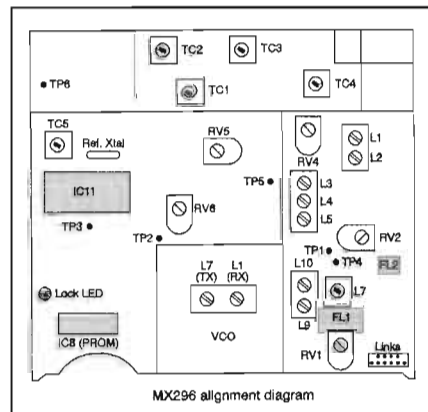
You'll need the following information *only* if you wish to program your own EPROM, or to make up a diode matrix and single-IC demultiplexer board for operation on a single channel. A suitable circuit was given in the MX294 2m ex-PMR conversion in the March 94 issue of HRT, and a copy of this circuit is available from the Editor on request for an SAE and an original 'corner flash' from this article.

The MX296 uses a synthesizer reference frequency of 12.5kHz, with the VCO operating at the final transmit frequency. On receive this operates at the final LO injection frequency, which for 70cm is 21.4MHz *above* the receive frequency.

For each frequency, transmit and receive, you'll need to calculate a 4 digit hexadecimal code to program in, one code for receive, one for transmit, for each channel. To do this, divide the final frequency (TX or RX LO injection) in MHz by 0.0125, i.e. divide by 12.5kHz which is 0.125MHz, to first obtain a decimal number. Then, subtract 3840 from this, which is the synthesizer divider chip 'offset'. Now, convert this resultant number into a hexadecimal code, *DCBA*, with *D* as the MSD (most significant digit) and *A* as the least significant digit (LSD). To do this, first divide by 4096, the resultant integer (the 'whole' number, not the 'fraction' part) is *D*. Subtract the integer to leave just the decimal part, then multiply by 16. The integer now is *C*, again subtract this and multiply the remaining fraction by 16. The integer you now have is *B*, again subtract this and multiply the remaining fraction by 16, the number you're now left with is *A*. This may be something like 14.9998 depending on your calculator, this of course is 15, and not 14. Remember to convert the decimal numbers to hexadecimal, i.e. 0-9 remain the same, 10-15 become hexadecimal A-F respectively.

Now, just to complicate matters, you need to swap the resultant hexadecimal sequence *DCBA* for each channel around to give *BCAD*, this is the order the synthesizer reads the data in from the PROM or EPROM. It reads this as four multiplexed 'lines' of four bits each, with multiplexing on the A0 and A1 addresses of your EPROM. The A2 line is the TX/RX 'toggle', with a '1' being presented on transmit, so you

program the TX codes immediately 'above' the receive codes. If you have 8 output data lines on your EPROM, you'll only be using four of them, so remember this when programming. If all this sounds too complicated, remember that you can always take the easy route and use a ready-programmed EPROM!



This is what's inside the box Tuning

Having correctly connected your EPROM, or any diode matrix and demultiplexer circuit you've made up to 'replicate' this for single-channel operation, first check your wiring. Then check it again. That's the hard part, honestly, the rest is easy!

Connect power and switch on. First, with a non-metallic adjuster (a filed-down matchstick or knitting needle works fine) carefully tune L1 on the VCO board, accessible through the lid, until the red 'lock' LED illuminates. You may need to remove any flexible sealant on this adjuster first, it should come off easily. Now tune L1 until you get a reading of around 6.5 V on test point TP2, this voltage will vary in sympathy with your tuning when the synthesizer is in lock. Now, with a suitable RF dummy load connected

to the set's aerial lead, key the transmitter either with your microphone if one came with the set, or by shorting together pins 3 and 5 on the mic socket. No transmit? Check the links if you changed these beforehand! Now, tune L7 on the VCO board again until the 'lock' LED lights, then again adjust for around 6.5V on TP2. You might get some RF power output present as soon as the synthesizer comes into lock, so be prepared.

Now adjust the RF driver and PA trimmers, TC1, TC2, TC3 and TC4 for maximum RF output power, as indicated on an in-line power meter. If you don't get a reading, adjust these first for a 'peak' in the current drawn by the rig from your power supply, then carry on adjusting for maximum RF power. RV4 is the RF power preset control, which you can adjust to set the output power between 5W and around 10-14W with. It's worth setting this to the power level you require and then carefully re-tuning the trimmer capacitors for best overall efficiency.

TC5, which sometimes forms part of a metal TCXO (Temperature Compensated Xtal Oscillator) block, is the reference frequency adjustment. If the unit came out of service, this should be accurately set, but if you have access to an accurate frequency counter, trimming this carefully will adjust all your transmit and receive channels.

RV5 is the peak deviation control, adjust this for the required transmit deviation. If you have access to an oscilloscope or an FET AC millivoltmeter, then you can adjust RV6 for minimum AC 'stepped' waveform voltage on TP3 whilst the transmitter is being modulated. This is the 'modulation balance' control which will probably already be reasonably set if the rig came out of service, and you should only adjust it if you've got the required test gear.

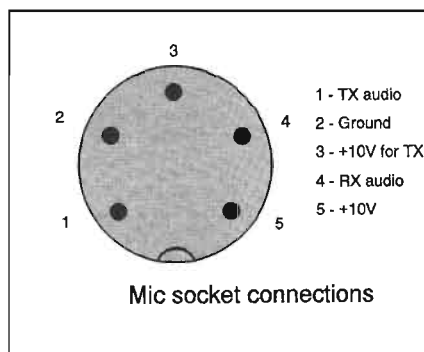
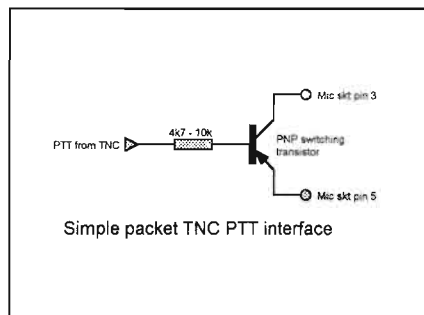
Now for the receiver. You may already be able to hear local 70cm signals on the rig, especially if it came out of service originally operating on the popular 431/440MHz PMR band as used around London. First, adjust RV1, which is the squelch preset, until you can hear squelch noise on your connected speaker. No noise? Check your links as detailed earlier, remembering to adjust the volume control at the front. Some 'plug-in' front panels have the volume control fitted onto the panel itself, in which case you'll either have to use this, or connect a 5k potentiometer to the

three obvious PCB connections at the front of the set, these being inside a silk-screened circle indicating the position of the PCB-mounted volume control used on 16 channel sets.

Now, switch to a channel where you know there's a strong signal present, and adjust L9 and L10, then L1, L2, L3, L4 and L5 on the receiver section for best reception, i.e. least noise, switching to weaker signals as required to get the absolute best sensitivity. A final 'peak' on a weak and noisy off-air signal, and that's it. Just readjust the squelch preset, RV1, for the level you want the squelch to raise at, and the job's done. You now have a ready-to-go 70cm rig, have fun!

Packet use

For 1200 baud packet, you'll find low-level receive audio present on pin 4 of the microphone connector, and you can inject your TX audio also at the mic connector, pin 1



being mic live and pin 2 being ground. If your TNC switches the PTT to 0V on TX, you'll need to add a simple one-transistor interface as shown. This is because the MX296 requires +10V on pin 3 for transmit, you'll find a steady +10V line present on pin 5.

For 9600 baud packet, you can take receive discriminator audio out from pin 9 of the MC3357 IC in the receiver section. On transmit, you can inject audio via a series resistor

of 100k to pin 6 of the 4558 op-amp IC5 (this pin is also connected to one side of RV6, the other side of RV6 connects to pin 7 of IC5).

More Information?

If you'd like a copy of the complete MX296 transceiver circuit diagram together with a component layout diagram of the set, send a stamped self-addressed envelope, enclosing the original corner flash from this page (photocopies will not be accepted) to: MX296 Circuit, HRT Editor, ASP, Argus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST.

Ready-programmed EPROMs

We've arranged with the HRT Reader's Services department to have ready-programmed EPROMs available for the MX296 at a modest £9.99 inc return UK p/p, cheques payable to ASP. They'll also accept orders over the phone with a credit card, you can call them on. 01442 66551. All EPROMs are pre-programmed with all 400 channels on 70cm from 430.000-439.975MHz, arranged into ten 1MHz sections of 40 channels each in a logical sequence (i.e. channel 6 is RB6, 14 is RB14 etc.) for use with either the set's 16 channel switch, a 40/80 channel switch if fitted, or your added BCD switches. They come with full connection information and channel lists.

Typical 70cm EPROM Codes		
Freq.	TX BCAD	RX BCAD
433.000	5807	0F07
433.025	5827	0F27
433.050	5847	0F47
433.075	5867	0F67
433.100	5887	0F87
433.125	58A7	0FA7
433.150	58C7	0FC7
433.175	58E7	0FE7
433.200	6807	1F07
433.225	6827	1F27
433.250	6847	1F47
433.275	6867	1F67
433.300	6887	1F87
433.325	68A7	1FA7
433.350	68C7	1FC7
433.375	68E7	1FE7
433.400	7807	2F07
433.425	7827	2F27
433.450	7847	2F47
433.475	7867	2F67
433.500	7887	2F87
433.525	78A7	2FA7
433.550	78C7	2FC7
433.575	78E7	2FE7

EPROM substitution for 82S129/185 PROM with 16ch switch

EPROM Function	EPROM Pinouts					PROM socket (18 pin) conn.
	2716	2732	2764	27128	27256	
A0	8	8	10	10	10	Pin 5
A1	7	7	9	9	9	Pin 6
A2	6	6	8	8	8	Pin 7
A3	5	5	7	7	7	Pin 4
A4	4	4	6	6	6	Pin 3
A5	3	3	5	5	5	Pin 2
A6	2	2	4	4	4	Pin 1
A7	1	1	3	3	3	To ext. sw
A8	23	23	25	25	25	To ext. sw
A9	22	22	24	24	24	0V
A10	19	19	21	21	21	0V
A11	—	21	23	23	23	0V
A12	—	—	2	2	2	0V
A13	—	—	—	26	26	0V
A14	—	—	—	—	27	0V
O0	9	9	11	11	11	Pin 14
O1	10	10	12	12	12	Pin 13
O2	11	11	13	13	13	Pin 12
O3	13	13	15	15	15	Pin 11
O4	14	14	16	16	16	o/c
O5	15	15	17	17	17	o/c
O6	16	16	18	18	18	o/c
O7	17	17	19	19	19	o/c
Gnd	12	12	14	14	14	0V
Vpp	21	20	1	1	1	5V
OE	20	20	22	22	22	0V
CE	18	18	20	20	20	0V
Vcc	24	24	28	28	28	Pin 18
PGM	—	—	27	27	—	5V



Suggested 70m chans for 16ch switch use

Chan	70cm ch (sw pos 1)	70cm ch (sw pos 2)	70cm ch (sw pos 3)
16(0)	RB0	Rev RB0	432.625
1	RB1	Rev RB1	432.650
2	RB2	Rev RB2	432.675
3	RB3	Rev RB3	433.625
4	RB4	Rev RB4	433.650
5	RB5	Rev RB5	433.675
6	RB6	Rev RB6	SU16
7	RB7	Rev RB7	SU17
8	RB8	Rev RB8	SU18
9	RB9	Rev RB9	SU19
10	RB10	Rev RB10	SU20
11	RB11	Rev RB11	SU21
12	RB12	Rev RB12	SU22
13	RB13	Rev RB13	SU23
14	RB14	Rev RB14	SU24
15	RB15	Rev RB15	433.700

HRT Reader Offer - EPROMs

Ready-programmed EPROMs are available for MX290 series ex-PMR transceiver conversions, for the MX294 (2m, published HRT Mar 94), MX295 (for conversion to 2m, planned for a forthcoming issue of HRT), and MX296 (70cm, published HRT Dec 94). The 2m EPROMs are programmed with all simplex, repeater, and reverse repeater channels, plus 144.500-144.8875MHz in 12.5kHz steps. The 70cm EPROMs are programmed with all channels between 430.000-439.975MHz in 25kHz steps, including repeater, reverse repeater, simplex and packet channels for use with 16 channel or BCD switches.

Each EPROM comes supplied with connection information and a channel list, the price includes UK p/p.

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Project

General Coverage HF Receiver

Raymond Haigh concludes with Part 2 of a receiver project and details the PCB construction and alignment

There are no particularly critical or hard-to-obtain components in this project. Almost any silicon PNP transistor will work in the TR1 position, and I found the BC177, BCY70, BC557 and BC558C all to be satisfactory. A number of dual-gate MOSFETS I likewise tested as regenerative detectors, including the 40673, 3SK51, BF981 and 3SK88. They all performed satisfactorily, with R11 adjusted to compensate for the spread in characteristics. The 40673 and 3SK51 have been superseded by the MFE201, which most suppliers claim to be a direct substitute. I didn't test this device, but I believe it should function well. The 3SK88 wasn't as lively as the other MOSFETS, and it displayed an increasing reluctance to oscillate in this circuit as the frequency of operation approached 30 MHz. It should, therefore, be regarded as a last-choice device as far as this receiver is concerned.

Almost any small-signal NPN transistors should be suitable for TR3 and TR4. A BC108 and BC109, and their plastic encapsulated substitutes the BC548 and BC549, I tested and found satisfactory. I employed miniature plastic film dielectric tuning capacitors in the prototype receiver to keep costs as low as possible. Suitable items are listed in the Maplin catalogue as AM tuner capacitors with 140 and 60pF gangs, but similar parts could be salvaged from discarded AM-only transistor radios. Maplin do, however, supply a small spindle attachment so that a control knob or spindle extender can be fitted in place of the cord drive drum.

These miniature film dielectric capacitors perform acceptably, but when the receiver is operating on the highest frequency range with the detector set to oscillate, they can be slightly noisy when rotated. They are also prone to shorting between the vanes. If salvaged components are to be used, connect

an ohmmeter between moving and fixed vanes and rotate the spindle slowly to check for shorting. Good quality air spaced capacitors are to be preferred, but if purchased new their cost may exceed that of all of the other components. A Jackson 365pF single gang type 'O' capacitor with a 470pF polystyrene capacitor connected in series would be suitable for band-set tuner, C3. A Jackson 15pF type C804A would be ideal for the bandspread control, C5, with the fixed vanes connected directly to C6 and not via fixed capacitor, C4.

One gang of a twin gang air spaced capacitor salvaged from an older valve or transistor radio can be used for C3. If a salvaged air-spaced unit is used, remove all the built-in trimmers, check the vanes are not shorting and that the component is clean and dry, and connect it into circuit via a 470pF fixed capacitor to reduce its swing to approximately 200pF.

The type of inexpensive earphones used with portable cassette players are suitable for this receiver, and the phone jack has been wired to connect both earpieces in series to give an impedance of around 60 ohms. Older, high impedance phones with a DC resistance much in excess of 1000 ohms will not work without a matching transformer.

and transistors are mounted on a printed circuit board as shown. Veropins inserted at the lead-out points aid off-board wiring, and the use of pins for the transistor leads makes it easier to check these devices by substitution. Variable capacitors C3 and C5 are mounted behind the front panel of the receiver, and C4 makes the connection between C5 and the printed circuit board. R21 is mounted on the phone jack and C20 connects the jack to the audio output socket.

Tuning coil

The required coil former is a 145mm length of plastic overflow pipe, available from most do-it-yourself stores. Drill holes 8mm in from each end and fit small solder tags. Clean and tin the end of a length of 24SWG enamelled copper wire, solder it to one of the tags and proceed to wind the coil. Ignore theappings at this stage, just wind on 98 turns and concentrate on keeping these tight and reasonably even. It's easy to lose count of the number of turns, if this happens, draw a sharpened matchstick slowly down the winding and count the clicks. When the correct number of turns have been wound, clean the wire end and solder it to the other tag.

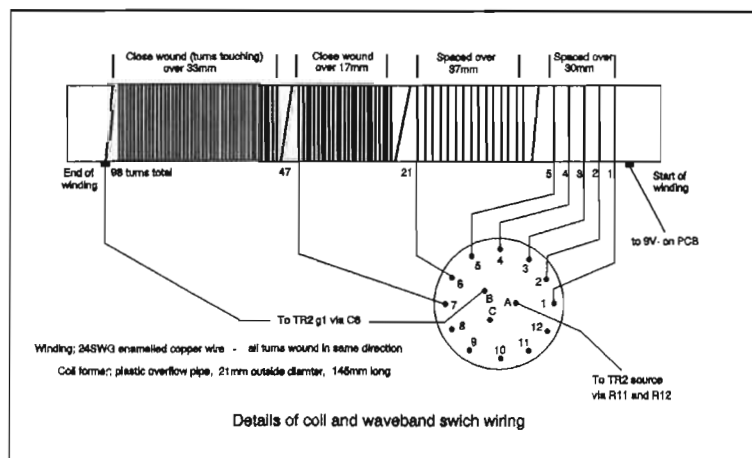
With both ends of the winding anchored, ease the turns into the arrangement shown. At the tapping points, insert the tip of a small screwdriver beneath the wire to lift it off the former (the former is sufficiently flexible to permit this). Use a sharp, pointed blade to scrape away the

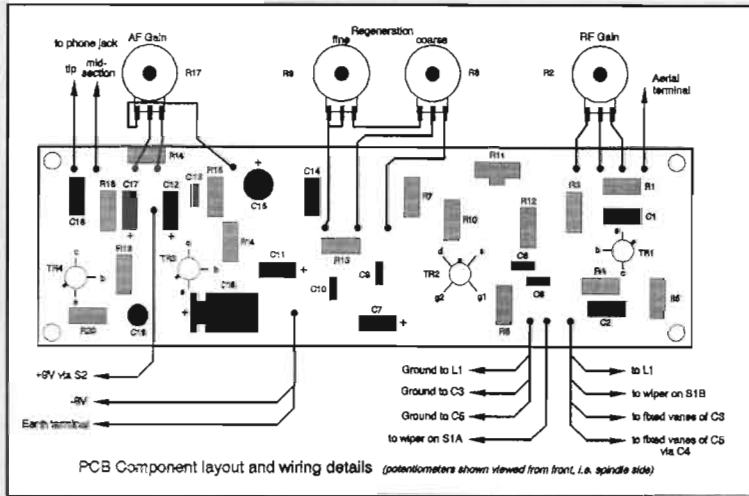
enamel, hook the end of the connecting wire around the tapping point and solder it in position. Make sure you have good solder connections to the coil or the receiver will not function.

A 50g reel will provide more than enough wire for the coil. If odd lengths of wire are being used, make sure that at least 7m are available before starting the winding operation.

Printed Circuit Board

With the exception of C4, C20 and R21, all the fixed resistors, capacitors





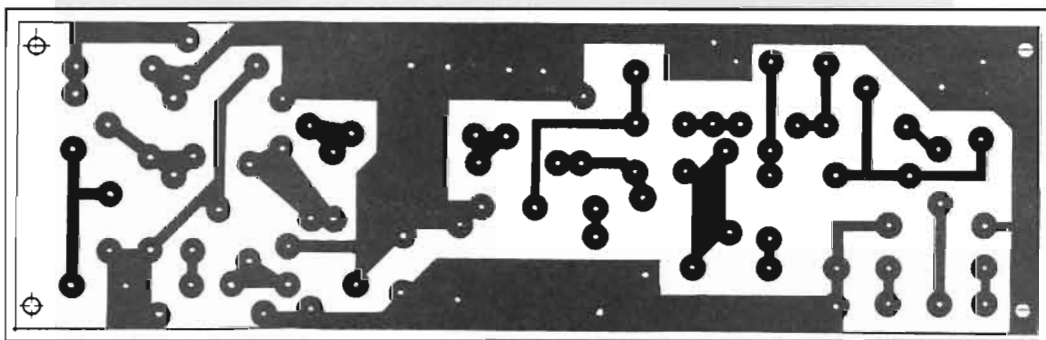
film variables connects with the moving vanes. Tags marked 'A' and 'O' connect with the fixed vanes of the 140pF and 60pF sections respectively. Wire both sections in parallel to form the 200pF band-set capacitor. Connect C4 to the 'O' tag to give an effective bandspread capacitance of 16pF.

Setting up and testing

Set the trimmers on the plastic film variable capacitors to minimum value, set R11 at mid-travel, then connect a pair of earphones, a few metres of wire to act as an aerial, and a fresh battery. Switch on and check the current consumption, which should be between 6 and 7 mA.

Set S1 to the lowest frequency (i.e., with the whole of L1 in circuit) and advance the regeneration control, R8, until a hiss is heard in the 'phones, then swing band-set capacitor, C3, to check that regeneration can be maintained around the dial. It will be necessary to adjust the setting of R8, and it may also

be necessary to turn down the RF gain control if strong signals are received (strong signals suppress regeneration). Repeat this procedure for each of the four bands, reducing



PCB, track side, shown full size

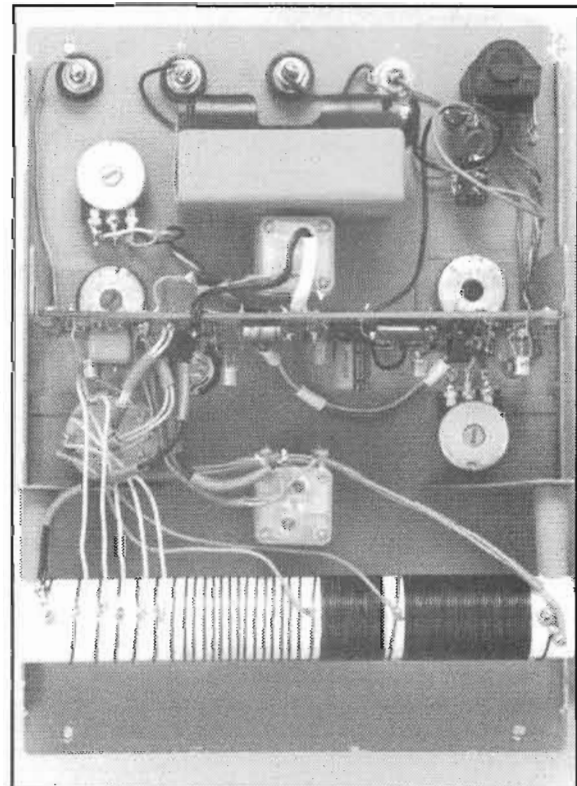
Assembly

If desired, the coil, tuning capacitors, potentiometers, 'phone jack and battery can be laid out on the bench and connected to the PCB so that the receiver can be tested before being permanently wired up. I assembled my prototype receiver behind the lid of a standard aluminium box which forms the case, the tuning coil and printed circuit board being mounted on aluminium brackets held in place by the switch and potentiometer spindle bushes. Before installing the PCB, check the orientation of transistors and polarised capacitors (electrolytics) and check for bridged tracks and poor joints - it is much easier to correct any faults before the board is bolted in position.

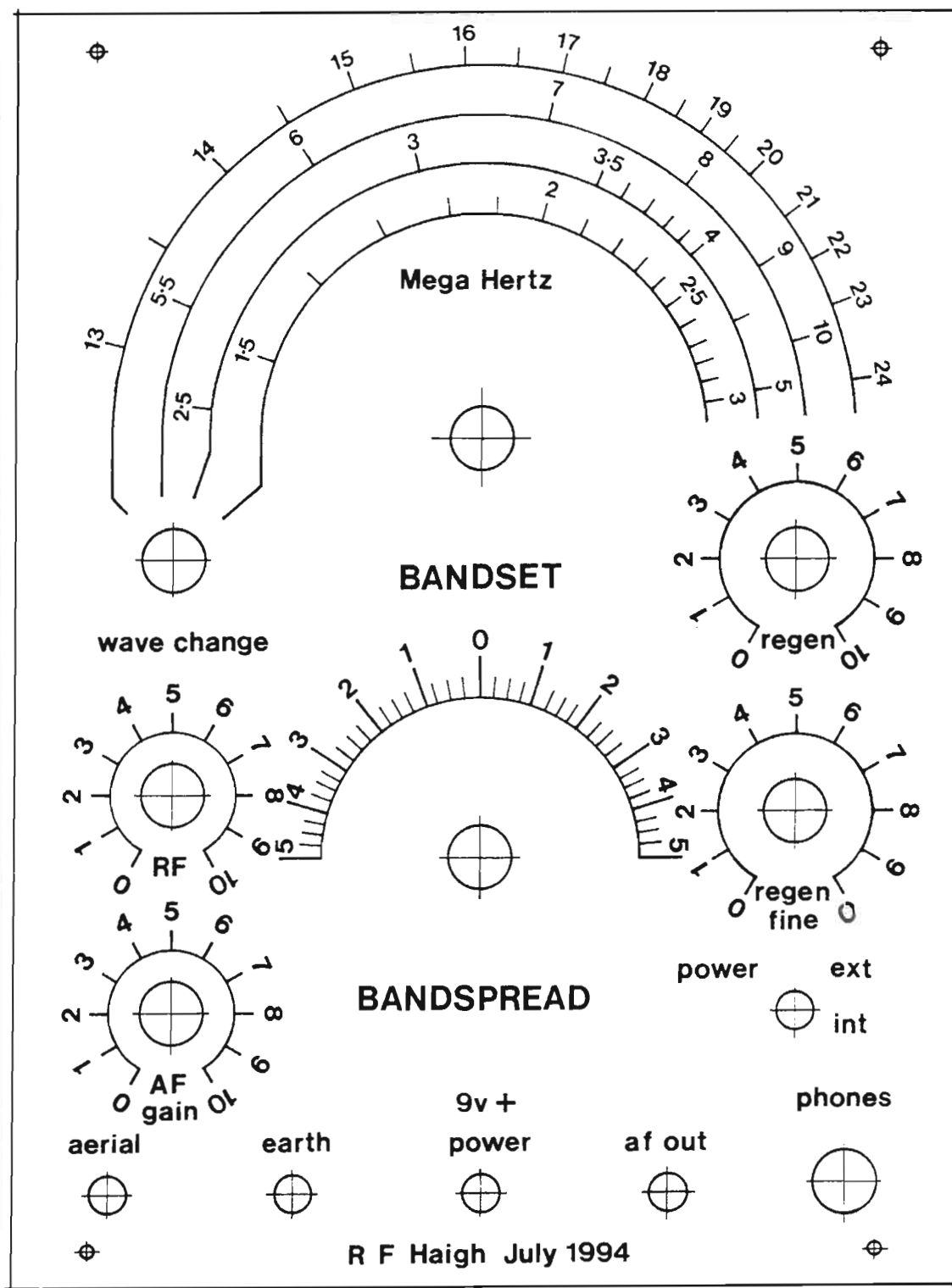
The miniature tuning capacitors are mounted on 'U' shaped brackets which are secured to the front panel by spindle bushes salvaged from old volume controls. Couplers and short lengths of spindle are fitted to extend the stubby capacitor spindle through the front panel. Tuning capacitors are fragile items which should be

handled carefully. In particular, ensure that the fixing screws which are driven into the front of the capacitor case are not too long or they will foul the vanes and ruin the component. Terminals and jack sockets are likewise fitted to the lid of the box, and a metal clip which retains the battery holder is secured beneath the bandspread capacitor bush. If the coil is wound as described, and the specified tuning capacitors fitted, the dial calibration should be a fairly accurate guide to the coverage of other receivers.

When the components have been mounted on the lid of the box, the wiring up can begin. Use reasonably heavy single-stranded hook-up wire or the frequency stability will be poor and the performance of the receiver erratic. The moving vanes of the tuning capacitors must be connected to the receiver earth line. The tag marked 'G' on the plastic



Internal layout



Front panel layout, full size

pre-set R11 if the set fails to oscillate when the regeneration control is advanced.

If a signal generator is available, check the coverage of the receiver. Coil tapings on my prototype were arranged to bring the 1.8, 3.5, 7 and 14 MHz amateur bands into the mid-swing region of the band-set control, and continuous coverage can only just be maintained by turning bandspread to zero or maximum capacitance. Constructors who would prefer to have continuous coverage

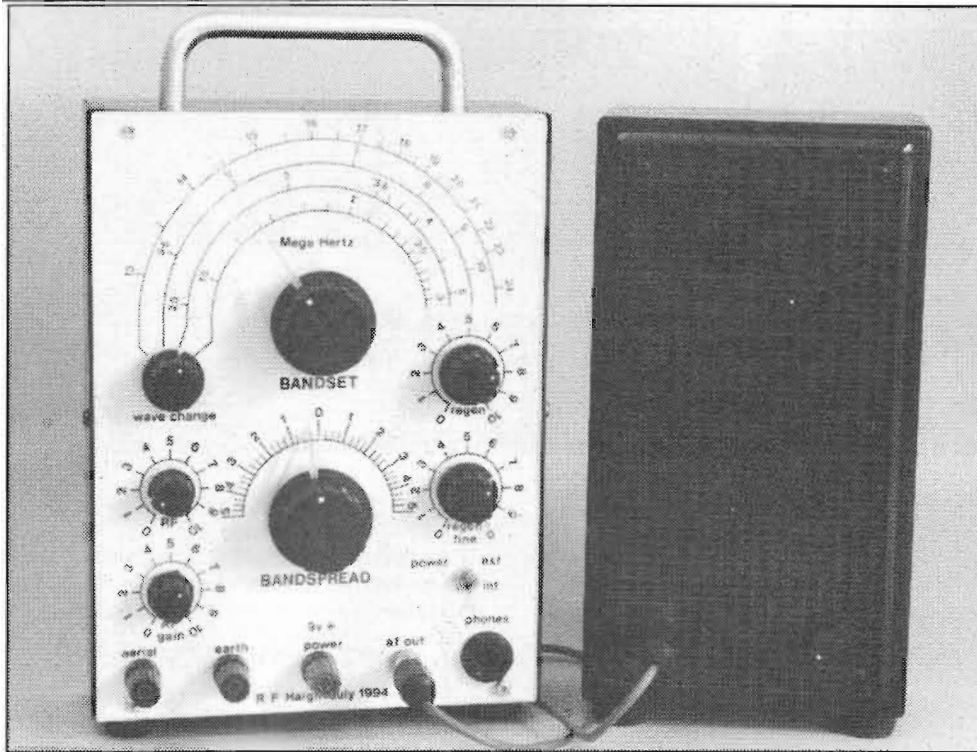
with the bandspread control held at mid-swing should adjust the tapping positions slightly. A calibrated dial greatly increases the usefulness of any receiver. If a signal generator or crystal calibrator isn't available, another general coverage receiver can be used for this purpose.

Operating the receiver

A degree of skill is required from the operator if this simple receiver is

to give of its best, but this will quickly be acquired with practice and the following notes may speed up the learning process.

For sensitivity and selectivity to be at maximum when receiving broadcast transmissions, the set must be kept as close as possible to oscillation. The regeneration control is smooth and completely free from backlash, and this condition is not difficult to maintain in practice, but the control *does* have to be adjusted as the band-set capacitor is swung across



The completed receiver, shown here with matching audio amplifier

the dial. Strong signals suppress regeneration, and the RF gain control should be turned well down if the receiver does not seem sufficiently selective. Indeed, in common with most communications receivers, best performance is usually obtained with the RF gain set as low as possible and the AF gain turned up to ensure audibility. Rotate the bandspread capacitor slowly when searching for weak signals, and use the fine

regeneration control to optimise performance when the desired station has been located.

Until they are processed, SSB signals sound like scrambled speech. When attempting to receive signals of this kind, the regeneration control must be advanced until the detector is oscillating. In this condition it will replace the carrier removed at the transmitter so that the signal can be made intelligible. Use the band-set

capacitor to tune the receiver to the centre of the amateur band, then search for transmissions with the bandspread control. Tuning is extremely critical, but adjusting the regeneration control shifts the frequency of oscillation of the detector a little and the signals can be clarified quite easily in practice. The vernier regeneration control can be used to change the pitch of a clarified signal.

If an SSB signal resists all attempts to clarify it, signal strength is too great and turning down the RF gain control will overcome the problem. The receiver is quite sensitive, and if a long (e.g. more than 20m) and high wire aerial is used, the RF gain control should be set almost to zero to avoid overload problems. A good earth connection may improve reception, especially at the lower frequencies.

An add-on audio amplifier and speaker project, suitable for this project as well as several other uses in the shack, is planned for next month's issue of HRT - Ed.

Queries relating to this receiver project should be addressed to the author c/o the HRT Editor at the HRT address, with an SAE enclosed if a reply is requested.



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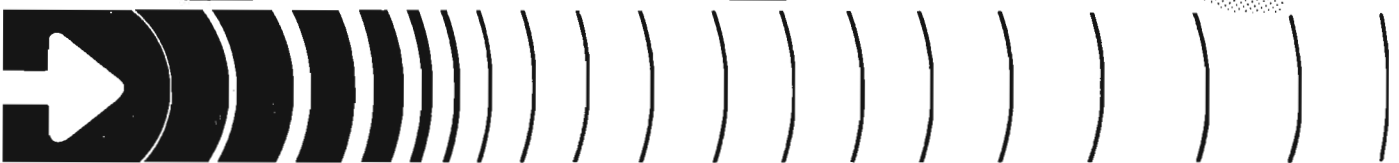
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VISA AND ACCESS WELCOME



QRP Corner

Dick Pascoe gets a tickle from a US aerial book, and tells of happy times at a summer QRP party



Han K8DD has a go on the paddle

News this month from the depths of Wales. Leighton Smart GW0LBI tells of a new Welsh QRP club. They are interested in promoting the low power aspect of the hobby and offer a free award to further this.

The "Worked all Wales" Award will be given to any amateur who has worked all eight Welsh counties. Log details signed and verified by another amateur complete with an SAE will gain the award.

Power levels must be under 5W output for CW/FM operators and under 10W PEP for SSB. A separate 'milliwatt' award is also available for operators who complete the above with a power output of less than 1W. This is one award where the VHF operator has an equal chance as the HF one.

Further details are available from Leighton Smart GW0LBI, 33 Nant Gwyn, Trelewi, CF46 6DB Wales. Please include an SAE with any request. How long until we have someone sponsor a "Worked all Scotland Award"?

Aerials II

A great book dropped through the door last week. Entitled "Aerials II" it comes from the publishers of the American *World Radio* magazine. No I didn't ask for it but I would recommend it to any serious aerial enthusiast. It dispenses many of the myths ingrained in the minds of many UK

amateurs and obviously US amateurs too.

Written by an oddly named couple Kurt N Sturba and Lil Paddle, these obvious pseudonyms are apparently designed to stop either of the authors being harassed at rallies, as they are often quite savage in their attacks on some statements made by well-known amateurs in the USA regarding aerials and associated equipment. The way their material is set out is often hilarious, always informative and I hate to say nearly always right. OK, always right (I think).

Kurt decided that the claims of some manufacturers about their aerials left something to be desired. The oft-quoted "dB" receives much stick as does other claims. One other he destroys is the oft quoted claim that feeder should be in multiples of half waves. Kurt insists that the feeder should at least be long enough to reach the shack and no longer.

He decided to try out a few ideas, which included loading up two shopping trolleys as a dipole. "Not great" he said, but he worked lots of stations, and as he says; "Loading a golf club can get you on 10m". (I wonder if I could use my 1 wood as the driven element and the 3 wood as a parasitic? ... think about it). The down pipe from his gutter provided another aerial.

This whole adventure with this book reminded me of a comment by the Rev George Dobbs G3RJV. "Why use a vertical aerial to spray RF weakly in all directions when you can use a beam and spray it less weakly in one direction!

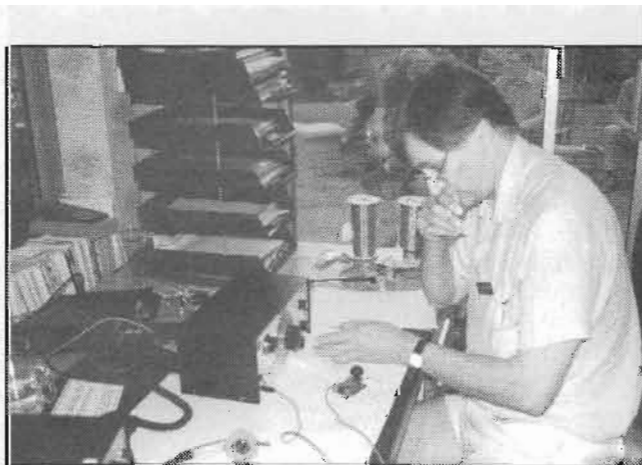
You will guess that I love this book, it is full of

surprises, good laughs but more importantly good information well written. It is available from: World Radio Inc, 2120 28th St Sacramento, CA 95818. USA at \$11 plus \$5 shipping to the UK. Say you read about it in HRT of course.

QRP summer party

Most QRP operators of long standing will know the callsign G4BUE. Chris has been an avid low power operator for many years, gaining many awards and certificates for his achievements. Each year he and his wife Pam host an annual summer party for the G-QRP club members in the south of England, and indeed further afield.

His wife Pam, helped by a few close friends, supplies a fabulous spread of good food for the visitors. The friendliness of this event is known throughout the amateur fraternity and it is always a point of interest to guess who will be there from overseas each year. Robert PA3BMK is a regular visitor, who usually stays for a few days. Other 'foreigners' this year included a couple from Germany and also some visitors from America. Hank W8DD was an old friend from Dayton, we even managed to renew a conversation from the last time we met. The photo shows Hank operating the



Victor G3JNB finds a JA

From My Notebook

Geoff Arnold G3GSR discusses the intricacies of polarities and the op-amp

In chats which I've had recently with many *HRT* readers at rallies around the country, I've been thanked for explaining in simple terms some aspects of radio which tend to get taken for granted by the 'old hands', but which mystify the beginner. I sympathise with this, for I can still recall when I was in that state (let's face it, I sometimes still am!).

In checking drawings of circuit diagrams as they are prepared for publication, and in actually assembling circuits, one of the essentials to watch at all times is whether the polarised components are drawn or inserted the right way round. It's more than a couple of years now since I talked about component polarity in *Notebook* (see *HRT*, June 1992). Looking back at that article, there were some points I didn't deal with, so I thought it might be a good idea to look at polarity once again.

Capacitors

I spoke then about the best way round to connect capacitors having a wound foil construction. Because one of the two layers will always finish up surrounding the other layer on the outside of the capacitor, by connecting the outer layer to the earthy side of the circuit, we can effectively put an earthed screen around the whole capacitor. The outer foil

connection is usually identified by a black band around that end of the capacitor. This isn't related to component polarity in the accepted sense of the term, more a case of component orientation.

Electrolytic capacitors on the other hand, including tantalum types, need to be connected with appropriate polarity if they are not to suffer early failure; perhaps even explode! Figure 1 shows a typical basic audio preamplifier circuit, based on a bipolar transistor, and incorporating several electrolytics. When used for smoothing or for decoupling, it's not difficult to work out which way round the electrolytics should go, because they will be connected directly across the DC supply rails (see supply decoupler C4) or else across a component in a series chain strung across those rails (C3, which is referred to as an emitter decoupler or an emitter resistor bypass). Don't forget that the component doesn't have to be a resistor. It can, for example, be a diode or a transistor. In an older circuit it can even be a valve, where a capacitor is used to decouple the screen grid, or perhaps the anode of a cathode follower.

Where the electrolytic capacitor is used for coupling - to pass an audio signal from one part of the circuit to the next whilst at the same time keeping them isolated from a DC point of view - it is not always so easy to tell which way round is the right way. Looking again at Fig. 1, consider C1, the input coupling capacitor.

Assuming a silicon transistor is being

used, it's fairly standard practice to arrange for the emitter in a common-emitter amplifier stage like this one to sit at around 1V above the 0V rail. With the usual nominal 0.6V across the forward-biased base-emitter junction, the base will therefore need to sit at around 1.6V. The resistors in the potential divider providing bias to the transistor base will have been chosen to provide that standing voltage at the tapping point, allowing for the base current drawn by the transistor, as well as the bleed current through the potential divider chain itself. What will this mean for capacitor C1?

Assuming that whatever is producing the input signal hasn't got a standing DC voltage on its output, the left-hand plate of C1 will be close to 0V, so C1 should have its positive side connected to the transistor base. This would be the case for an input coming from something like a gramophone pick-up, a dynamic microphone or a matching transformer.

Moving on now to look at C2, under normal operating conditions, the circuit will have been set up to put the collector of the transistor at somewhere around half the supply voltage - that way, when a signal comes, the collector can swing the maximum possible distance up and down before reaching the amplitude limits set by the positive and negative supply rails (clipping). Assuming a 9V, as shown, that means that the collector, and the left-hand plate of C2, will sit at about +4.5V. The input of the following circuit, usually another amplifier stage, will hopefully have no standing DC voltage on it (in other words, it will be sitting at 0V), so C2 needs to have its positive side towards the transistor collector and its

negative side towards the next stage.

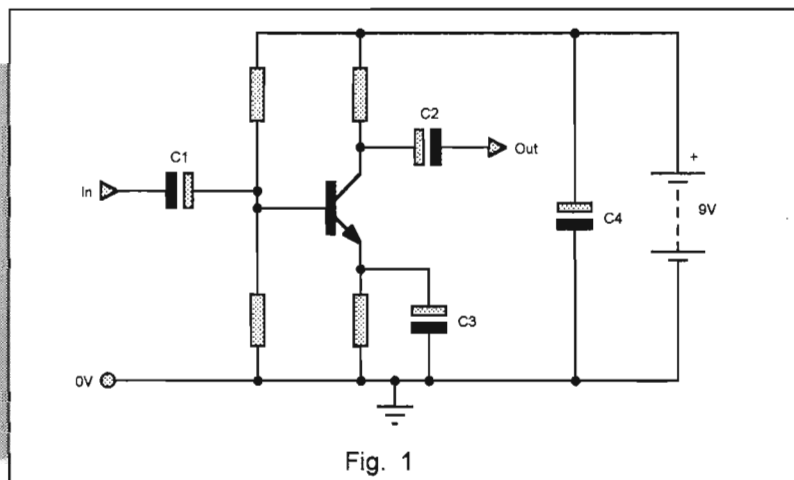


Fig. 1

Typical Basic Audio Preamplifier

Multi-stage

If two of these stages are cascaded - connected one after the other - to get more gain, the situation is somewhat different. Then, the output capacitor for the first stage will double up as the input capacitor of the second stage; it becomes an inter-stage coupler. The left-hand plate will sit at +4.5V and the right-hand plate at +1.6V, so it is still the positive side of the capacitor that needs to face towards the collector.

If the input to your preamplifier comes from a source with a standing DC potential on it, you might have to reverse the polarity of C1. A typical example, though nowadays a most unlikely one, would be a carbon microphone. These require a standing DC bias in order to function, about 6V for a double-button type, and you would need to take account of that when connecting the microphone to the preamp input. If you had +6V on the left-hand plate of C1 in Fig. 1, it would very definitely need to be put the opposite way round.

Dual-polarity supplies

In circuits using operational amplifier ICs (op-amps) as their 'gain blocks', rather than discrete transistors, and in high-power push-pull amplifiers, increased signal voltage handling capabilities are often obtained by using dual-polarity supplies. Here, two supply rails, typically +15V and -15V for operational amplifiers, or upwards of +24V and -24V for power amplifiers, are used. They are balanced either side of the 0V (earthy) rail, which is still used as the signal reference or return point in the circuit (see Fig. 2).

Providing two balanced

supply rails is an added complication and expense compared with a single rail. When using dual-rail op-amps in small-signal circuits, it is often possible to adopt a rather crafty dodge as a means of obtaining dual rails from a single supply. This is done by connecting a voltage divider consisting of two equal-value resistors across the supply, using the centre-tap of the divider as the 0V reference point. Both sides of the output from the power supply itself must, of course, be isolated from earth.

These dual-polarity supplies, whether generated as such originally or obtained by means of the voltage divider across a single supply, as just described, can present some head-scratching problems when trying to decide the correct polarity for coupling capacitors. In an op-amp circuit, either the inverting or non-inverting input will be tied to the 0V rail, sometimes directly, otherwise via a resistor. Feedback around the amplifier, from the output to the inverting input, will be used to set the voltage gain of the stage.

It is a characteristic of the op-amp with heavy overall negative feedback that the input impedance to the device itself is very low indeed; that is the impedance between the inverting and non-inverting inputs. Since one of those inputs is earthed (connected to 0V), the other input will be very close to earth as well, and in fact that input is called a *virtual earth*. In Fig. 2, the input impedance which the circuit presents to the outside world is therefore set solely by the value of resistor R1. (R1 plus zero = R1, OK?)

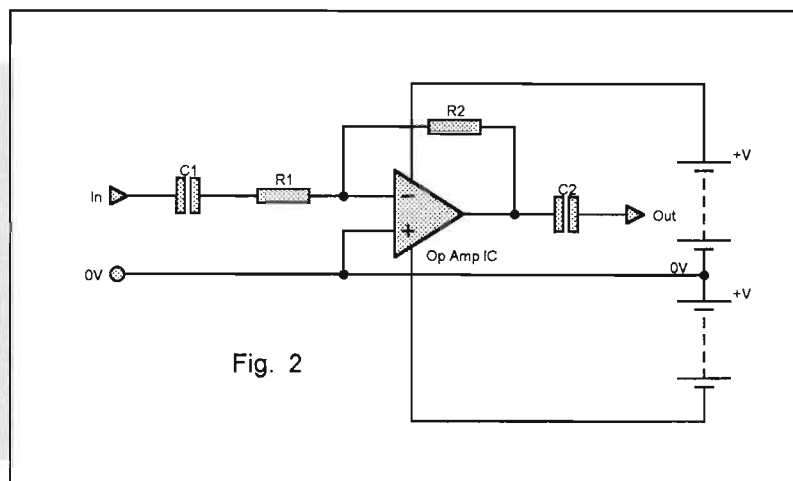
Whereas in the amplifier of Fig. 1, the base of the transistor sits almost 2V above earth, in Fig. 2 the signal input terminal of the op-amp is at 0V.

Similarly, the output terminal of the amplifier will sit very close to 0V, set by the action of the amplifier itself. The problem of deciding which way round to put the output coupling capacitor is often conveniently overcome by doing away with it altogether. Because the DC balance of the circuit is not usually perfect, it is often necessary to include a potentiometer adjustment to get rid of any small standing potential or offset. This control, and the associated terminals on the op-amp, are called *offset null*.

At the input to the amplifier, the coupling capacitor polarity conundrum can be got around by increasing the input impedance by using a fairly high value for R1 in Fig. 2. It will then be possible to use a smaller value of coupling capacitor, and therefore a non-polarised type, whilst still maintaining an adequate low-frequency response.

The op-amp, in either its original small-signal form, as developed for analogue computing applications, or in its developed form of a low-noise gain block for signal amplification, or even in its high-power audio amplifier form, has revolutionised much of modern radio and electronics. In the space available here, I have been able to provide only the merest glimpse at its characteristics. Perhaps it is something I shall return to some time.

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



VHF/UHF Message

Geoff Brown GJ4ICD asks "is contesting controversial?"

I've recently had several letters and conversations from amateurs regarding the spirit of contests on the VHF/UHF bands. It is a well-known fact that some VHF/UHF contesters use multiple aeri-als and multiple amplifiers, that means, four aeri-als and an amplifier in *one* direction, and four aeri-als and an amplifier in *another* direction.

It wouldn't be so bad if the power being used to both aerial systems did not exceed the licence regulations, but in some cases it does, so I am told! Comments received recently included the words, "We cannot compete with these monstrous stations running megawatts of power and lots of aeri-als". Another comment was "that the RSGB contest committee should now re-write and enforce the rules of allowing only one set of aeri-als and one amplifier on site". A good point to be made in my opinion, after all, you don't get these problems on HF! (*don't you?* - Tech Ed).

If all stations had an even footing, i.e., were only allowed to run the one aerial system and one amplifier at maximum legal (26dBW), then, many people feel sure that there would be more entrants and more spirit/. What do you think?

Band conditions

Sporadic 'E' conditions were reported on 50MHz on July 28/29th. ES5WE/0 was widely reported on his mini-expedition to KO07, which was a new square for many. Later on the 29th I had a quick word with Dave OZ3SDL, who advised me that when he was in Cyprus during July no contacts were made on 70MHz. OZ3SDL/P was worked a few days later in JO74 on six, another new square for many. Eight hours of 'ES' were reported during the 31st July.

August 2nd brought a small 50MHz

opening in the evening to SM and LA. 50MHz was again open on the 7th to Italy and Spain. On the 23rd, 'ES' conditions on 50MHz brought a new one on the band, YL3AG (KO26) who was worked by many stations in the north of England. Brian, G3KLL in Lanc's, reported a short strong opening to CT1WW on the 24th, he noted the beacon CT0WW on 50.030MHz at S9++ but no other stations were reported. Brian's station consists of an FT650 and 5 element yagi. It is interesting to note that stations in the north seem to have more 'ES' later in the year compared with stations in the south, as, nothing of the recent openings were heard down here in GJ or the south coast.

Snippets

Kevin, G4FNI wrote for his free copy of *Fastlog* and included the

comments "I wonder if you would be able to include more QSL routes and addresses?". Well the answer is yes Kevin, as you can see, thanks to the UKSMG.

Lawrence GJ3RAX, is currently working on ideas for the 70MHz transeiver, and by the time you read this he may have something running!

A new VHF award is offered from Estonia, this good-looking award will be a nice addition to your collection. The VHF Award starts at 6m and is available to those who meet the following criteria; for stations more than 1000km from Estonia you have to work two different ES5 stations, for stations less than 1000km away, work four different stations. Contacts are valid since Estonia gained access to 6m and the following stickers are available (without additional cost): *All QSOs on CW, All QSOs on SSB, All QSOs via Aurora.*

Tartu district is part of the ES5-call area. Look for the following stations known to be active on six; ES5WE, ES5MC, ES5DE, ES5QA, ES5RY, and others. Applicants should send a copy of their log and \$5 or 10 IRCs to ES5RY (Award Manager): T. Soomets, P. O. Box 177, Tartu, 202400 Estonia. Tom was also the QSL manager for the mini-expedition of ES5WE/0.

Here's a date for your diary, the Annual VHF Convention at Sandown Park, Surrey takes place next year on Sunday 19th February.

John, G4SWX reports that he is just 18 countries away from his EME DXCC, and looks to be the first UK station to do it.

Bill G6XM reported that he had a 3cm SSB contact with Martyn GU3UKV/P (Guernsey) on the 28th August, the 28th

was also one of the legs of the cumulative 3cm contests. Tim

QSL Routes

CU1CB - Via KN6BT. Victor Garcia, PO Box 492, Salida, CA 95368, USA.
EU1AA - Via PA3BFM. Frank Van Dijk, Middellaan 24, 3721 PH, Bilthoven, Netherlands.
EW1AA - *UPDATE* Now via PA3BFM. (See above).
EUSR - Only via Bureau.
EW7IM - Via UC2SMM. A. Scherbo, Cialkovskogo 6-22, 212000 Mogilev, Belarus, C.I.S.
FP5EK - Via K1RH. Ralph Hirsch, 172 Newton Rd, Woodbridge, CT 06525, USA.
F5EM7/TK (July '94) - S. Boutet, Rue Du Puy Sally, St Maurice, F-63270, France.
HB0/HB9QQ - Via HB9QQ. Pierre Pasteur, Sunnhaldenstr 28A, CH-8600 Duebendorf, Switzerland.
IA5F - Via IKSRLP. C. Dionori, Via del Maestrale 24, I-58046 Marina di Grosseto, Italy.
JY4MB - Mohammad S Balbisi, Box 3236, Amman, Jordan.
IX7DFA - Via LA7DFA. Per-Einar Dahlen, 8099 Jan Mayen, Norway (94/95only).
K0SN/CY9 - Via K0SN. T. Hellem, W 6321 Two Mile Rd, Porterfield, WI 54159, USA.
T97V - Via 9A bureau.
RA6YY - Alex Chalamow, Box 137, 352700 Maicop, Russia.
UJ8JJ - Via UB4JDM. Oleg Vitko, Box 111, 334270, Alushta, Ukraine.
UX0FF - Via OESEIN. Max Wagner, Aubrunnenweg 1, A-4020 Linz, Austria.
UX3FW - See UX0FF.
UY5ZZ - Via SP5CCC. Tom Ciepiewski, PO Box 19, Warszawa 131, 03-996, Poland.
US7CQ - Via UB4CQ. Yuri Kazakov, POB 334, 257000 Cherkassy, Ukraine.
9K2ZR - Via K8EFS. Merlin D Anderson, 4300 S Cochran, Charlotte, MI 48813, USA.
9K2USA - See 9K2ZR.
WB4NFS/V99 - Via WB4NFS. John O'Mara, 14378 Shtland Ct, Woodbridge, VA 22193, USA.
5B4JE - A. Kaponides, PO Box 1723, Limassol, Cyprus.

QSL Routes

G3KEU and partner G3FIX travelled to Walbury Hill, near Newbury, and had 27 SSB microwave contacts!

Cape Verde, 1995

In the September issue of HRT you may recall that I had previously sent a letter to J'lio D44BC asking him for help for a 50MHz expedition in 1995. Well here's the good news; the VHF 50MHz DXpedition is *on* (thanks to J'lio!) for the first two weeks of

'Roger, Roger'. The DXpedition will be a private one as the contacts involved are high. More details on the team will follow later, but, I will be 'going in' with the equipment and will be the last one 'out' with the equipment.

The Cape Verde Islands (a group of 15 islands/islets) are located around 600km off the West African coast between 16/17 degrees north and 23/25 degrees west, and about 1650km south-west of the Canary Islands. They are about 4425km from London, and around 5000km

operators in the USA) the path is 5200km. All these distances were exceeded this year via E's on 50MHz.

Provisional station information is as follows; the grid square is HK76MT (Mindelo) and for 50MHz the equipment will consist of an Icom 736 100W rig and a backup 50MHz rig (Kenwood TS60) which will be left with J'lio D44BC (who has been helping me with the trip) for future 50MHz operation, the aerial will be a 5 element. HF operation will be with a Kenwood TS940 and Alpha 76 1kW amplifier and lots of beams. No 144MHz equipment will be taken due to the high costs of excess baggage.

At present I'm trying to organise the flights. This is the *real* headache, as the route is Heathrow to Lisbon, then onto Cape Verde's international airport on Sal, and finally onto St. Vicente (one of the fifteen islands) where the station will be set up. For me it involves four flights from Jersey with a couple of stopovers at each end! More news later, but it has to be worth a try!



The Cape Verde Islands, off the west coast of Africa

June in 1995. The final dates will be announced later, but should be around the 4th to the 18th June. Negotiations have been taking place with Cape Verde (D4) for a number of months now, and I'm pleased to say that all is now

from central Germany. Given these facts, contacts on 50MHz with Europe look possible, especially the enhanced sea duct path conditions that should exist adding to the single/double hop 'ES'.

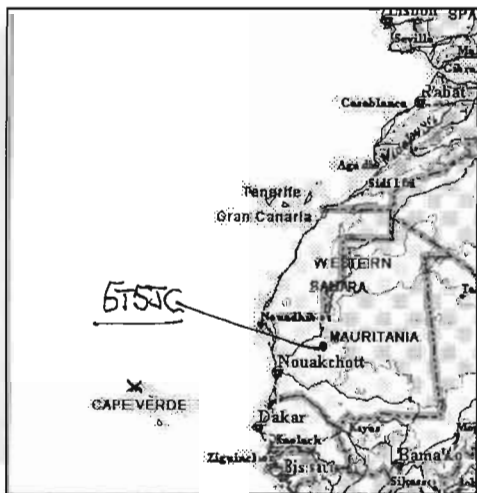
For the past three years, running contacts via multi 'ES' or chordal 'ES' have been made with 9K2USA, 9K2ZR and 9K2MU (S9+) at distances from the UK and Europe of around 4600 to 5200km. The path to the Caribbean and stateside also looks interesting. For instance, in June this year Eric 5T5JC in Mauritania worked over 100 US stations during daylight hours, at distances of up to 7000km, and JY7SIX made a 9800km QSO into the USA, and other QSOs up to 5000km. From Cape Verde to FM5 (Martinique) the distance is 3860km, to FY7 it is 3280km, to grid square FN42 (highly populated with 50MHz

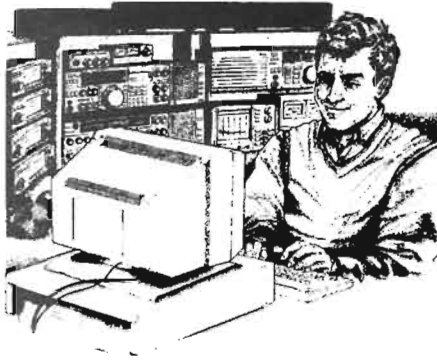
Perseids meteor shower results

Alan, GJ4ZUK reported spectacular visual sights on the evening of the 12th August, commenting that trails were seen every few seconds. Unfortunately I could not devote any time to radio during the shower this year due to work commitments, however several stations on the VHF net (14.345MHz) reported fabulous reflections on 144MHz. By the way, for any newcomer to the VHF bands who has access to an HF receiver, take a listen on the VHF net frequency (14.345MHz +/-QRM) during the weekends and just listen to the action going on.

Neil G0JHC (Lanc's) reported making around twenty QSOs on 50MHz, including the OY expedition.

Another month gone and back to the doldrums of winter, maybe it's time to get down to some home construction. Thanks again to the UKSMG and others who sent in information. News and views, photo's are all welcome to: Geoff Brown, GJ4ICD, TV Shop, Belmont Rd., St. Helier, Jersey. C.I. or phone/fax 0534 77067.





Packet Radio

Roundup

Chris Lorek G4HCL finds packet goodies galore at the BARTG rally

This year's BARTG Rally at Sandown Park was as popular as ever, with stands-a-plenty displaying all manner of packet and computer goodies. I left with a completely empty wallet - it must have been good! Shareware was very much in evidence with several stands offering all manner of software, the emphasis very much being on CD-ROM titles. The PDSL were busy taking orders for their 'Libris Britannia 4' CD collection of scientific and technical programs to be released soon, and Venus Electronics sold out of their low-cost HamComm interfaces within a couple of hours, having to send a van out for more! This was, once again, a superb rally for amateur radio data enthusiasts, see you there next year?

PaKet6.1

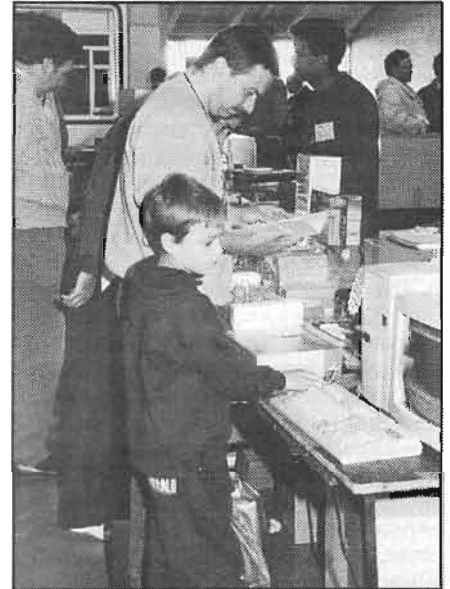
The response to the HRT 'software copy' offer for the PaKet 6 shareware software went down very well, and no doubt there are plenty of happy 'Packet Radio Roundup' readers using it successfully. There have, however, been reported problems with its use on early 'XT' machines with non-standard keyboards. The software author, Tony Lonsdale, has now brought out an update to hopefully overcome this, paKet V6.1. Modem users can download a copy from the Packet BBS on 0181 547 1479 and for

those on Internet via FUNET, the filename is PAKET61.ZIP. As you're reading this, all the HRT disks have been upgraded with the latest version, so you'll get v6.1 if you're now taking advantage of this. You can alternatively get a free copy from the UK distributor Jim Mahoney G6FCL, 89 Tyefields, Pitsea, Basildon, Essex, SS13 1JA, by sending him a stamped return mailer plus three *unformatted* 360k disks, or two formatted 720k disks, or one formatted 1.2Mb disk, or one formatted 1.44MB disk, for the software. Jim asks that you note the difference in formatting requirements!

80m PacTOR users

If you're on 80m with PacTOR, and have been trying to get into the DK0MHZ PacTOR BBS which puts such a good signal into virtually all of Europe, then you may have noted a few QRM problems from a commercial station on the same frequency. To overcome this, the SysOp Werner DJ2HZ has now altered the 80m frequency slightly, it now operates on 3.5870MHz (USB - 1.4kHz, LSB +1.2kHz) rather than the old frequency of 3.5830MHz.

It operates on 80m during the hours 0000-0800UTC and 1600-2400UTC, shifting to 7.038MHz between 0800-16.00UTC. More distant readers will



'Catch them young' on packet radio!

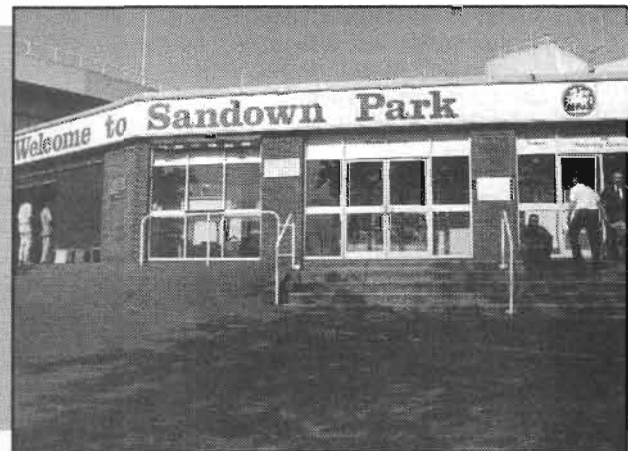
also be able to find it 24 hours a day on 14.0745MHz. Werner adds that a Packet to PacTOR and AMTOR store-and-forward system is under preparation for the mailbox.

HF Packet

Staying on the subject of HF, Peter GOKLR @ GB7DAD.#23.GBR.EU asks why he's having little success on his



The BARTG Rally at Sandown Park





Packet offerings galore to be found at the BARTG Rally

20m packet system, running a PK88 with his 100W FT-757 and G5RV. He can hear plenty of stations, but has a lot of problems in getting 'connected'. My own experience of HF packet has been virtually the same, and it was only when I added a tower-mounted beam and linear amplifier to get in with the 'big guns' that I started having reliable results. I've found packet is often rather unsatisfactory on HF unless you have a good path to the other station, and a reasonably clear frequency at both ends to overcome the 'hidden terminal' effect. On a frequency where your setup is receiving madly, it's likely that others will be too, and a weaker signal 'joining in' often gets little chance. Which is why I went over to PacTOR for one-to-one and BBS contacts on HF! However, if you are having success on HF, listen out around 14.103MHz, and if you hear G0KLR then try a connect, I'm sure Peter would appreciate it!

2400 baud

A message from Tony G0IAT @ GB7HSN says that "Following your article in the March edition of HRT on the 2m bandplan, listing the 144.525 to 144.675 recommended packet frequencies, I have been monitoring the 144.525 frequency for 2400 baud packet. I have not heard any packet on this frequency, only voice. I have also not heard 2400 baud on the band at all. Does no-one use this

frequency."

Tony lives in SE London, quite a busy location RF-wise. Around my area (Southampton), 144.525MHz is quite heavily used for packet, in fact all the 525-675 packet channels are in use! Some areas of course still have 'nets' on these frequencies, and the idea is that packet users should liaise with existing users before 'storming in' and taking over the frequencies! This could well have happened, with some regions being voluntarily 'packet free' on, say, one or two of the earlier 'unused' channels. An established club net, with stations using crystalised ex-PMR rigs for example (maybe a 'club project') could arguably have a 'right' to at least use the frequency some of the time. I know of at least one area where packet inter-BBS traffic has been voluntarily restricted to the early hours of the moment for this reason, as we must all live with one another in our shared hobby!

TPK solution from Maxpak

Joe G3VYA has been in touch to say that the Midlands-based Maxpak group can supply various software drivers suitable for the MAX-01 modem recently featured in HRT. Graphic Packet v1.52, MUBAY v1.01, Super Packet v6.11 and Baycom v1.50a are all

available. Following recent bulletins from packet users having problems with TPK, Maxpak can supply TPK v1.81 for Baycom on a 3.5in HD disk, the program being completely self-loading. All you need do is type *INSTALL* and enter your callsign and your local BBS call when requested. Each disk costs just £1.50 plus a stamped self-addressed return mailer. Further details, and orders to; Richard Nichol G1NZZ, 37 Thickenall Drive, Stourbridge, West Midlands DY9 0YH, Tel. 0973 262287 19.00-22.00 Mon-Fri or 10.00-22.00 weekends.

In the classroom

You know how kids love computers, don't you?. Well, if you'd like to make some 6th grade US schoolchildren happy at the South Avondale School in Cincinnati, then drop a message to WQ8Q @ K8SCH.#CIN.OH.USA.NA. They're up and running each day from their club station, and say they'll guarantee to answer your message. These inner-city school kids would I'm sure get a thrill out of chatting worldwide, Rick WQ8Q mans the station, his wife Pat is the classroom teacher. Nearer to home, remember that if you're involved in teaching, STELAR is the amateur radio organisation to contact, a message to Richard G3XWH @ GB7WRG will get you full details. My local school's packet station, GX7SOU @ GB7XJZ.#44.GBR.EU is certainly active, ably manned by CDT teacher Nigel G7POC. Why not drop the kids there a message as well - some are already Novice licensees.

CTRL-Z, end of message

My thoughts last month regarding 9600 baud advantages seem to have been acted on by at least someone - as my local BBS has just gone 9600 baud on its 70cm user port. I now seem to be downloading messages and bulletins so fast my problem is trying to read them all! Until next month, it's 73 from Chris G4HCL @ GB7XJZ.#44.GBR.EU, or post c/o the HRT Editor.

Satellite Rendezvous

Richard Limebear G3RWL of AMSAT-UK with details of the new UNAMSAT-1 satellite on 2m and 70cm

Webersat (WO-18) is now broadcasting new pictures and light spectrometer data weekly. Software for the extraction, decoding, and display of spectrometer data, written by KB7KCL, is available by request on AO-16/LO-19, direct from Weber State University, or via Amsat-UK. Monday etc, continues to be the day for the broadcast of the most recent spectrum, along with the week's WOD.

WeberWare 1.3, or a similar program is required for picture extraction, decoding, and display. This is the current software version, and is also available from Weber State University, AMSAT-NA, or AMSAT-UK.

Unamsat-1

UNAMSAT-1, which was scheduled for launch in September, will have a BBS similar to AO-16, LO-19, and IO-26; in addition it will carry a scientific payload to detect the velocity and direction of micro-meteorites.

UNAMSAT-1 is based completely on the standard microsats. It looks identical to AO-16 but the TSFR module is occupied by an experiment to detect echoes from meteorites by sending pulses of controlled duration (from 1 to 16 ms) with a pulse repetition rate also controlled (from 1 to 16 sec between pulses) at 40.997MHz, and by receiving the echo in the satellite. The pulse transmitter will run 70W RMS, this signal will be very strong and should be received very easily.

By analysing the echo and its doppler shift it is possible to determine the velocity of the meteor and this should tell if it came from inside the solar system or from the outside. This is important to assess the exchange of matter with the space outside the solar system. The rest of the satellite supports a BBS just like Pacsat, and the meteor observation files will be available from it, along with the normal mail functions.

They expect to distribute software to read the data of the meteor experiment very soon.

BBS operation will be identical to that of AO-16 but there will be a few files per day like Mmddxx.EXP. These are observed meteors; mm is the month, dd the day and xx is a 3 digit serial number (if needed).

The nominal orbit is circular, about 700km in altitude and 72 degrees of inclination. There are no pre-launch keplerians available because of the unknown launch time.

Weather satellites

Users of JVFX (last month's HRT software offer - Ed) may be interested in the UK Remote Imaging Group, who represent the Amateur International Remote Sensing Community with over 1788 members world-wide. The Group publishes a quarterly Journal containing news, views and construction ideas in hardware and software.

If you would like to know more, send an SAE for their free information leaflet to G3CQL: The Membership Secretary RIG, P.O. Box 142, Rickmansworth, Herts, WD3 4RQ.

Moonbounce from your station

The Toronto VHF Society, VE3ONT, will participate in this year's ARRL EME Contest using the Institute for Space and Terrestrial Science's 46m dish (located at grid square FN05xw). On Nov 26th, they'll be listening 144.100-144.110MHz between 0538 and 16.45UTC, similarly on Nov 27th between 0646 and 1713utc, always transmitting on 144.100MHz both days

The following operating hints will improve your chance of making a QSO: As in 1993, VE3ONT will work 'split' frequency. Don't call on VE3ONT's TX frequency, pick a random frequency in the listening range. VE3ONT will use circular polarisation on all bands. You may use linear or circular polarisation to make contact. If circular, use RHCP on TX and RX on 2m.

Low power and OSCAR class stations are encouraged to make an EME contact with VE3ONT. 100W delivered to a single long yagi should be sufficient on 2m.

QSLs with an SAE should be directed to Dennis Mungham VE3ASO, RR 3, Mountain, Ontario, Canada, K0E1S0. Reception reports are also welcome. For further information, contact Peter Shilton VE3VD, (905) 774-8766.

Keplers

Due to publishing timescale limitations, a copy of the latest keplers is now available for an SAE to me c/o the HRT Editor, or by modem or packet (HF/VHF) from me if anyone wants it; my packet mailbox is GB7HSN. When asking for keplers please say which satellites; all means about 150 satellites. ("all amateur sats" is adequate if that's what you want); requests on packet will get 2-line elements unless Amsat format is specified.

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.

UNAMSAT-1 operating frequencies:

RX;	RX A	145.922 MHz
	RX B	145.992 MHz
	RX C	145.962 MHz
	RX D	145.872 MHz
TX;	TX1	437.178 MHz
	TX2	437.138 MHz
		(secondary TX)

Note: RX will receive AFSK 1200 Baud manchester coded. TX will transmit 1200 Baud BPSK or raised cosine (compatible with AO-16, 19, 20, 26)

WxSat Polar Orbiters - Current status

Satellite	Status	Frequency
NOAA 9	OFF	137.62MHz
NOAA 10	ON	137.50MHz
NOAA 11	ON	137.62MHz
NOAA 12	ON	137.50MHz
METEOR 2-21	ON	137.40MHz (might be OFF)
METEOR 3-3	OFF	137.30MHz
METEOR 3-4	OFF	137.30MHz
METEOR 3-5	ON	137.850MHz
METEOR 3-6	OFF	137.30MHz

NOAA-9 is off due to VHF-conflict with NOAA-11.

Geostationary WxSats - Current Status

Meteosat 4	1691/94.5MHz	1W	Operational in standby
Meteosat 5	1691/94.5MHz	0	Operational (UK, Europe, Africa)
Meteosat 6	1691/94.5MHz	10W	Operational (Test transmissions only)