

HRIT

**Incorporating
SCANNERS**

HAM RADIO TODAY

FEBRUARY 1994 £1.70

**ALINCO
PANORAMIC
DISPLAY 2m
HANDHELD
REVIEWED**

**Win a VHF
transceiver in
our free
competition**

**Sort out your SWR
with the AEA 'HF
Analyst'**



**Icom PMR rigs
to get you on 4m
and 70cm FM**

BEST VALUE
Argus
SPECIALIST
PUBLICATION



NOVICE • PACKET • REVIEWS • PROJECTS • SATELLITES

HAM RADIO TODAY

VOLUME 12 NO.2 FEB 1994

REGULAR COLUMNS

FROM MY NOTEBOOK	38
Geoff Arnold G3GSR concludes his series on 'Hollow-State' techniques	
QRP CORNER	40
Dick Pascoe G0BPS reports on the 1993 QRP Convention in Rochdale	
VHF/UHF MESSAGE	42
Geoff Brown GJ4ICD says "Things have definitely been going downhill now"	
PACKET RADIO ROUNDUP	44
G4HCL looks at the new G0BSX 2400 baud modem, a new firmware upgrade, and a few 'wormholes'	
HF HAPPENINGS	46
Don Field G3XTT reveals a few surprises shown by aerials on the HF bands	
SATELLITE RENDEZVOUS	48
Richard Limebear G3RWL with this month's AMSAT-UK news including the Spot launch	
FREE READERS ADS	53
Helplines, For Sale, Exchange and Wanted, published free	

REVIEWS

ICOM PMR RADIOS FOR 4M AND 70CM	14
G4HCL examines a couple of high-performance offerings at amateur market prices	
ALINCO DJ-G1 REVIEW	20
Chris Lorek looks around on 2m with Alinco's panoramic display portable	
AEA HF ANALYST REVIEW	27
G4HCL checks his VSWR, graphically	

FEATURES

FREE COMPETITION	4
Win a free Icom transceiver for either 4m or 70cm, we've one of each to give away!	
SCANNERS INTERNATIONAL	29
Scanner database software, improving your scanner with a filter modification, how to get a free listening guide, and much more!	
PROBLEM PAGE	35
Our monthly answer to your questions and problems in amateur radio!	
THE METREWAVE YEAR	36
Jack Hum G5UM takes his customary retrospective look over the bands above 50MHz	

SUBSCRIPTION & BACK ISSUES HOTLINE
0737 768611

Right; AEA HF Analyst Reviewed

Left; Alinco DJ-G1 Panoramic display Portable reviewed

All reasonable care is taken in the preparation of the magazine contents, but the publishers, nor the Editor, cannot be held legally responsible for errors in the contents of this magazine, or for any loss however, arising from such errors, including loss resulting from the negligence of our staff. Reliance is placed upon the contents of this magazine at readers' own risk.

PROJECT

LONG, MEDIUM AND SHORT WAVE SUPERHET RECEIVER (Part 3)	24
Raymond Haigh concludes his AM/SSB/CW receiver project with alignment details and operating hints	

NEWS AND VIEWS

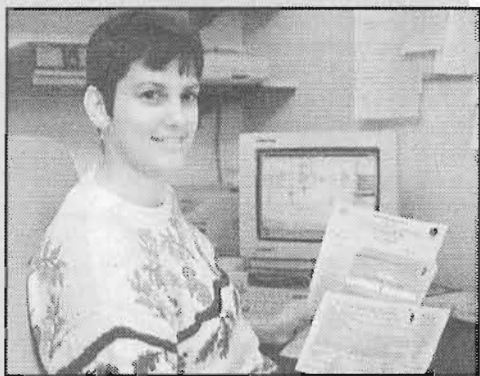
CQ de G8IYA EDITORIAL	5
Are you put off by the high cost of taking the RAE?	
LETTERS	6
HRT readers have their say	
RADIO TODAY	8
Leicester show report, special event stations, and more	
CLUB NEWS	50
Dynamic go-ahead clubs and voluntarily-run RAE course contact details. Is your club listed? If not, why not!	
NATIONAL SOCIETIES AND ORGANISATIONS	52
Contact details for the RSGB, Radiocommunications Agency, SSL, ISWL, and many more national organisations	
HRT SUBSCRIPTION OFFER	33
Make sure you get your HRT each month right through your letter box	
CLASSIFIED ADVERTISEMENTS	56
Your local dealers, component and kit suppliers, and RAE courses	
ADVERTISERS INDEX	58



CQ de G8IYA

Editorial

Is there an alternative to the high cost of taking the RAE?



Happy New Year! On looking back over the last year, happy and sad things have happened in the field of amateur radio. The 'old moans' still go on of course, some might never end. Hopefully better times are ahead. Maybe in 1994, SSL (Subscription Services Ltd.), who handle the administration of issuing our amateur licences, might have an 'easier time' after their earlier teething troubles. Mind you, I have here a photocopy of a licence Validation Document recently issued to a Class A amateur in Barnsley. Everything looked OK, his amateur Class A callsign and his address were correctly entered, all the CEPT countries he could operate in were given at the bottom. His name, callsign, and address were identical to his entry in the latest callbook. The only problem was that it said 'Citizens' Band Licence' at the top of his validation document! Ah well...(thanks for sending me the photocopy, Ian).

Another Voice

Throughout the past year, I've been pleased that HRT has again been effectively used as a 'voice' for amateurs, and, hopefully, has even managed to get a few things changed for the better.

Since the disclosure in this magazine of how profit-making organisations around the UK were making money out of would-be amateurs (or suppressing our numbers in the first place) by refusing to accept external candidates for the RAE sessions they ran, I've been

very pleased to hear from a number of radio clubs in the UK who've now also set themselves up as exam centres. You'll find details of these 'go-ahead' clubs in the HRT 'Club News' section each month. Many such clubs don't charge any 'centre fee', just the City and Guilds exam fee itself. One such centre is the SPRITE organisation in Sheffield, who've told us they're an exam centre for the Novice exam and that any prospective Novice is welcome to come along and take the exam there, with no 'centre fee' or 'course fee' being charged. Unlike one Novice course, who wanted to charge their prospective students just under £100 in addition to books, materials, and the exam fee. Yes, we *did* raise this with the RA and the RSGB some time ago at a meeting with them at the RA's headquarters in Waterloo Bridge House.

There's an Alternative Way

But did you know there's a much cheaper way to get an amateur licence in the UK? Like under £4.00 for both the written and the Morse tests, to get you the qualifications for a full Class A? A colleague told me he recently mentioned this to another amateur (he deliberately didn't tell me who the other amateur was), who immediately replied with "But you're certainly not going to *publish* that are you?". He added that a further amateur, standing nearby, immediately retorted "Why *not*? Prospective amateurs *should* be told!". So, in the interests of giving accurate and, most importantly, uncensored information, here we go....

SSL will, for example, issue you with a UK licence on payment of your £15 licence fee and documentary proof of holding a 'General' class US licence. To get one of these, you sit a written multiple-choice exam session and a 13 WPM Morse receiving test (you need to get 7 out of 10 multiple choice questions correct on the content of your received text for this, or alternatively a minute's 'solid copy'). These sessions are run by US Extra Class 'Volunteer Examiners', and a look at the UK packet

system showed me there was one session being run over here in October, another in November, another in January. These were just the individual sessions I happened to see publicized, there's no limit to the number of these held. Each session cost examinees just £3.40 (or \$5.60) each, and they were told their results straight away. If they failed, say, one written section, they could pay another £3.40 and re-take that section 'element' immediately. One candidate at the November session was a prospective Bangladesh amateur. He passed and was immediately given his certificate of successful completion, the resultant licence will allow him to obtain his Bangladesh licence. He said this was about the only practical way for him to get a licence for his home country, and that he'll now be just the 5th active native amateur on the air from there. Watch out for S21AF, you'll find him on 21MHz AMTOR and Packet to start with (he flew home a couple of days after the test, taking with him a secondhand PK-232 which we helped him obtain).

Now, you prospective amateurs, don't all rush at once to get that 'W' ticket! Incidentally, it's valid for renewable periods of 10 years a time and costs you nothing.

Write to Us!

Throughout the past year, as well as 'rattling the cage' I've also tried to give readers what they'd like to see in the magazine. I hope it's working. Our regular columnists certainly keep 'plodding away' in giving you what you want to read each month. Why not give them an idea of what you get up to. You'll probably get a mention in the magazine as a result, you might even get one of your photos (of yourself, your shack, your aerials, your club's field day, or whatever) published if you'd care to send one in. Write to us! You'll find the contact details for many of our regular columnists at the end of their columns, if this isn't given you can send your material to them c/o myself, Sheila Lorek, Editor - Ham Radio Today, ASP, Argus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST. If you'd like to Fax any information, I'll also be pleased to send this on, you can Fax direct to my desk on 0703 263429 anytime day or night. For example, what would you like to see in 'From My Notebook'? I'm sure Geoff would appreciate your ideas. Likewise the 'Problems Page', do send me your questions on amateur radio. If we can use it in the magazine, as well as an answer you might even receive a small 'something' in the post from us as a 'thank you'.

See you next month.

LETTERS

Letter of the month

Dear HRT,

I read with interest the letters concerning the DTI in December's edition of HRT, I also would like to know the powers of the 'DTI Storm Troopers' along with G6OIRZ.

In July of last year I received a visit from the RIS, a neighbour had complained of interference to his TV. I produced my log book for the DTI representative to look at, showing that my total operating time over any one week period to be about half an hour. I was asked to carefully log all times I operated (which every licensed amateur knows he has to do), and that he would be in contact with me.

A month later the DTI man returned, and his first words were "we have seen your aerials and it's you". I was even more surprised when I was told that a log on the TV had not been kept. I finally had to submit my station to an examination for 'spurious emissions' of which none were found.

I complained to the RIS of; a) the way I was treated (no apology), b) why I was targeted (their reply was that I was the only amateur in the area, when in fact there is an amateur living 50 yards from my QTH), and c) had they visited the illegal CB stations

in the area? (at that time there were four in very close proximity). I received no reply.

So beware, radio amateurs are presumed guilty until they have done the DTI's work to prove themselves innocent. By the way, the illegal CB activity has not changed.

Colin Stangroom, G6CRX

Editorial comment;

A 16 year old G8IYA, walking around with a 2m FM portable rig at a radio rally many years ago, was approached by the DTI (as it was then). He demanded to see the station's logbook (one had to operate /P then when walking around, and keep a written, and not loose leaf, logbook for both mobile and portable operation). Yes, it was immediately produced, and it was correct, and met the DTI's requirements. The DTI guy ridiculed it as (quote) "scrappy bits of paper, stapled together", and said (quote) "You'll be hearing from us". They instead heard from the RSGB, who deemed the attitude of such an officer as "totally unacceptable". It's good to have the backing of one's national society, maybe there's a moral there.

issue (March 94), subject to editorial space being available of course.

Dear HRT,

To become a Radio Amateur, how it's done at present. Study, pay the City and Guilds and obtain an RAE pass slip, send this pass slip and the fee to a Data Handling Company, who record the particulars and issue a call sign and documents. The RSGB do almost the same, apart from issuing documents and receiving any fee. (Duplication). During all this expense, you have to find cash for equipment etc., so joining the RSGB is put off, time passes and as you only hear bad about the RSGB you stay out of it, while accepting the benefits.

How it could be done. Study, take RAE, send pass slip and licence fee to RSGB, who issue call sign and documentation, along with membership to the RSGB at no extra cost.

On to CW, examined by the RSGB who issue a CW pass slip, which is sent, with fee to the Data Company for a new call sign. Again the RSGB amend their Database (Duplication). We could take the CW test and on passing, the RSGB automatically issue a new call sign, the test fee covering the cost.

Results, the RSGB would be representing all amateurs, the amateurs would get good value for money. Fifteen pounds from all, is better than thirty from a few.

While still responsible to the DTI, it would take the workload off its hard pressed staff, if they had the power (subject to appeal), to suspend, withdraw licences, take court proceedings, if necessary, in other words we could police ourselves, which could make the hobby much healthier, more attractive, and equal.

I hope this letter will encourage healthy and sensible debate, and not be stifled by those who are against

Dear HRT,

The idea of a problem page is in my opinion a most excellent one and deserves my personal thanks. I would also like to see more PMR conversion articles, say one a month as you yourself wrote in your editorial comment in reply to a letter in the December HRT.

Pete Minchin, G6NHW

Editorial comment;

Thank you for your kind comments. The problem page was one thing readers asked for in our survey, this

we have done. So come on, readers, write in with any amateur radio related problem and we will try to answer it through that page. We need your support to be able to continue the column. Regarding the PMR conversions, as the comment after the letter in the December HRT said, to be able to have one every month we need more pages in the magazine, but we will try to fit one in every few months. Readers may like to know the MX294 conversion, which I know many of you are waiting for, is planned for the next

£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, Ebury Way, Hemel Hempstead, Herts HP2 7ST, or fax your letter direct to the Editor's desk on 0703 263429. Please keep your letters short, we reserve the right to shorten them if needed for publication. Reader's views published here may not necessarily be those of the magazine.

"TONE BURST"



PRESENTS: How to "Launch" an aerial #4



change in any shape or form, because this could only be for the good of everyone concerned in our hobby. I welcome any truly held objections.

Helen Sharman said "the hardest thing in the training was learning to speak Russian (communicate) after that it was easy..." and that is what amateur radio is all about. Colin Mills, G7EVT

Editorial comment:
An example of this type of licensing method is the US system. Earlier this month, my Tech Ed Chris G4HCL went to an ARRL Volunteer Examination centre in the UK (the ARRL is the US national amateur radio society). There, he paid just £3.40, and took the US licence written and Morse examinations, and was told his result straight away (he could have re-taken it the same day if he'd failed). The volunteer examination team verified the examinees applications, and sent it at no charge to examinees to the US licensing administration. Each should soon receive their US licence, which costs nothing and is valid for ten years, renewable every ten years. A recent US proposal is for successful examinees to be immediately granted a temporary operating permit, to let them go on the air immediately while awaiting their call sign. Food for thought? What do other readers think?

Dear HRT,

I wonder if other readers are familiar with my tale of woe concerning the Kenwood TH-78E hand held.

Although sold as a 'hand

portable', I feel it unusual that this radio cannot be used for any other purpose, i.e., in the shack or the car. The reason for this is the total 'swamping' of the 2m band when the radio is used with any aerial, other than the standard one. I have tried both different car and base aerials in an attempt to reduce the signals into the radio, but to no avail.

My first thought was that my set was faulty, but I find on talking to two local owners of this radio, they have the same problem. My second thought was that the programmed receive expansion (50 to 1000MHz) had somehow made the VHF 'front end' open up too wide, so out went the software receive expansion and back to standard frequencies, same problem.

The set had not been modified other than the software expansion, details of which were provided by the dealer where I purchased my set. So now I have a beautiful 2m/70cm hand held and *no* 2m radio for the shack or my car. Perhaps I should not have 'traded in' my old Yaesu FT-23 after all!!

Andrew Parker, G7MVQ

Editorial comment:
Our HRT reviews, which always give measured technical results of receiver strong signal handling performance, do confirm this limitation with 'do everything' handhelds! If it's any consolation, it isn't just the TH-75E that suffers in this respect, indeed one or two other dual-band handhelds are far worse.

Dear HRT,

I am writing with reference to the

letter by Sandy GM0IRZ in Dec 1993 HRT letter's column.

It appears to me that upon reading the letter, Sandy does not take the hobby seriously enough to condemn the acts committed by Mr. R. G. Hitchcock, therefore lowering themselves to the same level. The hobby is, in my opinion, a very important and serious one and if licensing conditions are violated heavy penalties should be brought against the party involved.

How are we supposed to recruit more, especially young people, into the ranks of amateur radio when this is an example of the behaviour of amateur radio operators. Obviously these 'offenders' are only a handful of people. Imagine the thoughts of a young newcomer to the hobby who is confronted with this behaviour!! "Are Hams irresponsible?", "If this is the way they behave, there's no way I want to be licensed".

Remember the old saying "First impressions last". I am in full support of the RA and RIS and the penalty imposed to Mr. Hitchcock was very much deserved.

Peter Soby, G0PNM

Editorial comment:
As detailed in this magazine many times, amateurs who violate their licence conditions can and do get prosecuted. It's up to us to set a good example on air, because if everyone's 'casual' in their operating habits, others will follow. Just like the repeater group Chairman mentioned in the CQ de G8IYA Editorial who was abusing his own repeater, telling listeners he was doing nothing wrong. What an excellent show of how to behave.

Icom PMR Radios for 4m and 70cm!

Chris Lorek G4HCL looks at some high-performance offerings at amateur market prices



maybe just one finger. At the recent SUNPAC 'Meet the SysOps' get-together, (see last month's HRT), new 4m PMR rigs were being eagerly 'snapped up' just for packet radio use. Not everyone wants to 'take a chance' on getting a secondhand PMR rig to 'convert'. One UK company who've 'taken the bull by the horns' is Icom-UK, with a recent launch of a couple of their PMR version sets onto the amateur market.

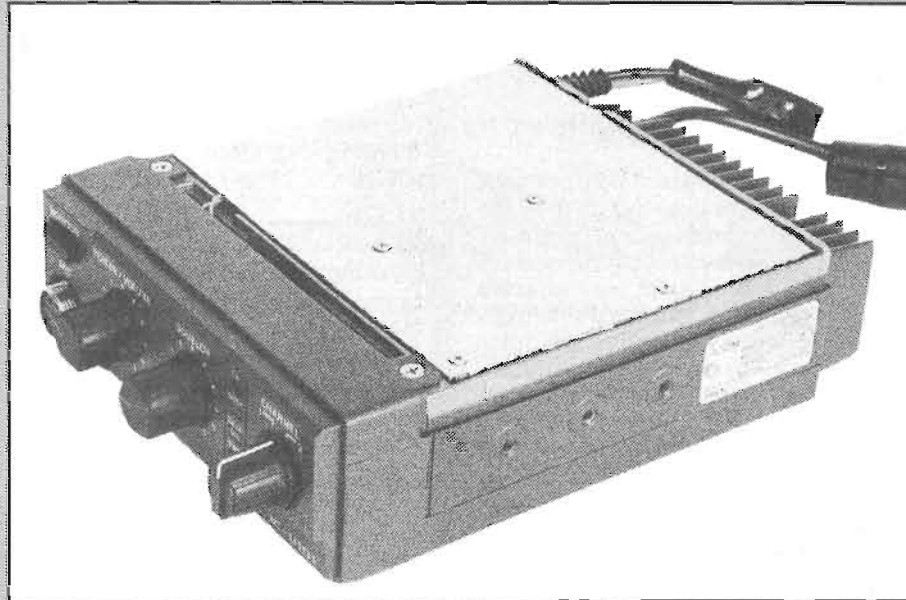
The Icom U-101 is a UHF FM transceiver, which has been specially modified by Icom-UK to give 12-channel operation with 25kHz channel spacing (they've changed the internal filters from 12.5kHz spacing ones). The other is the 'top of the range' Icom IC-V200T keypad transceiver for 4m, which Icom-UK supply programmed with 40 channels in 12.5kHz steps, giving complete coverage of the 4m band. Both models were originally manufactured to comply with the current UK PMR specifications (MPT1326 to be precise), and as such they should meet a very demanding technical performance.

Professional radio users need clear, interference free communications. For this, they use equipment with high technical performance, the standards for PMR equipment being legally enforced by the Radiocommunications Agency in the UK. Radio amateurs often use purpose-designed 'black boxes' filled with operating features, but often have to 'get by' with a lesser standard of actual *radio* performance. Which explains why some amateurs have found that, when they couple their latest all-singing all-dancing rig into an outside aerial, they sometimes pick things up besides amateur signals. Like unwanted pager transmitter breakthrough.

Ex-PMR rigs have traditionally been used by amateurs for repeaters and packet radio nodes on hilltop sites, not just because they're usually cheaper than a secondhand amateur rig, but because they have a much stronger resilience to unwanted signals. Another reason for using PMR rigs is on the UK

band of 4m, where the number of commercially-available rig types for the band can be counted on one hand. Or





fused DC power lead and an operating leaflet, and sells for £250. Options include a desk and boom microphone, the IC-UT31H CTCSS unit, and a base station power supply.

On The Air

I started off by putting the IC-U101 into service on the day it arrived, coupling the set to my rooftop colinear. Icom-UK had programmed the rig for all my local repeaters plus the packet channels in use in my area, plus with a few FM 'chat channels' including one I could monitor with CTCSS for when my XYL calls me when she's out and about. A handy 'channel list' was provided with the set.

I found no surprises with the set's

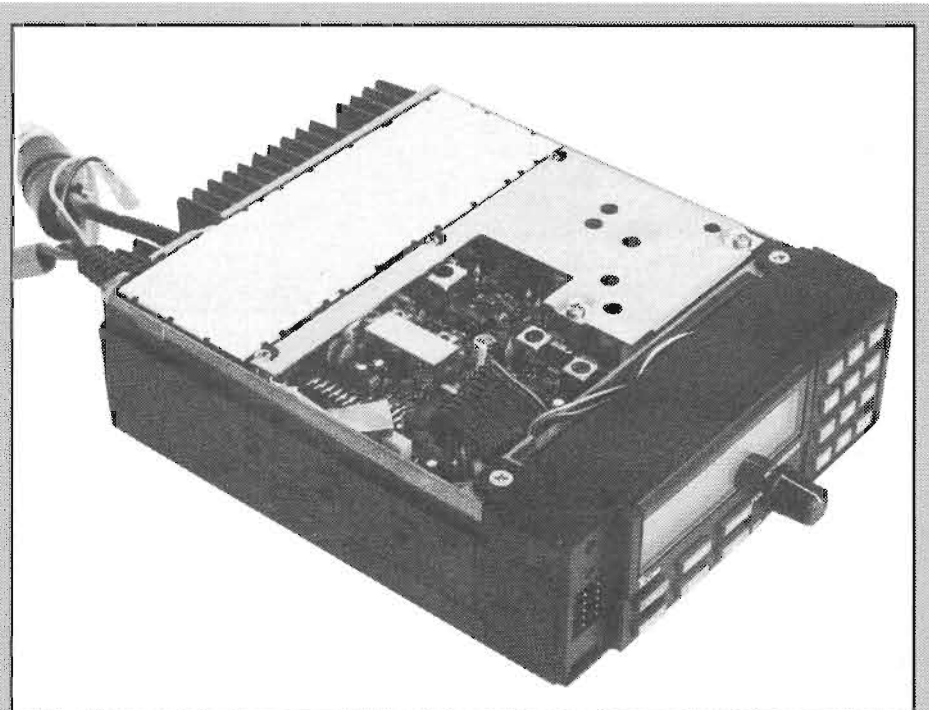
The U-101 for 70cm

Selling at £179, this synthesized mobile rig covers the 70cm band of 430-440MHz with a power output of 15W. Icom-UK have replaced the original 2 channel switch fitted for PMR use with a 12 channel type, and they supply the set ready programmed with your choice of 70cm channels. If you want to alter the channels sometime in the future, this can be done by 'cloning' from one set to another, or by an Icom PMR dealer, or by Icom-UK.

The set comes with a microphone, mobile mounting bracket, fused DC power lead and an operating leaflet. If you'd like CTCSS encode and/or decode capability, an extra £18.00 gets you the IC-UT31H CTCSS unit which fits inside the set and is set up with the tones you need when you order the set. If you need a 1750Hz toneburst, you'll need to add one yourself (see past issues of HRT - we've featured quite a number).

The IC-V200T for 4m

This is designed as a 'full function' PMR mobile, with plenty of 'bells and whistles'. For 4m use, the set gives a channel readout on its LCD of 1-40, corresponding to channel frequencies of 70.0125-70.4875MHz in 12.5kHz steps. A press of the 'Scan' button lets you search for activity, the set halting when it finds a signal. An internally pre-set squelch is used, and you can open the receiver squelch for checking purposes (or for 'open squelch' packet use) by pulling the squelch knob outwards, where it clicks into position. The transmitter gives 25W output, and as with the U-101 the set comes with a microphone, mobile mounting bracket,



performance. It worked extremely well, with no problems from unwanted signals. I did initially have a few problems in trying to sort out which channel was which, the new channel switch rotating though 360 degrees for the 12 channels. I quickly learned to 'count clicks' from the vertical position, but I'd have probably have added my own 'legend' to get over this if I were to have been using the set as a 'permanent fixture'.

The CTCSS unit worked well, it even added a short 'reverse squelch' delay (where a short carrier without tone carried on being transmitted after the PTT was released) on the channel with CTCSS programmed, which eliminated any long 'squelch tail' at the receive end. There was plenty of audio on receive from the set's internal speaker, although I felt the mic gain on transmit was a little on the low side - maybe this was set up for use with delivery drivers 'shouting down the mic'!

The IC-V200T was a pleasure to use on 4m. The scanning facility on the set even 'brought out' a few amateurs on the band who I'd completely missed before. Using the set, I even had a duplex cross-band chat as a result of this one evening. Unfortunately I found the pre-set squelch level to be too sensitive, the scan invariably stopping many times with the set's squelch 'popping away' on the threshold (4m seems to be very prone to 'stray signals' from computers and the like). With a bit of experimentation I found which internal pot adjusted this, and I suitably increased the threshold point.

As with the 70cm set, there was plenty of receive audio (and quite readable transmit audio from reports I received), and I found no problems at all from unwanted signals, typifying the professional nature of the set's intended use.

12.5kHz filtering is usefully retained in this set, which gave superb rejection of adjacent channels such as 70.3125, 70.3250, and 70.3375MHz as used on packet. My (very) local DX PacketCluster operates 70.325MHz, whilst a couple of semi-local nodes use 70.3125MHz, and I could use either with ease.

Standard 3.5mm sockets are used for external speakers on each set, but 'non-amateur' type microphone connectors are used. Unfortunately neither set comes with circuit or microphone connection details, however I know

from experience that a phone call to the Icom-UK service department quickly reveals all....

Laboratory Tests

These show the technical performance of the sets lives up to their designed use for professional communications. If you have problems with unwanted signals, such as adjacent channel reception, strong signal overloading, and the like, you're not going to find many other sets that work better! In the 'reverse' direction, a quick look at the extensive internal screening shows there shouldn't be much coming out of the sets that shouldn't be there either, and all the transmitter harmonic levels were very well suppressed at below the -80dB mark.

Conclusions

If you want a set that's easy to use on air as well as offering professional performance that 'beats the pants' off amateur rigs, but you don't want or need all the 'bells and whistles' found on purpose-designed amateur sets, you now know what to look for! These two sets certainly 'made the grade', and should find good use in demanding applications such as packet nodes as well as doing an excellent job as 'easy to use' sets in the car or shack.

My thanks go to Icom-UK for the loan of the two review sets.

Editor's note - Icom-UK have very kindly provided these sets as prizes for our free competition this month - see elsewhere in this issue for details of how you can win one!

LABORATORY RESULTS:

All measurements taken on 70.250MHz (IC-V200T - 4m) or 433.500MHz (IC-U101 - 70cm) with 13.2V DC supply, using supplied DC cable, otherwise stated.

RECEIVER:

Sensitivity;

Input level (modulated with 3.0kHz deviation) required to give 12dB SINAD;

4m;	0.19µV pd
70cm;	0.25µV pd

Squelch Sensitivity;

	4m	70cm
Threshold;	0.12µV pd (4dB SINAD)	0.19µV pd (5dB SINAD)
Maximum;	-	0.44µV pd (21dB SINAD)

Adjacent Channel Selectivity;

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

	4m	70cm
+12.5kHz;	64.2dB	65.2dB
-12.5kHz;	63.8dB	56.4dB
+25kHz;	72.0dB	76.2dB
-25kHz;	71.6dB	76.6dB

Blocking;

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

	4m	70cm
+100kHz;	88.7dB	90.4dB
+1MHz;	97.2dB	94.1dB
+10MHz;	97.4dB	92.5dB

Intermodulation Rejection;

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

	4m	70cm
25/50kHz spacing;	81.5dB	81.2dB
50/100kHz spacing;	79.4dB	79.0dB

Maximum Audio Output;

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

	4m	70cm
	2.48W RMS	2.47W RMS

Image Rejection;

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

	4m	70cm
	>100dB	>100dB

TRANSMITTER

TX Power and Current Consumption;

4m;	24.3W/6.0A
70cm;	15.1W/5.6A

Harmonics;

	4m	70cm
2nd Harmonic;	<-80dBc	<-80dBc
3rd Harmonic;	<-80dBc	<-80dbc
4th Harmonic;	<-80dBc	<-80dBc
5th Harmonic;	<-80dBc	<-80dBc
6th Harmonic;	<-80dBc	<-80dbc
7th Harmonic;	<-80dBc	<-80dbc

Peak Deviation;

4m;	2.81kHz
70cm;	4.73kHz

Alinco DJ-G1 Review

Chris Lorek G4HCL looks around on 2m with Alinco's panoramic display portable



2m 'black box' portables are now getting so full of operating 'bells and whistles', you may think there can't be much else that can be added to one to make it 'unique'. But how about a small handheld that, while you're operating on one channel, shows you whenever up to six other channels become active? We're not talking about ordinary 'scanning' here, or 'priority watch', or whatever. We're looking at a panoramic adaptor, which shows you on an LCD graph which channels are active on either side of the one you're operating on, and at what relative strength each of the signals are! That's just what the new DJ-G1 from Alinco does. Launched in the UK by Waters and Stanton at their stand at this Year's Leicester Show, it wasn't long before the HRT team were trying one out on the air!

you're monitoring S20, you can also see what's happening on S17, S18, S19, S21, S22 and S23. What's possibly more useful is that, in 'memory channel' mode, the set shows you the activity on the memory channels either side of the one you're on, for whatever frequencies you have programmed in them. So you can, for example, program memory channel 4 for your local repeater or 'chat channel', with channels 1-3 and 5-7 programmed up with other locally used channels. Very useful!

If all this becomes a bit too much for you, then never fear! The set *can* be used in a more 'normal' mode, with a left-to-right bargraph indication of received signal strength on the channel you're on. Indeed, this is the mode the set normally uses, you just need to do a few button-pushing operations to switch it into 'panoramic display' mode.

Looking Around

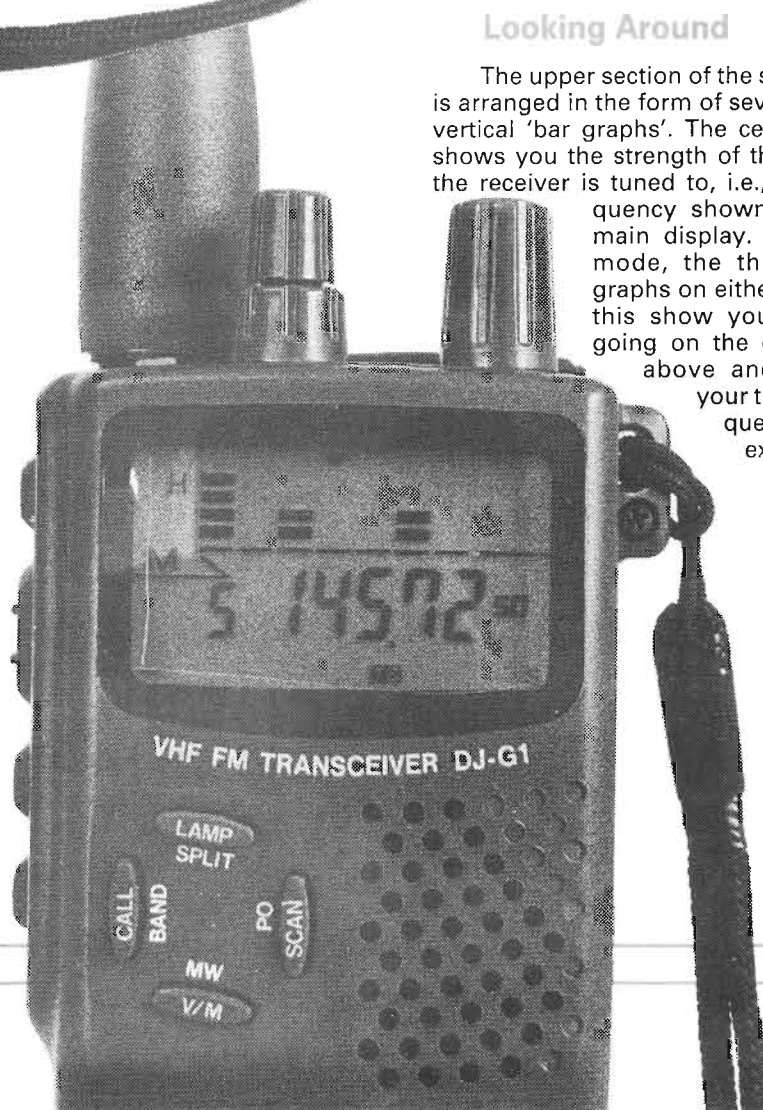
The upper section of the set's LCD is arranged in the form of seven small vertical 'bar graphs'. The centre one shows you the strength of the signal the receiver is tuned to, i.e., the frequency shown on the main display. In 'VFO' mode, the three bargraphs on either side of this show you what's going on the channels above and below your tuned frequency. For example, if

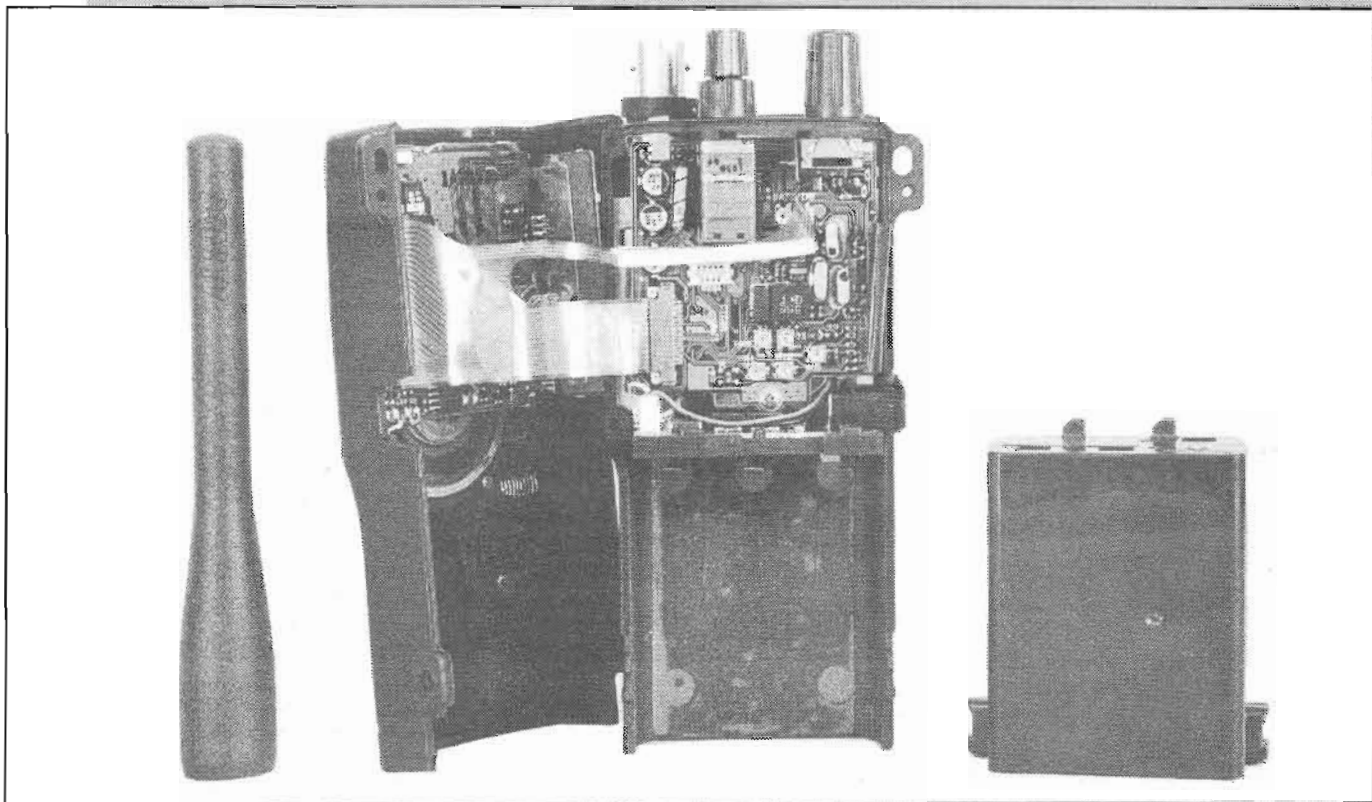
Multiband Receive

The DJ-G1 comes as a 2m transceiver, although a press of the 'band' button does a few interesting things! As well as receiving on just 2m, it can cover 108-174MHz, 400-470MHz, and 825-950MHz on receive. Sharp eyed readers will have spotted that the lower part of its VHF coverage extends to cover the entire civil airband, which of course uses AM. Guess what, you can switch the DJ-G1 to receive AM as well.

Getting back 'down to Earth', the set gives you a transmitter output of around 1.5W with the supplied 7.2V 700mAh nicad pack, and a desktop 'pod' charger is provided to keep these topped up. Plugging in an external 13.8V DC supply increases the transmitter power output to around 5W, and you can select 'Mid' and 'Low' powers levels of around 1W and 200mW respectively for use in close quarters.

The set measures 50mm x 116mm x 37mm, and weighs in at 360g. Together with the nicad and charger, it comes supplied with a belt clip and a wrist strap, plus a well-written instruction manual with plenty of operating examples. Optional extras include a high-capacity 7.2V 1200mAh nicad, a 700mAh 12V nicad for higher power,





empty cell case, a remote control speaker microphone, a car DC lead with built-in filtering, and various soft cases to fit the set depending upon the size of battery you have fitted.

In Use

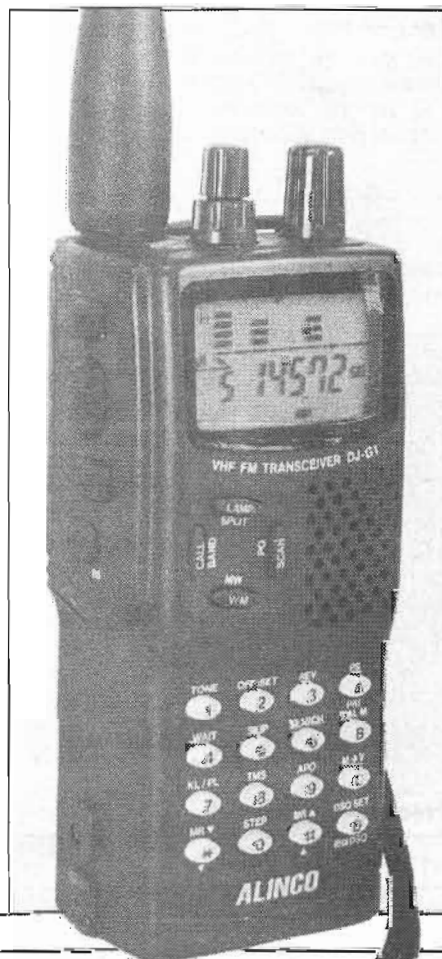
At first, I didn't have an English instruction manual for the set – this arrived a few days later (I was so eager to try the set out on air that I asked Waters and Stanton not to wait for these to arrive!). This did however provide a very good opportunity for me to see how easy the set was to use as a 'raw beginner'. Within a few minutes, I'd programmed up all of my favourite memory channels, and had placed the set into 'panoramic display' mode for a good look around! When the manual came, I found the set did indeed have all the 'bells and whistles' of other 'top of the range' FM rigs, such as various scanning and 'priority watch' modes, battery economizer, and all the various DTMF selective calling, group calling, and 'paging' modes. Even the delay from PTT to DTMF tone initiation could be changed, to either 450mS or 750mS, to take account of repeater key-up times.

The side of the set has, besides the usual PTT bar, a secondary button to transmit a 1750Hz toneburst, the two other buttons act as a 'squelch defeat' and 'function' buttons. If your local re-

peater accepts CTCSS as an alternative access method, the DJ-G1 has a CTCSS (sub-tone) encoder built in as standard, and an optional plug-in board is available if you'd like CTCSS 'tone squelch' (decode as well as encode) facility. As an example of the versatility of the set you can also change the 1750Hz tone button to act as a 'low power' TX PTT instead. No less than 80 memory channels are available to store your favourite channels in, which should be enough for most needs! I found the additional coverage of 70cm quite useful, and by suitable programming I could have a cross-band QSO between 2m and 70cm quite happily. The panoramic display was functional on the other bands as well, but I did find a slight 'catch' in using this, on whatever band I was receiving on. Every few seconds, the set would mute the receiver audio for a fraction of a second on the channel I was listening to, updating itself on the activity of the other channels. Which is how the panoramic display facility works on the set in the first place. Switching the set to 'normal' operation, i.e., with a single lengthwise 'S' meter, got over this limitation, and I tended to do this when I was in QSO to make sure I didn't miss anything.

When out and about, the receiver section gave a reasonable level of audio, although when I used it in a car I found I really needed an efficient exter-

nal speaker (or speaker microphone) to stop the small internal speaker being



driven into distortion. Operating the transceiver out and about portable during the dark winter nights, I found the backlighting facility was very good. As well as illuminating the display, very well I might add, it also lit up all the keys together with the legends on the keys themselves.

On the air, I found the set wasn't quite as good as I'd have expected in terms of operating 'range'. A smart and possibly multi-band, but compact, helical aerial is supplied, replacing this with a longer 2m-only whip transformed the set into a superb performer! Likewise at home, the set proved extremely sensitive. Here, I was happy to find that the squelch range let me 'squelch out' weak signal levels to allow the set to scan for local and semi-local stations – some sensitive sets have the disadvantage of halting on too many signals! I found the receiver did occasionally suffer from other strong 2m and 70cm packet signals from my (very) local node system, which I suppose is to be expected.

Laboratory Tests

These did indeed confirm the excellent sensitivity of the receiver. The strong signal handling performance was reasonable in terms of the relative difference of wanted to wanted signal levels – obviously what I found on air was down to the good sensitivity! On transmit the set put a very clean signal out, only the 3rd harmonic was anywhere near the 'bottom' -80dB level I use as an 'amateur yardstick' for measurement purposes.

Conclusions

The Alinco DJ-G1 offers the very unique facility of a panoramic display, and I found this a very novel and quite

useful way of keeping track of what was going on. For example, whilst listening to my local repeater, I could instantly see which other of my favourite channels were active, the resultant 'knob twiddling' made sure I didn't miss out on a thing! The set was easy to use, fitted comfortably in my hand, and the facility of multi-band receive gave me something else to listen to when 2m was 'quiet'.

The DJ-G1 is currently priced at £349 including nicad and charger, and my thanks go to Waters and Stanton Electronics for the timely loan of the review sample.

LABORATORY RESULTS:

All measurements taken on 145MHz with fully charged nicad as supplied, high power TX, otherwise stated.

RECEIVER:

Sensitivity;

Input level required to give 12dB SINAD;

144MHz; 0.13µV pd
145MHz; 0.12µV pd
146MHz; 0.12µV pd

Squelch Sensitivity;

Threshold; 0.08µV pd (7dB SINAD)
Maximum; 0.41µV pd (29dB SINAD)

Maximum Audio Output;

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

153mW RMS

TRANSMITTER

TX Power and Current Consumption;

Freq.	Power	7.2V Supply	13.2V Supply
144MHz	High	2.14W/890mA	5.08W/970mA
	Mid	1.02W/490mA	1.02W/490mA
	Low	190mW/280mA	190mW/280mA
145MHz	High	2.14W/880mA	5.05W/980mA
	Mid	1.02W/490mA	1.02W/490mA
	Low	190mW/280mA	190mW/280mA
146MHz	High	2.14W/860mA	5.05W/970mA
	Mid	1.02W/480mA	1.02W/490mA
	Low	190mW/280mA	190mW/280mA

Frequency Accuracy;

+170Hz

Toneburst Deviation;

2.52kHz

Adjacent Channel Selectivity;

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

+12.5kHz; 32.2dB
-12.5kHz; 38.6dB
+25kHz; 62.4dB
-25kHz; 62.4dB

Image Rejection;

Increase in level of signal at first IF image frequency, over level of on-channel signal, to give identical 12dB

SINAD signal; 60.9dB

Current Consumption

Standby, squelch closed; 112mA
Receive, mid volume; 140mA
Receive, max volume; 149mA

Blocking;

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

+100kHz; 74.1dB
+1MHz; 88.7dB
+10MHz; 97.8dB

Intermodulation Rejection;

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

25/50kHz spacing; 63.2dB
50/100kHz spacing; 62.0dB

Harmonics;

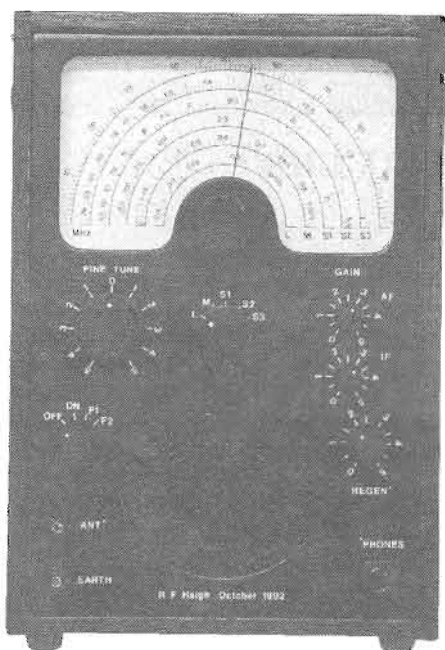
2nd Harmonic; <-80dBc
3rd Harmonic; <-69dBc
4th Harmonic; <-80dBc
5th Harmonic; <-80dBc
6th Harmonic; <-80dBc
7th Harmonic; <-80dBc

Peak Deviation;

5.40kHz

Long, Medium and Short Wave Superhet Receiver (part 3)

Raymond Haigh concludes his AM/SSB/CW receiver project with alignment details and operating hints



This guidance is offered for constructors who do not have access to a calibrated signal generator. A battery-powered, AM transistor radio is required in connection with the alignment of the IF stages, and non-metallic trimming tools must be used for the core adjustments. If a set of professional trimming tools is not available, cut 150mm lengths of plastic rod (sprue from plastic model kits or knitting needles), and shape the ends to a snug, but not tight, fit in the slots in the cores and trimmers.

A test meter, set to the 0-30 or 0-50mA range and connected in series with battery supply to the power amplifier, will give a visual indication of maximum output when the adjustments are being made. In the absence of a steady tone from a signal generator, its

usefulness is limited, however.

The initial testing, setting up and alignment of the receiver is best done before the printed circuit boards and other parts are mounted on a chassis or in a box. Faults are easier to correct this way. A more precise alignment, including the adjustments to ensure maximum coverage, can then be carried out with confidence after final assembly.

Variable capacitors, printed circuit boards and speaker can be wired together on the bench for the initial testing. Keep the leads to the variable capacitors short, and take particular care to protect this vulnerable component from dirt and damage. The procedure is as follows:-

(1) Check the printed circuit boards to ensure correct component placement, in particular the semiconductors, electrolytic capacitors, and the wiring to L7/L8. Check for any bad connections and for solder bridges across the copper tracks. If everything is in order, set R19 to maximum resistance and all other potentiometers to half-travel, and connect fresh 9V batteries to the IF/AF board. Do not connect a front end board at this stage. The current drawn by the power amplifier section should be about 6mA, the IF amplifier and the audio preamplifier should draw around 1mA, and there should be a faint hiss from the loudspeaker.

(2) Set the regeneration control at about two-thirds full travel, then reduce preset R19 until the detector oscillates. This is indicated by a slight increase in the hiss from the loudspeaker. When you advance and retard potentiometer R14, the detector should go smoothly in and out of oscillation, without any backlash. If the transition is too rapid, set R19 to a higher value.

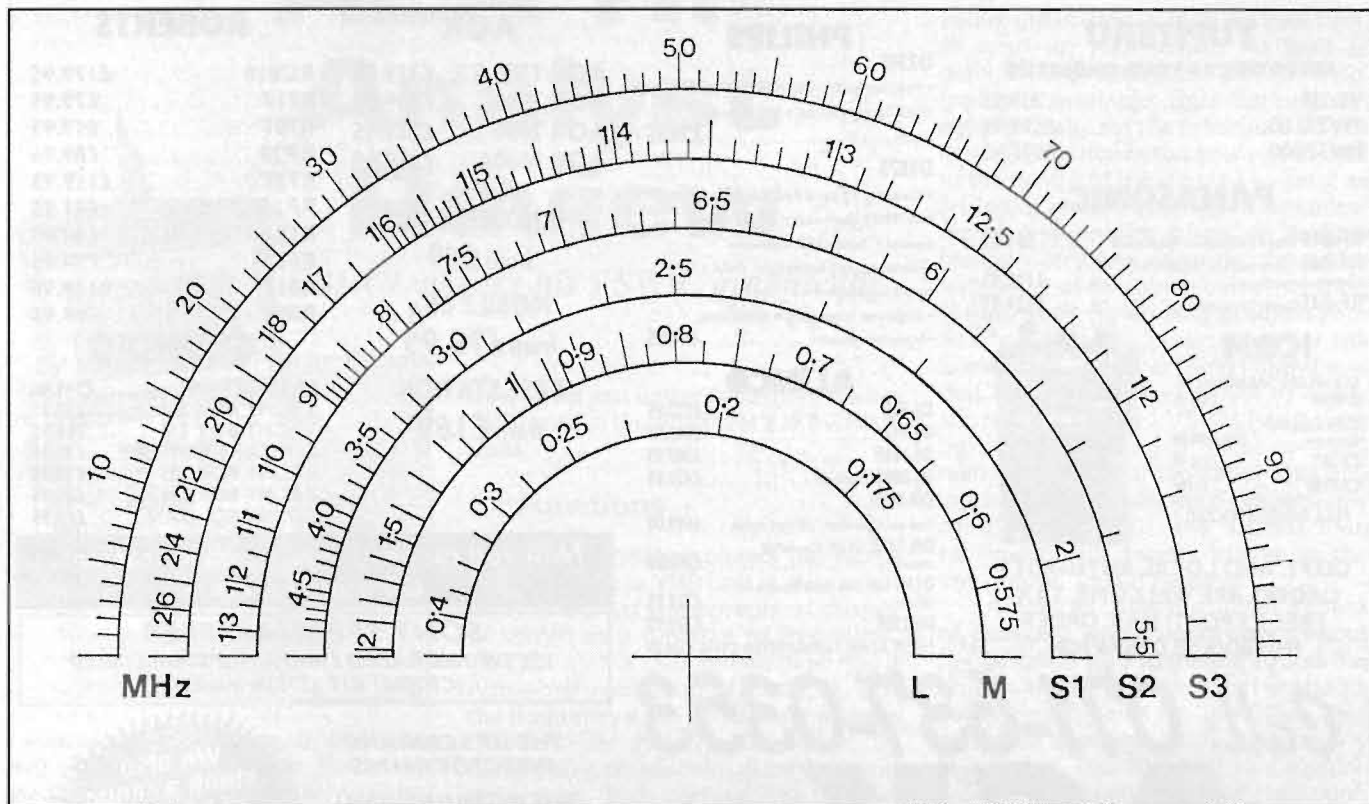
(3) Open up the case of a domestic transistor radio, expose the printed circuit board, and locate the secondary, or base coupling winding, of the second or third IFT. Most domestic portables use IF transformers with a pin arrangement identical to the Toko IFT used in this receiver, and locating a suitable connection point should not be too difficult. The transistor portable used for the alignment should preferably be an AM only model, the duplication of IF transformers in receivers with FM bands makes it more difficult to locate a suitable IF take-off point. Constructors who have no experience of working on mains-powered equipment should ensure that the portable is battery powered. Almost all domestic AM receivers have an IF within the range 450 to 470kHz, and any frequency within these limits will be satisfactory.

Switch on and tune the portable to a steady local station, and connect the IF board input leads to the secondary of its second IFT via a low value capacitor (5 to 10pF). Adjust C16 until the signal is heard in the speaker of the receiver under construction, turn up IF gain control R7 if necessary. Adjust the core of L5/L6 (IFT1) to further peak the response, reducing the IF gain control when the output becomes excessive. Repeat these adjustments, with regeneration set close to the point of oscillation, until no further improvement can be obtained. The IF gain control may have to be set quite low towards the end of this procedure to prevent the strong signal damping regeneration. This completes the IF alignment.

(4) Take the SW2 front end board (this is the easiest to align), set both trimmers to half mesh and both coil cores flush with the tops of the formers. Connect up the ganged tuning capacitors, then connect the front end board to the IF/AF strip, current drain should rise to about 4mA. With an earth connection and two or three metres of flex as an aerial, some signals should be heard when the tuning capacitor is rotated. If not, gently adjust the core of oscillator coil, L3/L4, until transmissions are received.

Tune in a signal with the vanes of the ganged capacitor as near as possible to full mesh and adjust the coil cores for maximum output. Tune in a signal with the capacitor vanes as open as possible and adjust the RF trimmer capacitor, C2, for maximum output. The RF stage tends to 'pull' the oscillator, and the tuning capacitor spindle should be gently rocked while the above adjustments are carried out. Pulling is common to all single transistor mixer/oscillators, and rocking the gang will ensure alignment to a true peak.

Repeat the adjustments until there



is no further increase in output. As the circuits are brought into alignment, begin to check that the receiver is as lively with tuning capacitor settings around the half-mesh position. If not, gradually shift the position of the oscillator coil core, adjusting the RF coil core in step to maintain alignment, until the receiver performs well at any setting of the tuning capacitor. Strictly speaking, perfect oscillator tracking occurs at only three settings of the capacitor; at points near the extreme ends of the swing and at a point near the centre.

On short waves, it is possible to align the front ends with the oscillator set above or below the signal frequency. The higher frequency is the correct one, and a check should be made to ensure that this has been selected. With the short wave coils, maximum inductance, i.e., lowest frequency, is obtained when the coil cores are about flush with the tops of the coil formers. With the long and medium wave coils and the IF transformer, inductance increases as the core is screwed down.

(5) Repeat the above procedure for the SW1 and SW3 front ends. Setting up the medium, and particularly the long wave, front ends is more difficult as it is less likely that signals will be heard until the circuits are coming into alignment. With a little care and patience it can be done, however. Taking the medium wave board first, proceed as follows:-

(6) Set trimmers at half mesh and coil cores two turns down from the top

of the can, and connect a short aerial. If a ferrite loop has been fitted, connect the wire aerial to the base of TR1 via C5. Rotate the tuning capacitor to locate a signal. If nothing can be received, gradually adjust the oscillator coil core whilst searching with the tuning capacitor. Eventually, signals should be heard and the alignment process described earlier can begin.

Remove the wire aerial from a ferrite loop as soon as alignment is good enough for the set to function without it. The coil on the ferrite rod should, of course, be adjusted with the vanes of the ganged capacitor near full mesh; the positioning of the coil on the rod is quite critical. Frequency preset C9 and the oscillator coil core have to be adjusted until alignment is satisfactory at the half mesh as well as the full mesh position of the tuning capacitor. If, when the tuning capacitor is rotated from full to half mesh, the RF transformer core has to be wound down to peak output, the frequencies preset should be reduced and the alignment process repeated until tracking is satisfactory at all points of the tuning capacitor swing.

(7) Take the long wave board. Adjust the coil cores two turns down from the top of the can and set all trimmers at half mesh. Then proceed as described in (6) above. The relationship between the oscillator frequencies, trimmer and coil core is very critical on long waves. Additional capacitance is usually wired across the oscillator coil in order to ensure good tracking, and this is pro-

vided by the 5-60pF trimmer, C8. After the final assembly and wiring of the receiver, adjust alignment on all ranges, inductance and capacitance introduced by the switch wiring will make this necessary. If another general coverage receiver is available to compare and identify signals, trimmers and cores can more easily be set to eliminate gaps between the ranges. Maximum coverage will be obtained with trimmers C2 and C8 set to the lowest possible capacitance consistent with correct alignment.

Calibration

I used a crystal calibrator, generating markers at 4, 2, and 1MHz, and 100, 50 and 25kHz to calibrate the receiver, the resulting dial is reproduced in Fig. 9. There is a very slight gap in coverage between ranges SW1 and SW2: the SW2 front end would not oscillate at a lower frequency, despite the use of a BC108C, and stray capacitance prevented any extension of SW1 high frequency coverage.

Medium wave coverage was set to extend from around 560kHz to 2MHz to ensure continuity with the first short wave range. Constructors who prefer a more conventional spread, from, say, 510kHz to 1.6MHz, will probably find it easier to optimise tracking if the oscillator frequency capacitor, C10, is reduced to 330pF.

A calibrated dial is by no means essential, but it is an aid to serious

SCANNERS AND TRANCEIVERS

YUPITERU

AIR POWER AT YOUR FINGERTIPS

VT-225	£239.95
MVT7100	£399.95
MVT7000	£329.95

PANASONIC

RF-B10 World band receiver - pocket size	£69.95
RF-B65 Si/pro multi band digital radio-memories present	£189.95
RF-B45 Digital M/band radio	£129.95

ICOM

SCANNERS/TRANCEIVERS	
IC-W2E	£429.95
IC-R115-1300 MHz	
100 memories	only £380.00
ICP-2ET	£310.00
ICR-7100	£1199

FULL RANGE STOCKED



GOVT. AND LOCAL AUTHORITY
ORDERS ARE WELCOME, TAX-
FREE EXPORT! MAIL ORDER
IMMEDIATE DESPATCH

Call: 071-637-0353

ASK ELECTRONICS LTD

248 Tottenham Court Road, London, W1P 9AD Contact Mr Kumar Tel: 071-637-0353/0590 Fax: 071-637-2690

PHILIPS

D2345	
• Portable Radio • LW/MW/FM/2 x SW	
• Fine Tuning Control • Mains/battery supply	£24.95

D1875	
• Compact 12-band Portable Radio • LW/MW/FM/9 shortwave • Large tuning control • Tuning LED indicator	
• Telescopic and ferroceptor aerial • DC supply connection	
• Earphone connection • Wrist strap	
• Attractive pouch	£49.95

ALINCO

DJ-S1E	£222.95
DJ-F1E	£289.95
DJ-180E	£209.95
DJ-580E Dual band	£439.95
DR-599E	
Dual band 2m/70cm - 50 watt mobile	£689.00
DR-112E 2m FM 45w mobile transceiver	£300.00
DJX1 with Free Nicad Batterie & charger	£319.95
DR130E	£329.95
NEW ALAN TRANSCEIVER CT145	£199.00

AOR

AOR 1500 EX	£319.00
AOR 2800	£409.00
AOR 2000	£279.95
AOR 3000A	£859.95

HAND-HELD CB's

from £49

MOBILE CB's

from £79.95

BASE STATION

from £169

ROBERTS

RC818	£179.95
R717	£79.95
R701	£79.95
RP28	£89.95
R737	£119.95
RP15	£21.95
R101	£44.95
R621	£54.95
R817	£139.95
R808	£99.95

GRUNDIG

SATELLIT 700	£349.00
YACHT BOY 222	£52.95
YACHT BOY 230	£65.95
CONCERT BOY 230	£35.95
YACHT BOY 205	£29.95
YACHT BOY 206	£35.95
COSMOPOLITAN	£64.95

New full range antennas, base stations, CB mobiles, etc

SONY SPECIAL OFFER

ICFSW 7600 RADIO £149.95 ICFSWIE £149.95
ICF20001 KIT £275.00 inc ANI

THE UK SCANNING
DIRECTORY £17.95

THE INTERNATIONAL
GUIDE TO
COMMUNICATIONS ABOVE
80 Mhz £17.95
30 Mhz £24.95

We also
stock a range
of books for
frequency
scanning

listening. If a crystal marker or another, calibrated, full-coverage receiver are not available, the dial can be marked up from station frequency announcements. This does call for much patient listening, however.

Operating the receiver

The receiver demands more of the operator than a domestic portable but, with care, what is only a very basic superhet design can be made to give a high standard of performance. Experience will reveal the best potentiometer settings for different conditions. As a guide, IF gain should be well advanced and the regeneration control turned back a little when searching over the broadcast bands. When receiving amateur or commercial SSB transmissions, the regeneration control must be advanced until the detector is oscillating, the IF gain turned down as low as possible, and audibility maintained by increasing the AF gain. Too high a setting of the IF gain control is the usual cause of difficulty in resolving these transmissions. They have to be very precisely tuned, and the fine tuning system should be used to clarify them.

The regeneration control is extremely smooth and completely free from backlash. In this design, regen-

eration is applied to a circuit with fixed tuning, thereby eliminating the need for constant and critical readjustment. Nevertheless, the ultimate sensitivity and selectivity of the receiver does depend on regeneration being maintained just short of oscillation. When receiving weak signals, or signals overlaid by interference, performance will be enhanced if care is taken in setting this control.

The fine tuning system relies on a very slight shift in IF (Intermediate Frequency). If the regeneration control is turned well down, IF selectivity may be too low for the small change to have much effect on receiver tuning. The shift produced by the specified varicap diode represents a good operator compromise. Constructors who prefer a gentler action should increase the value of R12 in order to limit the sweep of potentiometer, R11. Alternatively, connecting two varicap diodes in parallel will magnify the effect.

Switching in the audio filter will usually help to clarify signals when reception conditions are bad. The restricted audio bandwidth inevitably makes the tone of the receiver rather 'hollow', though.

Two metres of wire used as an aerial will 'pull in' stations around the dial on short waves but, for serious

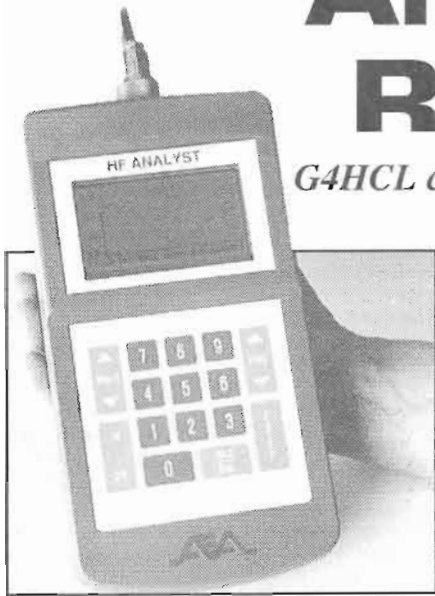
listening and amateur band reception, a longer, higher wire is very desirable. Aerials much longer than 30 metres can overload the front end and cause spurious response problems. Try connecting long aerials via a 10 or 20pF capacitor if difficulties of this kind are encountered. An earth will sometimes improve reception (*likewise an ATU or preselector - see next month's issue - Ed*).

Three turns of wire were wound around the medium wave ferrite rod to form a coupling winding for external, long-wire aerials. One end of the winding was connected to earth and the other to the aerial terminal via S1a and C1. This improves performance at the HF end of the medium wave band and is a worthwhile modification for constructors wishing to listen to amateur transmissions on 1.8MHz (160 metres). Coupling long wire aerials to the ferrite loop tends to degrade performance at the LF end of the medium wave band, however, (spurious responses are the main problem).

The author of this project will answer queries on this project if you enclose an SAE for reply. Write to: Raymond Haigh, c/o The Editor, Ham Radio Today Magazine, ASP, Argus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST.

AEA HF Analyst Review

G4HCL checks his VSWR, graphically



If you use the HF bands, it would be very unusual if you never found the need to check, and most likely adjust, your aerial system for minimum VSWR. Some amateurs need to do this each time they change frequency, for example by using an ATU to either match or resonate their aerial.

The 'Hassle' Factor

Those who build, and/or erect, their own aerials will know the 'hassle factor' in getting the beast 'on frequency'. This normally involves taking lots of 'spot frequency' VSWR readings across the band (or indeed bands in the case of a multi-band aerial), then going back and making (usually) a small adjustment, followed by another 'sweep', then back again, and so on. A few months ago I needed to set up my 18AVT/WB (an 80-10m HF vertical), which I'd put up on a roof along with four full-sized radials for each band. Setting this up meant lots of trips up and down ladders, back into the shack each time, and lots of paper for each 'trip' with the resultant VSWR curves! After five or six hours, I'd finished. I really wished I'd have had something like the AEA unit then. I now know I'd have been able to do the job, more accurately as well, in about 30 minutes!

Well-equipped professionals in the HF aerial business use a network analyzer, which amongst other things can give you a graphical plot of VSWR against frequency. So can the AEA HF Analyst. The difference is that a network analyzer can set you back upwards of around £25,000, the AEA unit albeit can't do anywhere near as much as

this, but at just under £400 there's a big difference in the price! Let's see what it does.

Functions

The HF Analyst covers the range 1MHz-32MHz (a VHF unit is also available), and gives you a graphical display of VSWR as a function of frequency. The dot-matrix LCD screen used has a horizontal resolution of 110 dots, and the frequency span can be set between 0-200kHz per dot. The narrowest, '0', gives you a single-frequency test, and the widest, '200', corresponds to a frequency span of 22MHz. The VSWR scale is auto-ranging, with a maximum reading of 65.5:1 (you've got something very wrong if you get this sort of reading on your aerial!).

A flat membrane keypad controls the unit's functions, this I imagine would give it a bit of 'weatherproofing' for use outdoors. The unit operates either from an external 12-16V DC source or from eight internally-fitted AA size batteries, measures 103mm (W) x 54mm (D) x 204mm (H), and weighs 740g with batteries fitted. 'Hold' and automatic 'Power Save' features let your batteries last that bit longer. The 'Hold' facility also lets you take the unit indoors to couple up to a PC, optional software being available for this which lets you save and print out the VSWR graph.

In Use

After switching on, by keeping the 'On' button pressed for a few seconds, the unit was extremely simple to use. I just entered the centre frequency in kHz, the scan width (in terms of the number of kHz per LCD 'dot'), then let the Analyst show me what my connected aerial system was doing. Each 'scan' takes around 9 seconds, and whenever a parameter is altered from the keypad, an initial scan takes place to set the unit's auto-range facility up, after that the unit gives a graph every nine seconds with the same maximum scale VSWR indicated.

Needless to say, aerial adjustments are extremely easy, especially when

you're out in your garden, on your roof, or even up your tower! As well as manual range setting, an 'auto centring' facility is available. Here the unit can automatically set the minimum VSWR in the frequency range you've selected to the centre of the display – useful as an initial check. In 'single frequency' mode, the Analyst gives an audible bleeps every few seconds, the audio frequency of the bleep corresponding to the VSWR. So it's easy to adjust your ATU or whatever by listening for the lowest tone. Another thing I found was that I could use the Analyst to easily show the 2:1 or 3:1 VSWR bandwidth by first connecting a 100Ω or 150Ω resistor in place of the aerial (this giving 2:1 and 3:1 mismatch respectively compared to 50Ω), the analyst then configuring its display to this as the 'maximum' VSWR reading.

As well as using the unit as a check of, basically, what I already knew about my aerials, I also managed to use the unit 'in anger'. A while ago, I erected a set of 'fan' dipoles for 20m, 15m, and 10m with a centre balun, near to my house roof. The 20m and 10m dipoles worked fine, but try as I might I couldn't resonate the 15m dipole at all. I eventually put this down to some resonant 'funny', and erected a separate 15m dipole in a different position. I thought I'd now have another go, this time with the AEA HF Analyst – which revealed all! When cut to what I thought was the correct length, the 15m section was actually resonant in two places, the VSWR null being at 19.5MHz with another 'odd' null of around 3:1 at 21.9MHz. Cutting bits off the 15m dipole section very quickly gave me a perfect match at 21.225MHz, the centre of the band, with no extra 'oddities'. I'd never have found this otherwise, and I now need one less aerial!

Conclusions

It's very easy for me to write enthusiastic comments after I've played with the AEA Aerial Analyst for a while, especially when it solved a problem that had me confounded. But it was *incredibly* useful, I wish I'd have had it when I was putting up my 5 band vertical, my quad-band yagi, my 160/80/40m trap dipole, my the list goes on. I'm very tempted to buy one, I was quite sad to have to send it back following the review period. I believe something like this could also be a very useful 'club purchase', and I'd certainly recommend this as a most useful piece of test equipment.

The AEA HF Analyst is currently priced at £395, and my thanks go to ICS Electronics in Arundel for the loan of the review unit.

SCANNERS

From The Editor's Desk

In talking to readers, the word 'computers' often seems to come up as one of the items to be found in the homes of radio listeners. So this month, you'll find something here to use on your computer to help you keep track of all those frequencies. Next month, I plan to detail a program, that's yours for just a disk and SAE, that helps out in airband listening. This sort of feedback from readers isn't just useful, it's essential. But don't worry, computers aren't 'taking over' these pages. Let me know what else you'd like to see in *Scanners* each month! Reader's letters for publication on topical issues are also most welcome. Write in with your views, to Sheila Lorek, Editor *Scanners/HRT*, ASP, Argus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST.

ScanNews

Chris Lorek brings the latest news from the listening world this month

Following last month's announcement of the new AR-3030 from AOR-UK, I've been told the UK price has now been confirmed as £699 including VAT. I was fortunate in meeting up with Tak Endo and Richard Hillier of AOR-UK at this year's Leicester Show, and managed to have a quick 'play' with a prototype of the new receiver which Richard and Tak had

Tak Endo (left) with Richard Hillier (right) proudly display the new AR-3030 high-performance HF receiver.



New Products

Netset PRO-2032

This is the latest scanner to be released by Netset, and is a 200 channel base/mobile set. It features scanning between limits, hyperscan, search, lockout, scan delay and a priority channel, plus a 10-channel monitor bank for temporary storage of frequencies found. The scanner is powered from AC mains or a 12v DC supply, and comes with a telescopic aerial which plugs into the unit. We're planning to review this model in next month's issue, watch this space! In the meantime, you can get further details from Netset suppliers Link Electronics in Peterborough, Tel. 0733 345731.

LaserQuest for the AR-3000A

The curiously-named *LaserQuest* (we thought it was a new computer game) is described as one of the first software packages to take control of the AOR 3000A communications receiver in conjunction with the Commodore Amiga range of computers. We're told that virtually all the features incorporated in the AR-3000A may be controlled with *LaserQuest*, e.g., frequency entry, step size, scanning, searching, priority monitoring, signal meter, attenuator, mode, shift etc. A

brought along with them. Watch out for the review, coming here soon.

New 'Passport To World Band Radio'

If you're a short wave broadcast band listener, this book is, in my opinion, an essential accessory to have next to your receiver. I've certainly done likewise over the last few years! Now in its 10th year, 'Passport' continues to act as an authoritative and easy-to-use guide to the world of international short wave broadcasting from a listener's point of view.

Within its pages you'll find plenty of information, including: 'How to Listen', the '1994 Passport Buyer's Guide to World Band Radios', and 'When and Where'. The latter is a very useful section, giving details such as an hour-by-hour selection on which English broadcasts you can receive in your location, and a 'country-by-country' section on broadcasts in English. Last but not least, the 'Blue Pages' are a channel-by-channel guide to what's on, and where, in frequency order which

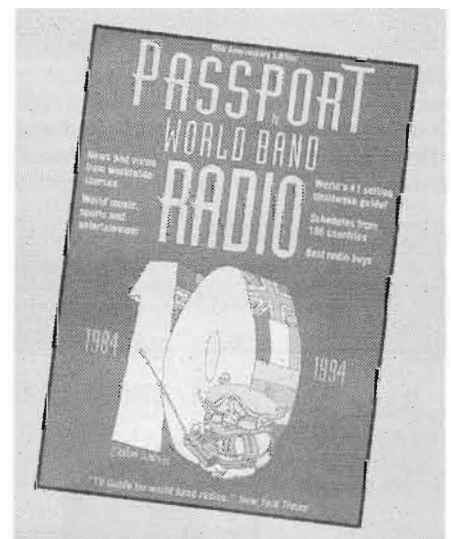


The new Netset PRO-2032

password protection routine is incorporated, and all memory files are automatically encrypted to protect the user from 'prying eyes'! A useful feature is the incorporation of a spectrum analyzer type display with bar graph, and single, repeat, cumulative or date/time controlled options. We've been promised a review sample as soon as it's ready, and our thanks go to the LaserQuest distributors, who are Hi-Mach Technologies (UK), Tel. 0244 549563, for this information.

Glassmount Scanner Aerial

Waters and Stanton Electronics have announced the availability of their new TGSP glassmount wide band scanner aerial for mobile use. Using a similar mounting method to professional glassmounted aerials, it requires no holes to be drilled, and a re-mount kit is available if you change vehicles in the future. They tell us it's proving an ideal option for car scanner use. Priced at £32.95, you can get further details from Waters and Stanton in Hockley (Tel. 0702 206835).



can be a useful guide to identifying that strange station you're listening to. With 432 pages it's priced at £14.99 and should be available from bookshops, ISBN 0-914914-30-5, as well as

several radio and scanner dealers. It's distributed in the UK by Gazelle book Services Ltd. (Tel. 0524 68765).

Free 'DXers Guide to the Galaxy' Listening Guide

You may already be a listener to Radio Sweden, either on HF or on the Astra satellite

(on 11.597GHz – the Sky Movies Gold transponder – with audio on 7.74MHz). George Wood is the station's DX Editor, and he's put together a 50 page softbound book full of interesting information of virtually every type of communications satellite in operation, including military satellites, the Space Shuttle, and the Mir Space Station. What's more, the book's yours, free, for the asking.

Part One details European broadcast sat-

ellites, whilst Part Two covers 'Weather and other Utility satellites', Part Three details amateur radio satellites you can tune into with your scanner, and Part Four gives an idea of what's coming in the future and where you can get more information. If you'd like a copy, which comes also with a nice pamphlet on Radio Sweden, write to Radio Sweden, S-105 10 Stockholm, Sweden, asking for the 'DXers Guide to the Galaxy'.

Improving Your Scanner

Bill Robertson tells how you can literally transform your scanner

For the owners of some types of handheld wide-coverage scanners, connecting an external aerial transforms what was a reasonable receiver into something which just gets 'clobbered' by strong signals on nearby channels. Reviews in *Scanners* of the standard on-air performance of, for example, the Icom IC-R1 and the Alinco DJ-X1, has shown this to be a 'real' problem, rather than just something measured by technical boffins in their laboratory! Although these sets pack a great deal into a tiny case, in all fairness they aren't designed for such use with outdoor aerials. But users will be users, and it isn't much fun in trying to search across a frequency range on, say, UHF, with the scanner 'locking up' at 6, 5, 4, 3, 2 and 1 channels away from the 'wanted' signal each time, is it? Your finger gets naturally used to being kept on the 'pass' button!

But why does this happen? Then let's take a look. Let's then show how to get over it with a single improvement to the set's 'insides'.

Inside The Scanner

In the cases of the above two examples, where very good engineering practices have been used in the wideband 'front end', a high first IF (Intermediate Frequency) gives you extremely good 'image rejection'. This means you don't hear signals on two sets of frequencies – the classic American 'cellphone' problem. However, plenty of signal gain in the first stages means plenty of signal at the second IF stages of 10.7MHz. The majority of the set's

selectivity, i.e., its ability to reject nearby channels for narrowband communications use like narrowband FM and AM, takes place at the third and final IF of 455kHz (yes, there's another one!). Here you'll usually find a block ceramic filter, like you see in many CB sets. Before this comes a 'mixer' which downconverts the 10.7MHz signal to 455kHz. This is the bit of circuit that doesn't like strong, unwanted signals. It doesn't like them at all. The problem is, the 10.7MHz filter before this is usually a small three-legged ceramic filter, the type you find in wideband FM stereo receivers. It needs to be wide to let those signals through to the 10.7MHz wideband FM detector stage. Sometimes a couple of these filters are used 'in series' to give better performance, but the 'passband' is still just as wide! This means it lets strong unwanted signals on nearby 'narrowband' 'communications' channels get the better of the mixer, which causes the problem you find on air.

What's The Cure?

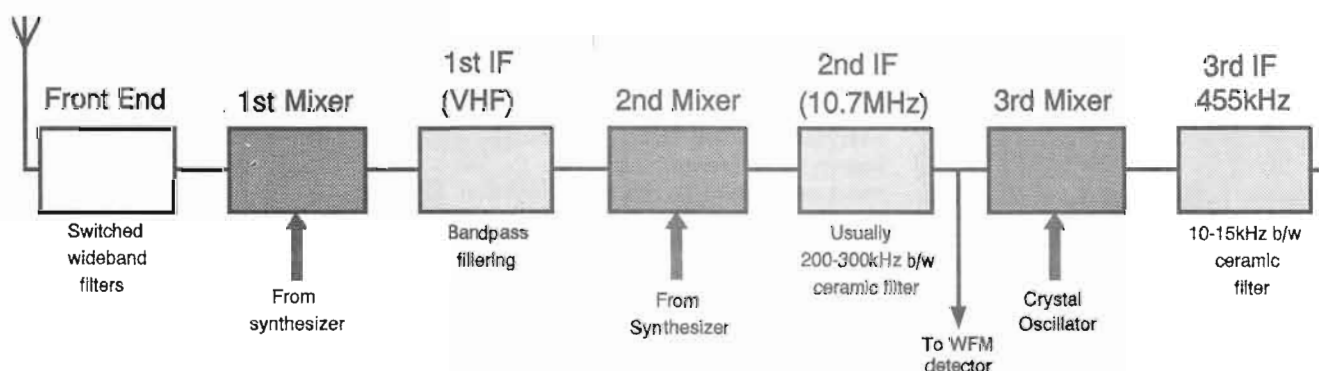
Very simple, fit a narrower, crystal filter, in place of or even in line with the wide 10.7MHz ceramic filter!

But what's the catch? Well, there's a couple. If you're a 'Smart Alec', you'll have seen that if you 'squeeze in' the filter bandwidth, those wideband Broadcast Band II signals on 88-108MHz won't be able to get through. OK, you may be able to live with that – you can use a £5 broadcast receiver in the kitchen to listen to Radio 1 with! The second problem is a little more difficult. If you've

ever dared to open up your scanner, you'll see there isn't much room in there. Most of the components are 'surface mount', and many don't even look like components at all! You need to be a very skilled electronics technician to venture inside with a soldering iron.

Why don't the manufacturers add these as 'standard'? Well, you tell me, even the UK distributors of these sets couldn't give an answer apart from that of increased cost. Which, if you look at it, is sensible. However, all is not lost! A couple of enterprising scanner dealers have also done the necessary homework you've read about here, and are doing a great job in upgrading these sets! Maybe this is their 'best kept secret'? If for example you have an Icom IC-R1 that could do with improving, give Raycom Ltd. in Alcester a ring (Tel. 0789 400600), £49 inclusive gets you a 14 day turnaround on adding such a filter to your scanner. Likewise if you have an Alinco DJ-X1 that suffers from the same problem, give Waters and Stanton in Hockley a call (Tel. 0702 206835) – who do a similar 'crystal filter' mod for the DJ-X1 but with retention of the wideband FM facility.

If you're experienced, then you can fit one yourself. If you do, ensure you check the manufacturer's specifications on the filter you've chosen, particularly the input/output impedances of this. This is because you'll need to add various components to the filter's terminals to match the existing impedances of your scanner's original filter, these depending on each individual case. Either way, you now know the way to get better performance. Happy listening!



Typical filtering arrangement in wideband scanners such as the IC-R1 and DJ-X1

Review – 'Scanner Manager'

Bill Robertson looks at a scanner database for your personal computer

With most scanners now having memory banks holding several hundred, if not a thousand, frequencies, keeping track of what you have stored in them all can be a mammoth task. Scanners haven't (yet) reached the stage where they give you a multi-line text display of what you're listening to (although some 'up-market' short wave receivers have started to feature this – Ed), so you just have to remember what 'user' you've programmed into what channel and what bank!

Extremely versatile PC-based scanner control systems, such as AcePac 3 and 3A for the AOR3000 and 3000A are available, although these have a price tag of over £100. But if you don't need full 'remote control' of your scanner, the £15 'Scanner Manager' PC database system featured here could be just the job.

Features

The program comes supplied on a single 3.5in or 5.25in disk, together with several pages of easily followed instructions on setting up and using the program. It should run on virtually any IBM PC or clone with CGA graphics or better plus at least 512k of memory. The program gives a only a black and white display, so various CGA emulators should work fine if your computer uses Hercules graphics.

In use, it gives you a powerful facility of managing what you have stored in your scanner, or indeed your scanners, on a channel-by-channel and bank-by-bank basis. An 'information card' is used for each channel, and from the information you've entered it can produce you with printed reports and the like on a channel, frequency, or user basis. It uses a 'sort of' windows-type environment, albeit with large, chunky windows, and you can move between the various windows and menus by using either a mouse or your computer's cursor keys. Selecting and entering information is thus quite easy.

The program can cope with frequencies and duplex frequencies each having up to 4 decimal places. Along with these, 'boxes' for operational mode and channel spacing are used, plus additional text fields for the user's callsign (if any), a one-line 'user' field for information on who uses the frequency, plus a three-line field for any comments you may wish to add for that channel.

Along the bottom of screen are commands for 'Continue', Left and Right 'arrows' to go up and down channels, arrows together with a 'B' for bank up/down, plus various search and print command boxes. The program can also output data in a DBASE III format to your other programs if you wish



Searching

Possibly the most powerful feature in the program is its 'search' facility, where you can find which channel the user's frequency you need is stored in. You can do this either on a frequency, duplex frequency, mode, channel spacing, user, or 'notes' basis, or indeed any combination of these. Enter 'Distress', in either upper, lower, or mixed case in the 'user' field for example, and click on the 'Continue' box, and the program will try and find the nearest match for you. Enter 'air' for example, and if you haven't anything with this stored, but you have with, say, 'aircraft', then it'll hunt that one out for you.

Security

Of course, you may want to keep your frequency and user database away from 'prying eyes'. With this in mind, the program has a 'password protection' system which you can use as an option, on a 'level by level' basis of card editing, adding, or viewing. The program author however warns that if you forget your password if you've chosen to protect your information with this, he cannot recover the data for you, it is lost forever!

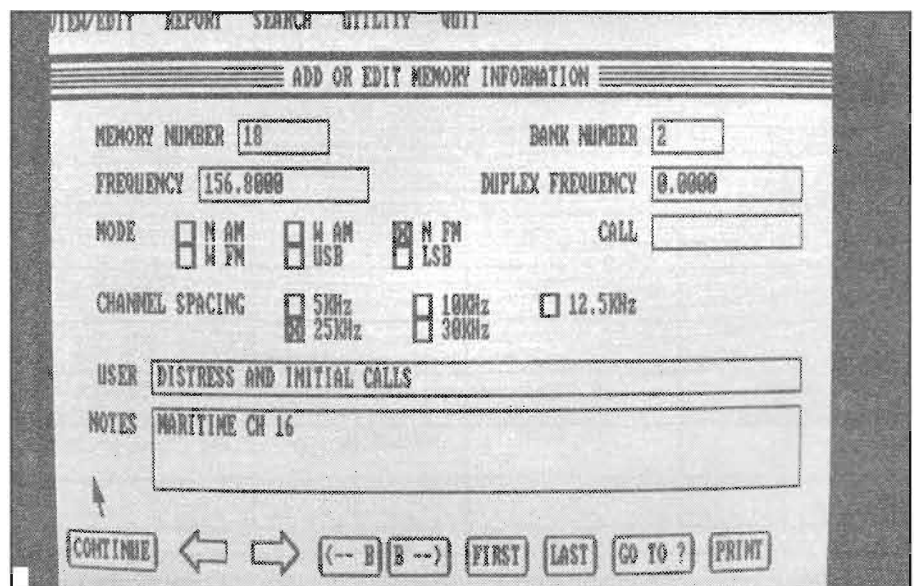
Gripes?

Yes, I did have one or two gripes regarding the program, but not many. Moving be-

tween 'cards' I found was rather clumsy, a bit more 'user-friendliness' would have been handy here, although this is probably because I'm used to using professional (and thus rather expensive) Windows-based programs. The other was in the 'search' facility which, although very useful when I knew what I wanted to find, it wouldn't, for example, find something like 'marine' if I'd have asked for 'maritime' or vice-versa. It would although find text with a 'subset' of the information I'd requested.

Conclusions

Many 'scanner databases' I've found available are US-based, with various information fields that would be limited for European usage. Scanner Manager doesn't suffer from this limitation, and I found it a very useful, if slightly clumsy-to-handle, program. The author has indicated that a shareware version of the program is due to be available on various BBS systems (he emphasizes this will not be distributed by him direct – nor can we at *Scanners* supply this I'm afraid – Ed), limited to 100 memory files. The 'full' program is available direct from the author, Mr. T. Rowell, c/o 10 Council Rd., Ashington, Northumberland, NE63 8RZ, at £15.00 (cheque, PO or international money order made payable to J. Rowell), to whom our thanks go for the supply of the review program.



Problem Page

Our monthly answer to your questions and problems in amateur radio!

Dear HRT Problems Page,

I have a problem with a PF2UB, I have the receive side working but can only transmit a very low output signal. I think the power amplifier transistor may be faulty and wonder if you can tell

me how to check this, or maybe how I can test the transmitter board to see if it's some other fault. The unit is being powered by a 13.8V PSU and gives out only a few milliwatts.

Peter Minchin G6NHW

The power amplifier unit in the PF2UB is located at the bottom right hand side of the set, in a screened unit. You can remove the screen to 'get at' the components by gently straightening the metal tabs securing this, and unscrewing the flat-headed fixing screw, then pulling the upper screen away from the body of the PA compartment. Inside, you'll see the final multiplier stage (a BFY90) which triples a 145MHz signal to 435MHz, the driver (a further BFY90), and the power amplifier (a PT3536) which is a 'flatmount' radial transistor with four legs extending from its casing, thermally bonded to the internal screen for heatsinking.

Before buying a replacement PA transistor (these are manufactured by TRW, with replacements available from companies such as Mainline and Cirkit), we need to find out whether or not it's likely to be faulty.

First, disconnect the input to the PA/multiplier stage, and terminate the input to this, from the earlier multiplier stages, with a 50 ohm load. A small 47 or 56 ohm non-inductive resistor with very short leads will be quite OK. Then use a 2m receiver to listen to your 70cm frequency divided by three, tuning the earlier multiplier stages for maximum signal strength. If you've a diode probe, tune for maximum reading at this point. If you're not getting much here, with

maybe little difference in tuning, it could be that the multiplier stages haven't been tuned to the right crystal multiplication, and the PA is trying to amplify a non-70cm frequency!

Now reconnect the final multiplier/PA stage, connect a 1/2W dummy load to the output, and using an adjacent 70cm receiver tune C2 (3rd multiplier stage) for maximum signal strength on 70cm. Remember to use a non-metallic trimming tool - you'll de-tune the circuit if you don't! Then tune C7, the driver tuned circuit - the received signal strength should increase. Now adjust C19 and C21 in the filter section, again for maximum strength. Having done that, try adjusting C13, the PA trimmer capacitor. If by now you haven't found you're getting the power output you'd expect, around 500mW, then it's investigation time.

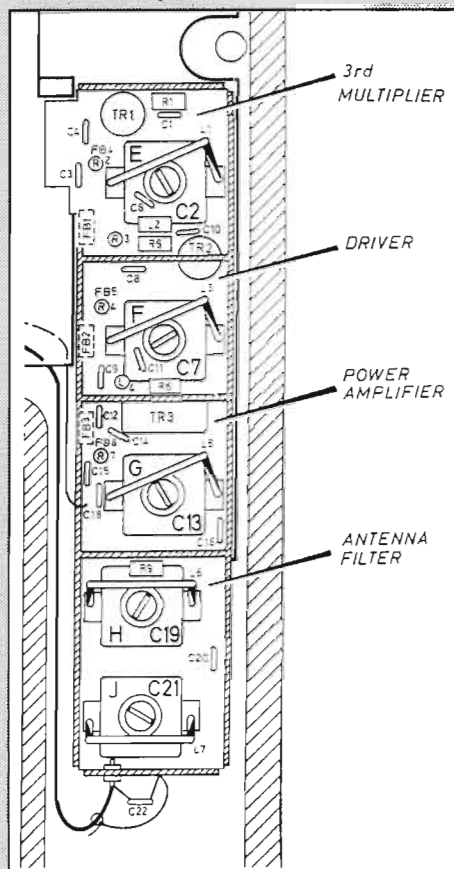
Use a diode probe and, whilst keying the PTT, look at the probe reading on the tapping point of L1. Transfer to the tapping point of L3, and check there's quite a bit more there. This will show that TR2, the driver, is amplifying. Then transfer to the tapping point of TR3, again checking there's a lot more there, which will show the PA is working. If there's a 'drop' somewhere along the line, it's a fair bet that it's that stage which isn't working. Check for 'dry' or broken solder joints, especially on the rigid silver-plated 'loop' coils which have component leads soldered to them. Due to flexing of the transceiver (they *do* get dropped in use!) these can sometimes go open circuit, resulting instead in just a small amount of 'capacitive coupling'.

If all still seems OK, then try measuring the current the set is taking on transmit. This should increase a lot when you switch to transmit, from a few tens of mA on receive to around 200mA (300mA absolute maximum) on transmit. If you find the current's OK, then suspect a faulty connection between the PA and the output - maybe the filter section, or the pin to the coax output.

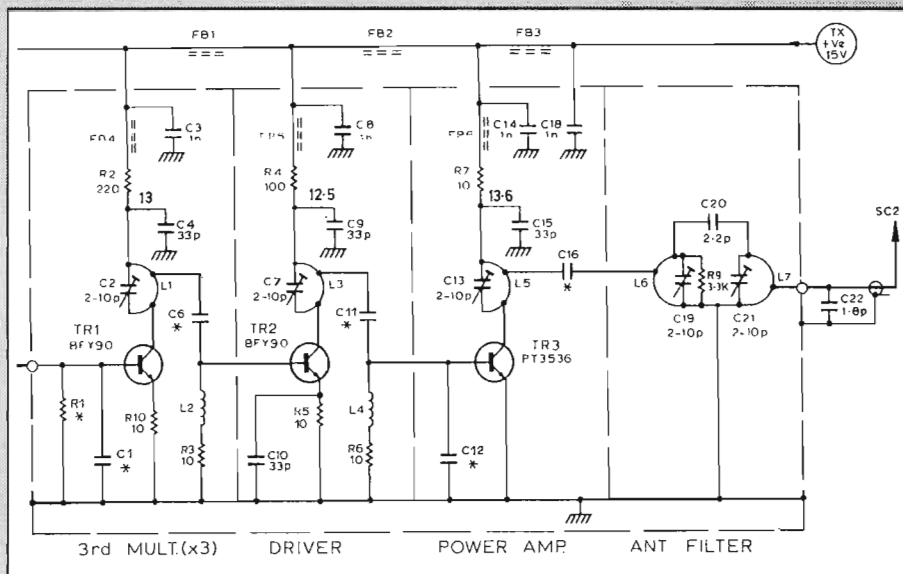
If, after following all the above, you find there's little increase in current in switching to transmit, then it does look like the PA transistor's hit the dust, although in my experience most problems are due to 'open' solder joints or the incorrect multiplier frequencies being passed to the PA.

I hope the above helps you Peter, and thanks for your question, the answers to which I hope will benefit other HRT readers. My thanks go to the Publications Department of Philips Radio Communications Systems in Cambridge for their kind permission in allowing me to reproduce the PF2UB PA circuit details shown here.

PF2UB PA Layout



PF2UB PA Circuit



The Metrewave Year

Jack Hum G5UM takes his customary retrospective look over the bands above 50MHz

Conversations generated on the metrewave bands during 1993 turned sooner or later to the observation "Where has everybody got to?". Last year, like many before it, had shown a steady decline of activity on the VHF and UHF bands. The big question was, why?

Many theories were adduced for this situation. Had everyone gone over to packet? Unlikely: the proportion of 'Packeteers' is still modest compared with the totality of metrewave operators. Had the number of licensees decreased? Not substantially: according to the Radiocommunications Agency's Annual Report there was a loss of 870 Class A licences in 1992-3 and 1,947 Class B, of whom some of the 'As' and all of the 'Bs' were VHF orientated. These figures were offset by the addition of more than a thousand Novice licensees. All in all, not much of a hole in the total of nearly 60,000 of us.

Barron bands

It has been common experience to trawl the bottom end of the 144MHz band during an evening and to come across perhaps no more than three or four SSB signals, and with luck a hopeful CW one. The 70cm, 4m, and 6m bands proved even more barren unless there was a contest on or anomalous propagation was evident.

Not so in the FM segments of these bands. Where contestants and DX chasers number maybe a few thousand of us, FM users number tens of thousands over the country. But you tend not to hear many of them on a typical evening's shack session.

So where are they all? A certain proportion are on packet radio, whose distinctive bleepings maintain all-day occupancy in their particular parts of the spectrum. Some of the packeteers might aver that the spectrum allocated for that mode is not enough, noting as they do the silent spaces either side of it. They feel they have a case for asking for more room. Be that as it may. Recognising that FM is the predominant mode in use on the four primary metrewave bands, let us take a look at its scene as it appeared during 1993.

This scene has been brightened by the enormous increase in the use of hand-held dual band transceivers. These had, and have, the merit of encouraging operators to try the delights of 'Seventy Cems'. Many essaying this band for the first time reported a renewal in their delight in amateur radio. No rat race. No idiocies on the repeaters (of which there are three times as many to talk through on 70cm than there are on 2m). A notably friendly ambience about the band. And exceptionally high standards of operating from the thousands of Novices who now inhabit it, tribute to the way they had been trained by the hundreds of dedicated men and women 'full call' who had given their time at 'techs' and similar places of learning. Bless them all, the trainers and the trained.

Two Reservations

Two reservations to the above. The hand-held rig proves disappointing when operating into an inadequate aerial (yes, that thing sticking out of the top). A multifold performance increase

results if the coax from a small vertical beam is applied to its aerial socket.

Second reservation. It was noticed during 1993 that many Novices tended to use local repeaters rather than have 'real QSOs'. A contact through a repeater is not a real QSO, as has been remarked here before. "I can hear you on the input" is the indication that a direct contact may be possible. It will be made *even more possible* if a modest beam is used. Every Novice of reasonable dexterity could build himself one, simply by obtaining redundant Band I and Band III aerials languishing unloved and unwanted in the nearest TV aerial contractor's yard.

A third observation on the Novice scene, it is a pity that so few have opted for the 'full call'. The sequence was stuck in the 20AG for much of 1993. For younger Novices the teen ages are the time of life when learning 'the code' comes most easily.

To return to our look at the FM scene, and here lies a dichotomy, do you want to use FM only or are you interested in tackling CW and SSB? If you want to do both you will need two aerials, one vertical for FM, the other horizontal for the DX modes. Yes, we've heard all about horizontal FM (peculiar term, but it is clear what is meant).

A preponderance of FM users, virtually all mobiles (though you do encounter the lone hero trying SSB with a halo) and of course all repeaters use vertically polarized 'sky hooks'. This trend, initiated on 2m and 70cm and accelerated by the growth of repeaters over the previous twenty years, has now spread to 'Four' and 'Six'. It was evident during 1993 that many pockets of 70MHz activity, including several nets, had developed. On 'Six' there is still a long way to go, too few mobiles, too large an aerial on the vehicle and low activity.

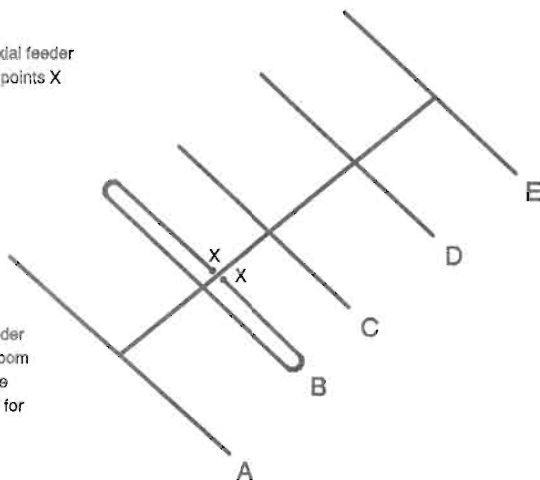
'Six', Two Rays Of Hope

Two rays of hope for FM on 'Six'. One is that the weekly GB2RS news bulletins on there, now go out vertically polarized. The other is the suggestion that repeaters should be established, a few have already on the Continent. More mobile activity would occur if they were, and the threatened upper 'meg' of 50 to 52MHz, available to the amateur service only on sufferance as a secondary

- A - Reflector - 336mm
- B - Radiator - 317mm, coaxial feeder to points X
- C - 1st Director - 305mm
- D - 2nd Director - 305mm
- E - 3rd Director - 292mm

Spacing between all elements - 165mm

Note - after connecting the feeder to points X, tape it along the boom for 50mm before taping it to the mast. Loop the feeder to allow for rotation stress.



Simple to build, and not at all expensive to buy, the Yagi aerial greatly improves the talk power of a 433MHz station - and the receive capability as well. Dimensions shown are for a 5 ele design for 'Seventy'. To adapt it for 'Two', scale up dimensions and spacings by a factor of three.

Now to more everyday matters. Last year, as all years before it, revealed a number of quirks of operating of which the following are representative. "CQ Contest": But where from? When in a contest announce your county, especially if you are 'stroke P'. Distant listeners will then know where to point their beams. By the same token... "CQ Seventy (or Six)": But where from? If you are recently licensed, hold a

Quirks of operating

As for the bottom end of 'Six', the DX end, disenchantment has set in with many operators. Comment is wide-spread that "...every QSO is the same, just RST and locator and no chance of a relaxed conversation". The addicts will say, "If you can't stand the heat in the kitchen then keep out". And certainly the heat is on when anomalous propagation aids contacts with Finland or Florida, Austria or Australia. The excitement of the chase evokes the 'Everest syndrome', the success of accepting a challenge 'because it's there'.
 Now to more everyday matters. Last year, as all years before it, revealed a number of quirks of operating of which the following are representative. "CQ Contest": But where from? When in a contest announce your county, especially if you are 'stroke P'. Distant listeners will then know where to point their beams. By the same token... "CQ Seventy (or Six)": But where from? If you are recently licensed, hold a

Returning to our opening thesis, what can be done to revive activity on the Metrowaves? Commercial predation may not be able to hear. "Thanks for the half-hour on the repeater": But how many mobiles were denied it's use during those thirty minutes?

Back To Square One

Novice call signs and are not in the Callbook, indicate location. "Thanks for this repeater QSO. My QSL sure": You don't have QSOs through repeaters but exchanges, or conversations. The repeater is doing the work and logically should be the recipient of your QSL. You won't get a card back, repeaters listen and talk but they can't write. And so on to...
 "I can hear you on the input": A real QSO should eventually swap QSL cards. "I'm using an automatic Morse key... but I can't copy you when you come back to me". The answer, slow down your sending. The other party will respond by answering you at your speed. "I can't hear anyone on the calling channel... so we might as well stay here". Don't! You never know who else might want to use it or how many distant squelches you are opening at stations you may not be able to hear. "Thanks for the half-hour on the repeater": But how many mobiles were denied it's use during those thirty minutes?

Novice call signs and are not in the Callbook, indicate location. "Thanks for this repeater QSO. My QSL sure": You don't have QSOs through repeaters but exchanges, or conversations. The repeater is doing the work and logically should be the recipient of your QSL. You won't get a card back, repeaters listen and talk but they can't write. And so on to...
 "I can hear you on the input": A real QSO should eventually swap QSL cards. "I'm using an automatic Morse key... but I can't copy you when you come back to me". The answer, slow down your sending. The other party will respond by answering you at your speed. "I can't hear anyone on the calling channel... so we might as well stay here". Don't! You never know who else might want to use it or how many distant squelches you are opening at stations you may not be able to hear. "Thanks for the half-hour on the repeater": But how many mobiles were denied it's use during those thirty minutes?
 Add your quota to Monday night CW activity night on 'Two', and to Tuesday night activity night on 'Four'. Bleep up the local repeater at regular intervals, some on 70cm in particular need more occupancy. Then go simplex if possible.
 There's much, much more that can be said. The great thing is to keep your callsign on the air (after all, you pay for it) and that expensive equipment operational. If every operator targeted generate a dozen contacts a day either direct or via repeaters, there would be no more talk about low activity. Try it and see.

COASTAL COMMUNICATIONS
 YOUR LOCAL INDEPENDENT EAST COAST DEALER

HUSTLER HF MOBILE ANTENNAS

If you are serious about HF mobile operation the Hustler HF Mobile System is the obvious choice. Hustler manufactures and sells mobile HF mobile antennas world-wide than anyone. No other manufacturer offers the convenience, the flexibility or the pure performance that Hustler does. Our HF Mobile System offers a wide variety of components which enable you to customise your installation to fit your present and future needs.

A choice of four different support masts provides an installation solution for every vehicle. A selection of seven masts provides resonators in high and moderate power levels and varying bandwidths are available. A full complement of accessories such as springs, a multi-band adaptor and a quick disconnect device complete the system.

RM-18	10m	150-250KHz	£15.95
RM-12	12m	30-120KHz	£16.50
RM-15	15m	100-150KHz	£16.95
RM-20	20m	80-100KHz	£23.95
RM-30	30m	50-60KHz	£24.50
RM-40	40m	25-30KHz	£24.95
RM-80	80m	25-30KHz	£25.95
RM-105	105m	250-400KHz	£24.95
RM-155	155m	150-200KHz	£26.95
RM-205	205m	100-150KHz	£29.95
RM-405	405m	50-80KHz	£34.95
RM-805	805m	50-60KHz	£45.95

WANT A FAIR DEAL?
 Call us at Coastal!
 Interest-free finance on the day or 90 days until 1st credit payment on 28.3% APR. Send for written details.
 Finance available through the post anywhere in the UK!

YAESU OFFICIAL DEALER HAVE APPOINTED COASTAL AS AN OFFICIAL DEALER

SPECIAL INTRODUCTORY PRICES!

FT747 c/w CW filter & MIC	£665
FT5100 c/w MIC	£495
FT736R c/w MIC	£1,375

HANDIES
 THERE ARE TWO NEW TEAMS IN TOWN, IN STOCK AND ON DISPLAY AT COASTAL!

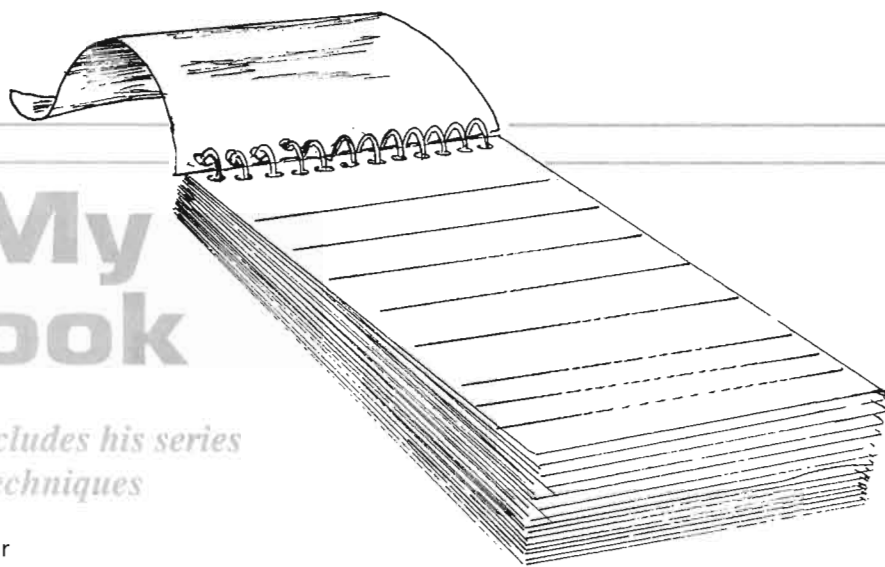
TH22E	£239
TH42E	£269
FT411E	£289
FT811E	£319

FREE FAST MAIL ORDER FROM STOCK!

19 Cambridge Road, Clacton-on-Sea, Essex CO15 3QJ Tel. 0255 474292

From My Notebook

Geoff Arnold G3GSR concludes his series on 'Hollow State' techniques



If you plan to get involved in repair or refurbishment work on valved equipment, it's useful to have some sort of bench power supply unit capable of providing HT, GB and LT for sets whose own supply circuits may be faulty. Where battery sets are concerned, either of the '1.4-volt' or '2-volt' variety, a mains-driven supply is an essential. Even if you could obtain suitable batteries, their price would virtually put them into the 'second-mortgage' category!

The HT used by battery sets – in the range 90 to 120 volts – is fairly easily obtained from a standard transformer, rectifier and reservoir capacitor set-up. Transformers with suitable HT windings are not widely available nowadays except on the second-hand market, although suppliers including Electromail and Maplin do stock a 'general-purpose' valve mains type. The HT for battery sets should be regulated in some way to avoid 'seeing-off' too many components with excess voltage. The traditional gas-filled regulator tubes are still available from valve suppliers at reasonable cost.

Provided safe limits are not exceeded, HT voltages are not generally critical. However, low screen-grid voltage can drastically reduce the anode current passed by some tetrodes and pentodes, and consequently their gain. If you find that the anode current of one of these types is low, it is worth checking the voltage on the screen grid (or measuring the value of the screen dropping resistor and the insulation of its decoupling capacitor) before replacing the valve itself.

The LT supply for battery valves is more of a problem, as it must be stable and extremely well smoothed to avoid hum. Modern technology can come to our aid, for there are any number of variable voltage regulators capable of delivering outputs of 1.2 volts upwards at reasonable currents and reasonable prices. My own favourite money-saving circuit arrangement is to use a string of forward-biased silicon diodes as 'zener-substitutes', with a suitable series resistor across a low-voltage DC supply. Bearing in mind that a silicon diode will have a forward voltage drop of around

650 to 700 millivolts, it's not difficult to visualise two in series yielding some 1.4 volts, or three in series 2.1 volts. Just about the right voltage for either type of battery-valve! A similar arrangement, but with more diodes in series, will provide a substitute for a grid-bias battery.

Tolerance on heater supply voltages is usually stated by the manufacturers to be within 7 per cent of nominal, although overall supply tolerances are quoted at 10 per cent. I've never quite reconciled the difference between these two figures. For 1.4-volt valves, the end-point for battery life is reckoned to be 1.1 volts, although oscillator circuits are likely to cease functioning long before that figure is reached, especially at higher frequencies.

The Dreaded Hum

Hum coming from the AC heater supplies can be a problem in equipment using indirectly-heated valves, too. Ideally, the whole heater circuit should be 'balanced' (you'll see the mains transformer LT secondary winding rated at 3.15V-0-3.15V, with the 0V centre-tap earthed), and run in twisted-twin wire, in an effort to cancel out the hum field. In sets using metal-chassis construction, the wiring should be tucked into the corners of the chassis as it wends its way from valve to valve.

Where your transformer has a single-ended LT secondary instead of a centre-tapped one, you can adopt an old dodge, called a 'hum-dinger'. This is simply a low-value, wire-wound potentiometer connected across the LT circuit, with its wiper earthed. The pot acts as a voltage divider, providing an artificial centre-tap for the single-ended winding, and is adjusted for minimum hum on the equipment output.

Hum is a particular problem in audio amplifiers for low-level inputs, such as dynamic microphones and gramophone pick-ups. Low-noise, low-hum valves were designed for these stages, but other special techniques

have been used. One was to power the heater of the input-stage valve from a DC source. To avoid having to include a separate smoothed supply for the purpose, the heater was connected in series with the cathode of the audio output stage, which in a beefy Class-A design could be passing upwards of 100mA, more than enough for a small voltage-amplifying pentode.

As I explained in a previous article, in a valve stage which derives its bias from the voltage drop across a cathode resistor, the cathode is positive to the (earthy) control grid, rather than the control grid being negative to the cathode. From a bias point of view, the effect is the same, but that cathode will also be positive with respect to the heater, which is usually at or near earth potential. The result can be that the cathode and heater, although insulated from each other, act as a diode, with electrons flowing from the heater to cathode. This conduction path leaks a little of the AC heater voltage into the amplifier circuitry. The result – you've guessed it – hum! One way round this one was to feed the heater of the input stage from a floating transformer winding all of its own, and to give it a positive bias by connecting it either to a tapping on a resistive voltage divider strung across the HT, or to some other positive potential, such as the cathode of the output stage. Providing the input stage heater is positive to its cathode, this diode-leakage current will be prevented.

Valve Codes

When faced with an unfamiliar piece of valved equipment, usually without the benefit of a circuit diagram to aid you, it can be very helpful to recognise the valve types, which may at least give a clue as to the circuit arrangement. All valves are marked with a type number (or were once – it may have been rubbed off), allocated according to one of several systems. Un-

fortunately, 'several' is something of an understatement—including military ones, I can think of at least sixteen different coding systems! All I have room to give you here is shortened versions of the three commercial systems most likely to be encountered in radio and TV receiving equipment in

the UK.

The first of these is the Mullard system, later adopted as a European standard by Pro-Electron (see Table 1). In this, the valve number has four parts. The first part is a letter indicating the filament or heater rating. The second part is one or more letters indicating the construction – diode, triode, pentode, etc. Multiple letters are used for multiple valves. The third part is a figure indicating the valve-base type, and the fourth part is an identifying serial number.

The second system is one used by the MO Valve Co., (Osram, GEC and Marconi), in which the valve number has two parts (see Table 2). The first, consisting of one or more letters, indicates the construction, diode, triode, pentode, etc. The second part is a serial number of one, two or three figures. This obviously doesn't give as much information as the Mullard/Pro-Electron system.

The final system I'll describe here is the American system (see Table 3), which of all three, tells you least about the valve. The first part is a figure indicating the filament or heater voltage. The second part consists of one or two letters which are really just a serial 'number'. The third part is a figure indicating the number of 'useful elements' brought out to pins and top cap (if there is one), calculated according to a fairly tortuous formula.

I emphasise that these are abbreviated listings. Full versions of these

numbering systems, and many others, have appeared in various reference books over the years. A series of comprehensive articles on commercial and military numbering systems, including military valve equivalent information, were published in 'Radio Bygones' magazine, issues 9, 10, 11 and 14. Readers of this column can obtain the set of four issues at a special price of £6.00 including UK post and packing, by sending a cheque to G C Arnold Partners, 9 Wetherby Close, Broadstone, Dorset BH18 8JB, and requesting 'Valve Numbering Info'.

Table 1. Pro-Electron/European Receiving valves

Filament or heater rating	
A	4V
B	180mA
C	200mA
D	0V-1.5V (1.4V nominal)
E	6.3V
G	5V (later various voltages)
H	150mA
K	2V
P	300mA
U	100mA

Construction

A	Diode (excluding rectifier)
B	Double diode with common cathode (excluding rectifier)
C	Triode (excluding power output)
D	Power output triode
F	Pentode (excluding power output)
H	Hexode or heptode (of the hexode type)
K	Octode or heptode (of the octode type)
L	Power output tetrode or pentode
M	Tuning indicator
N	Thyratron
Y	Half-wave rectifier
Z	Full-wave rectifier

Note – For multiple valves, 2 or 3 letters may be used, in alphabetical sequence

Base type

1	Miscellaneous
2	B10B (previously B8B/B8G (Loctal))
3	International Octal
4	B8A (Rim-fit)
5	B9D (Magnoval) & Noval (previously B9G)
8	B9A (Noval)
9	B7G (Miniature 7-pin)

Serial number;

- .One figure for early valves
- .Two figures for later entertainment valves
- .Three or four figures for later professional valves.

Note – In some 3-figure type numbers commencing with a '1', the second digit indicates the base type

Table 2. GEC/Osram/MO Receiving valves

Construction

B	Double triode
D	Diode or double diode
GU	Gas-filled rectifier
GT	Gas-filled triode (thyatron)
H	High impedance triode
HL	Medium impedance triode
KT	Kinkless tetrode (beam tetrode)
KTW	Vari-mu RF kinkless tetrode
KTZ	Sharp cut-off RF kinkless tetrode
L	Low impedance triode
N	Output pentode
PX	Output triode
U	Rectifier
W	Vari-mu RF pentode
X	Frequency changer
Y	Tuning indicator
Z	Sharp cut-off RF pentode

Serial number;

- .One figure for early valves
- .Two or three figures for later valves

Note – Suffix 'M' indicates external metallising

Table 3. USA RMA Receiving valves

Filament or heater rating

0	Cold cathode
1	Up to 1.6V
5	4.5-5.6V
6	5.6-6.6V
7	5.6-6.6V with Loctal base

Above this, figures represent the nominal working voltage

Note – For tapped filaments or heaters, the figure indicates rating with sections in series

Serial & code letters; Allotted in sequence commencing with A (omitting I and O). Rectifiers follow the sequence backwards commencing at Z. When all the single letters are exhausted, the sequence continues using two letters commencing with AB. Single-ended valves usually have the first letter S. The second letter may be that of the nearest equivalent double-ended valve. The initial letter L indicates a lock-in type in the battery range.

Number of 'Useful elements' brought out;

Metal valve envelopes, lock-in metal bases and internal screens on separate and exclusive terminals count as useful elements. A filament or heater, whether single or tapped, counts as one except for unequally-rated tapped sections. In octal-based glass valves count pin No. 1 as one, even if unconnected. Combinations of elements connected to the same pin count as one.

Suffix letters;

- A, B, C, etc., indicate a later/modified version which can be substituted for a previous one but not vice-versa.
- W indicates a military version.
- X indicates a low-loss base.
- Y indicates a medium-loss base.

QRP Corner

Dick Pascoe G0BPS reports on the 1993 QRP Convention in Rochdale



Dick G0BPS tries out the new Ten-Tec Scout and Jones key, watched by George G3RJV, during the QRP mini convention at Rochdale

Having a long chat with the Editor, I must thank all those readers who noted on the HRT Reader's Survey that they liked this column – you may note the extra space I've recently had as a result!

G-QRP Convention

I always look forward to October, not because winter is fast approaching, but because the annual pilgrimage to Rochdale is nearing. The QRP Convention that is held each year at the Rev. George Dobbs' church is *not* a 'rally' by today's standards, but, I am told by long standing amateurs, it is very much like what a rally **used** to be some thirty years ago. A place to meet those friends worked and swap a few goodies.

Some five years past, George decided that a small gathering of friends and other QRP enthusiasts would be very nice. Unfortunately, he chose the same weekend as the very popular Leicester Rally, but even so, about one hundred dedicated club members turned up. Obviously these members enjoyed themselves so much, that

George decided to try again the following year. Now in its fifth year, this annual gathering has become a highlight of the QRP calendar for many members (and a few non-members too). This year almost 400 visitors attended, with members from several other countries too.

For her third visit, Paula WB9TBU again brought husband Wally along. Paula is President of our American sister club, the Amateur Radio Club International, which, like the G-QRP Club, is also growing at a high rate of knots! Petre OK1CZ was another visitor who returned yet again. Petre, the Secretary of the OK QRP Club, has gained many close friends here in the UK. Johnny SM7UCZ brought his wife *and* another couple too, he must have enjoyed his lone visit last year very much! Peter PE1MHO, Marinus PE1LIF and two other members of the Dutch Dragonslayers QRP group, arrived laden with goodies such as special cakes, Dutch gin, beer, coffee and butter (there is only one non-Dutch member of this club, yours truly!). Other countries represented included a single visitor from Austria, plus a foursome from Germany.

The main attraction of the Convention is the Saturday, when the doors of St. Aidan's Church hall are opened and

the visitors roll up. A non-profit-making bring and buy is available with lots of beautiful junk (sorry – valuable surplus equipment) for the discerning visitor. A club stand selling goodies that are a 'must', together with a very few select traders who are closely associated with the club, were present. Black boxes are not to be seen, but lots of kits were available from several suppliers.

Living in Folkestone, it's a long way to your's truly to travel for just the one day, so a long weekend in the company of George and his delightful wife Jo-Anne makes the convention side almost an aside.

Just before I left home, a phone call from the Editor informed me that a sample of the new Ten-Tec Scout transceiver had arrived for me to 'play with' (*our thanks to Waters and Stanton for the sample – Ed*). "Don't send it to me at home!" I cried, "send it to Rochdale." What a chance to try it out, with almost a dozen or so club members in George's shack. Suffice to say I managed to turn the wick down from the 50W as supplied to about 4W, fed it into a simple wire doublet, then worked 5T5 on 40m getting a 549 report! I was using the new Jones hand key too, a brief review of this is planned for the near future.

One of the small 'fun' parts of the weekend was to visit a local who deals in used test equipment. Called 'the sheds' by locals, a visit by invitation only is an eye opener! Piles of test gear vie with pieces of *very useful things* to catch the eye. Mine was caught by a very nice signal generator, a crossing of palms with silver and it was mine. I mention this because Ty, GM0LNO bought a very large cucumber slicer, sorry, variable capacitor.

Back at the vicarage, talk turned to the capacitance value of this unit and of course church funds. A challenge was thrown out, at 50p a time to guess the value. In all, £10 was collected and we split this 50/50 with half going to the person who made the nearest guess and the other half to the church. My capacitance bridge was brought into action, after all, offers had been made to measure the beast.

Now there is a moral to this story. The winner was David GM4LNX who rightly guessed 173pF, various members having chosen everything from 16pF to 2000pF. When given the prize, David offered some words of wisdom; when guessing the value of a variable capacitor, look at the sides. This one was marked 10-173. We had all missed it! For those members, or even those vaguely interested, a visit to next year's convention is a must. I will of course be there, all being well.

G6XBH G1RAS G8UUS

Visit your Local Emporium

Large selection of New/Used Equipment on Show

AGENTS FOR:

YAESU • AZDEN • ICOM • KENWOOD • ALINCO

ACCESSORIES:

Diamond Range, Adonis Mics, Mutek Pre-Amps, Barenco Mast Supports, DRAE Products, BNOS Linears & PSU's, ERA Microreader & BP 34 Filter, SEM Products Full range of scanning receivers

AERIALS. Tonna. Full Range of Mobile Ants. Jaybeam

JUST GIVE US A RING

Radio Amateur Supplies

3 Farndon Green, Wollaton Park, Nottingham NG8 1DU
Off Ring Rd., between A52 (Derby Road) & A609 (Ilkeston Road)
Monday: CLOSED Saturday 9am-4pm, Tuesday-Friday 10am-5pm

Tel: 0602 280267

R.A.S. (Nottingham)

R.A.S. (Nottingham)

ARE YOU MISSING OUT EVERY MONTH?

Are you having trouble getting a copy of your favourite HRT magazine every month? Are you missing out on the great news, views and features that we pack in these pages? Are you losing the race to grab the new issues? Do you want to help yourself or a friend keep in touch? If the answer to any of those questions is yes then simply fill in your name and address on this coupon and hand it to your local newsagent and he will order or save a copy just for you!



Dear newsagent,

Please deliver/save me a copy of Ham Radio Today Magazine every month.

Name

Address

Ham Radio Today is available from SM Distribution Ltd.,
Tel. 081 677 8111. ISSN No. 0269-8269

Next Month

Projects;

Add-on Preselector for HF receivers
Pye/Philips MX294 Ex-PMR Conversion to 2m and 4m

Reviews;

Alinco DJ-480 Novice 70cm hand held
Yaesu FT-11 2m hand held
Netset PRO-2032 base scanner
Optoelectronics 3300 Mini Counter
Amateur Radio CD-ROM programs

Plus all our regular columns and more

(Planned articles subject to editorial space being available.)



familiar to club members, Miguel EA3EGV, Vicens EA3ADV, Miguel EA3FHC and Xavier EA3GCV. They publish a magazine similar to 'Sprat', with their first issue showing a photo of the famous OXO transmitter on the front cover. A sample copy of the membership certificate is shown. If you would like more information on this latest QRP club, contact Miguel EA3EGV at Pau Abad 15 3o 1a. 08207 Sabadell, Barcelona, Spain.

Talking of other QRP clubs, readers will be aware that I handle the DX membership of the ARCI, membership application cost just £7 with renewals at £6. I also now handle DX membership applications for the OK QRP club, these cost £5. Application forms for both these clubs are available from me at the address below.

That's it for this month, I would like to thank again all those people who made a note on the survey that they like the column, we now have extra space as a result. Please write in with your news and views on low power operating, circuits for simple projects are also very welcome. Share your pleasure with others by sending a note to me Dick Pascoe G0BPS, Seaview House, Crete Road East, Folkestone, Kent CT18 7EG, via packet @ GB7RMS, or via HRT Editorial.

QU-R-PE

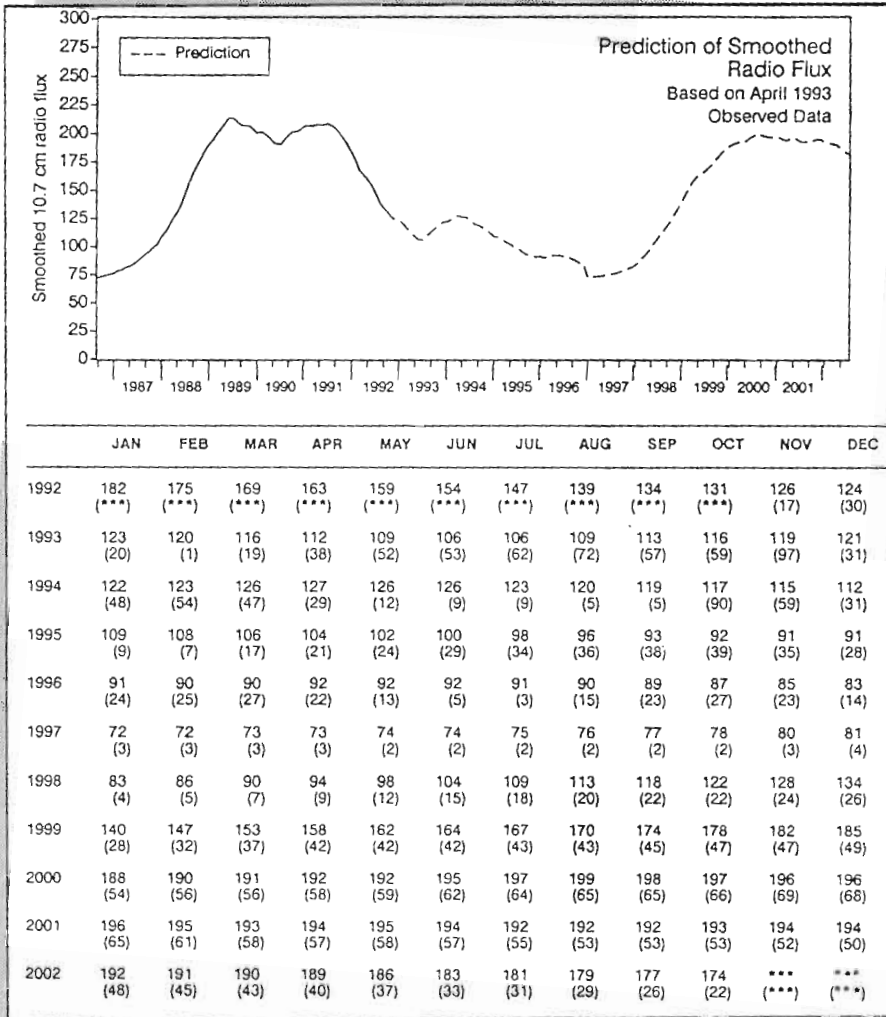
Some interesting news from Spain, where a new QRP club has been started, named the QU-R-PE EA-QRP Club. The name, as the heading may not be dis-

The new EA-QRP Club membership certificate

tinct, but when spoken slowly with a Spanish accent, the meaning will become obvious. Try "Quoo- air-pee." Founder members call signs may be

VHF/UHF Message

Geoff Brown GJ4ICD says "Things have definately been going downhill now"



Unfortunately no stations were active, but many people were listening as Eric F5JKK (ex TL8MB etc) was heard operating on the HF bands as 5T5/P/F5JKK hoping that he would come up on 50MHz and give everybody a new country.

On the 8th, 5T5/P/F5JKK in IL30AM was worked in Italy, Spain and northern France up to IN97 (two squares south of your's truly!) by what seems to be double hop 'ES' which is really unreal at this time of year, as, signals were S9+ and it seems just the right distance. It does seem too short for TEP mode, and also too far north (20deg), but you never know with 50MHz. If it was TEP, then why haven't USA stations been working into the Caribbean recently?

The 9th (with a 'K' of 6) brought more single hop 'ES' in the afternoon to Portugal (CT1BH) and a loud data signal on 50.125MHz, there was also an opening to Italy from the north of England. The next day, more 'ES', this time to YU, OM, 9A3, CQ7 (Special prefix for Portugal) and at 1200z the beacon CU3URA/SIX in HM68 was S9+, again believed to be multi-hop 'ES'.

Once again these sporadic 'E' events have happened just after, or around, solar flare activity, which must indicate something! But at 1700z things were going crazy with SM's, OH's coming in, and down to the south a new one for everybody, Eric 5T5/F5JKK (5T5JC) who was S9+40db into GJ. Ken G4IGO phoned around the DXers to let as many people as possible know Eric was on

The Current Solar Cycle Trend

Well, things are definitely going downhill now, with little or no 50MHz TEP propagation being reported in the UK. But without the valuable beacons on six, we wouldn't know if there was any propagation at all. Below you can see the current trend of the solar cycle.

Band propagation

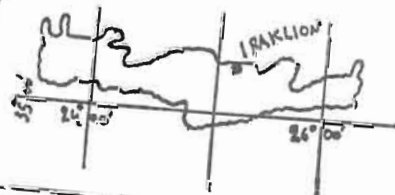
October 6th brought a short 'ES' opening into the UK on 50MHz, Neil G0JHC reported stations in Portugal as being S9+. The beacon V51VHF was heard into the south of the UK on the 5th at around 1730z, it seemed that no 'ES' was present for the TEP to link up to, so it looks as though it could well have been pure TEP from Namibia.

Rare DX here! SV9ANJ is now QRV for another country on 50MHz

KPHTH CRETE ISL
EUROPE-ZONE 20

SV9ANJ
EMANUEL NERANTZOU LIS

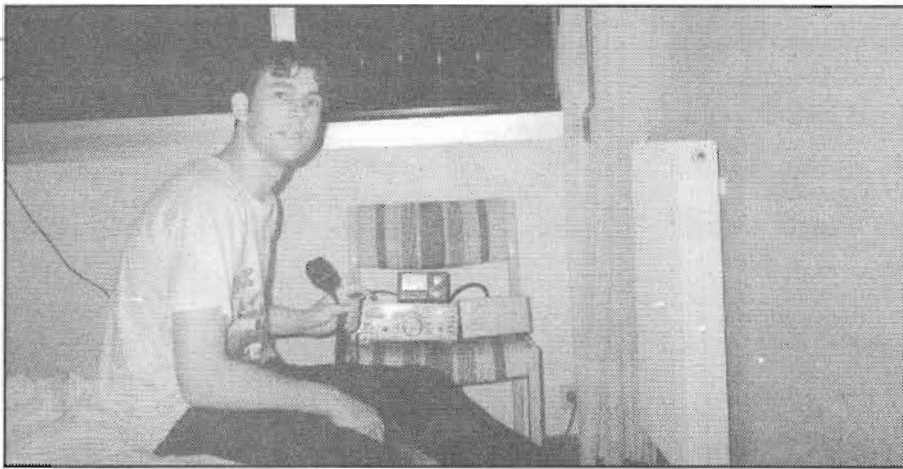
P.O. BOX 1272
71110 IRAKLION - CRETE ISL.
HELAS



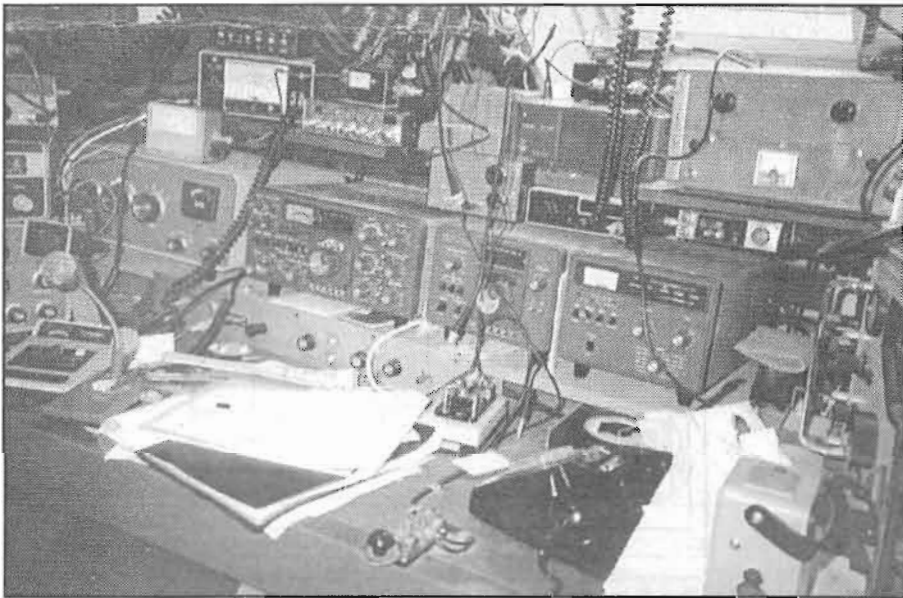
CONFIRMING CONTACT

RADIO	DATE	UTC	MHz	2-WAY	RST
GJ4ICD	15 8 92	8 29	50	SSB	5 9

LOC. KM25NH



Dave OZ3SDL/G3SDL's 50MHz shack



Raymond F/PB0ALN operating in France on VHF last year

the band (truly great spirit in a field of competition!). Others known to have made the grade were G3WDS, G4CCZ, G3ZYY and another station, believed to be a Class B in the Cornwall area. Well done to all.

More 'ES' on the 11th at lunch time from the north of England to CT was reported by Neil G0JHC and others. In a QSO on 28MHz at 1700z on the 11th, Eric 5T5JC told me that he had just had a TEP opening to PY5, ZP and LU at 1630z. At 1700z Eric then had a path into SV9 and 5B4, unreal! Later that night Neil G0JHC had single hop 'ES' to CT0WW and then EH8ACW in for two solid hours via double hop 'E'. At 2130z PY5CC was into Belgium and Europe, he was also heard by G0JHC in Lancashire.

The 14th brought more life to 50MHz with a TEP opening enhanced at the top end with 'ES'. African stations worked in the Southern half of the UK were 7Q7RM, Larry A22BW and Mal Z23JO. Another small 'ES' opening occurred on the 17th to 9A, S5 and YU. It lasted around two hours with very strong signals reported.

The Higher Bands

Conditions have been very poor recently with very little info coming in. For you moonbounce lovers, news is that Eric 5T5JC has with him an FT736 with 144/432 and 50MHz. Eric is stationed in Mauritania (very rare on 144/432) for another 18 months and may be persuaded to use one of the military dishes he has access to, for 144 or 432MHz EME. Look out for him on 14.345MHz or 28.885MHz on the HF bands.

Dave G8GXP (Yorks) reported good conditions on 23cm into Germany as the high pressure started to slide away. Other openings noted from the UK around the 18th were 432MHz into OZ, SM and DL.

Beacon News

Last month's column contained information regarding the new 50MHz beacon, 9M6SMC. Well I'm pleased to say all went well and the package was delivered to Richard G4CVI for despatch. Paul G4CCZ confirmed on October 3rd that the Z21SIX beacon has now been

shipped to Zimbabwe after a long delay.

The next 50MHz beacon to be made will be 8R1SMC, and Richard G4CVI tells me its frequency will be 50.013MHz (corresponding to the 13th Camel Trophy event). 8R1SMC should be a very interesting site, as the FY7 beacon (50.039MHz FSK) has been heard several times during last summer via multi-hop 'ES'.

A new replacement 6m beacon was also about to be built for Iceland, again on behalf of SMC Ltd. However it has emerged that TF3LB has rebuilt the existing beacon, TF3SIX, on 50.057MHz and all is well again, this runs 8W into a ground plane aerial. TF3LB also states that he is QRV on 50MHz until the end of 1994.

Samir OD5SK reports that OD5SIX is still going strong, with lots of reports during the summer months of this very important propagation beacon.

In June last year, another new beacon appeared. Its call is ZS1SIX in JF96JC, the frequency is 50.080MHz (FSK) and it runs 10W into a halo.

50MHz DXCC

In the November Issue of HRT I mentioned that Ela G6HKM had become the first class 'B' operator to attain 100 countries on 50MHz. Unfortunately this was not correct, as, surprise to us all, Byron G6HCV acquired his ARRL DXCC in the early part of 1993, so apologies to all concerned for this information.

First 'G' 50MHz Repeater QSO

Phil G7BZD reported a contact with LA2PH through the Norwegian repeater in JO59 (near Oslo). The input frequency was 51.200MHz and the output was 51.800MHz, LA2PH confirmed that Phil was the first 'G' station to work through the repeater.

The VHF Convention

Don't forget this year's VHF Convention at Sandown Park, it's next month would you believe! The date is the 20th Feb, which this year does not coincide with the 144/432MHz contest weekend.

Another month and year gone by! My thanks to all who have supported HRT during 1993, and let's hope for some better conditions on the higher bands soon. Any comments, letters, and photos would be very much appreciated. Special thanks to Neil G0JHC for UKSMG info. My details; Geoff Brown, GJ4ICD, TV Shop, Belmont Rd, St Helier, Jersey, C.I. Fax/Tel 0534 77067 anytime.

Packet Radio

—Roundup—



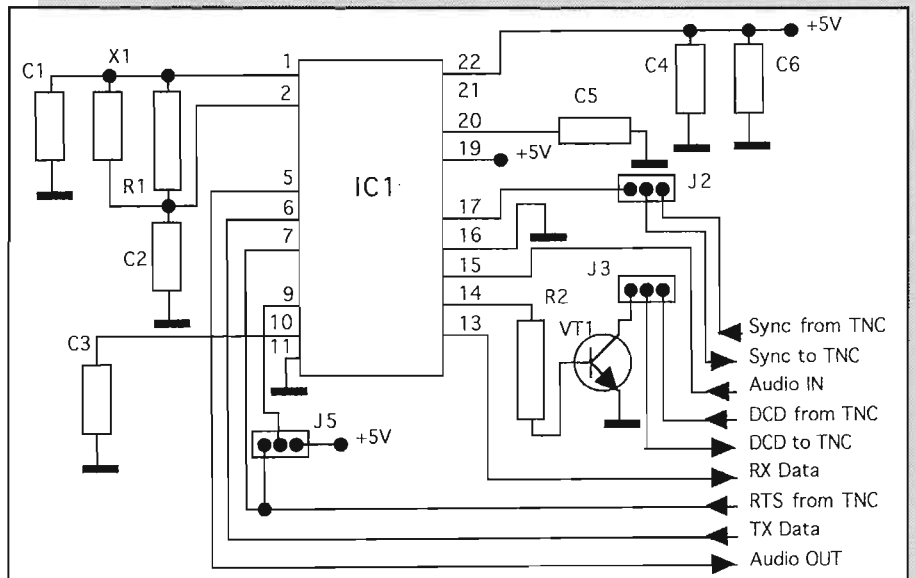
Our resident packet SysOp G4HCL looks at the new G0BSX 2400 baud modem, new firmware upgrade, and a few 'wormholes'

A phone call came from Peter G0BSX (famous in the packet world for the 'BSXTNC'), detailing his new 2400 baud TNC. I felt this would certainly be of interest to packet users, and Peter kindly sent me an information pack in the post.

G0BSX 2400 Baud Modem

Unlike 9600 baud modems for higher-speed packet, this doesn't need you to go delving inside your rig to try and modify it – the audio just plugs into your mic and speaker sockets. Peter tells me he designed the modem to fulfil the need for faster packet radio data communication on user access and inter-node dedicated links. While 2400 baud may not seem much of an improvement over the standard 1200 baud in common use, this data rate allows the use of unmodified radios and will, in most cases, require minimal modification to existing 1200 baud packet stations apart from installing the modem board.

The circuit was designed to be as simple as possible with minimal component count and size. While originally designed for the BSX2 TNC, the modem plugs into the standard TAPR modem disconnect header and can therefore be used with most TNCs on the market today – there are no mods needed for example in the Tiny-2 TNC which is commonly used for packet nodes. The modem circuit is designed around a full duplex Fast Frequency Shift Keying (FFSK) modem chip which comes in a ceramic 22 pin DIL package, together with just 11 external components including a 4.032MHz crystal and various timing and bypass components. To give an idea of performance, on Peter's dedicated 4m internode link using PMR radios, the average retry rate is 2-5 frames per hundred, with a maximum sustained data throughput of about



The 2400 baud G0BSX modem

10kB per minute.

Peter tells me he doesn't intend to make a profit out of amateur radio, just cover costs. He envisages to be able to supply the modem parts for; PCB only including documentation and postage, £6.00; partial kit of board, modem chip and crystal, £23.00 including documentation, postage and packing; and £28.00 for the full kit including p/p and documentation. Availability is usually by return, although the chip supplier seems to take about 2-3 weeks to deliver which may slow things down a little. You can contact Peter by post to Peter Meiring, 67 Tom lane, Fulwood, Sheffield S10 3PA, tel 0742 309478 (after 8.00pm please), or Email to p.d.meiring@sheffield.ac.uk, or on packet to G0BSX@GB7BSX.#19.GBR.EU

Kantronics KPC-3 Upgrade

Low Electronics, who are the UK Kantronics Distributors, now have the Version 5.1 upgrade available for owners of the KPC-3. I've seen plenty of packet bulletins asking "What does it do?", so here goes. The majority of the

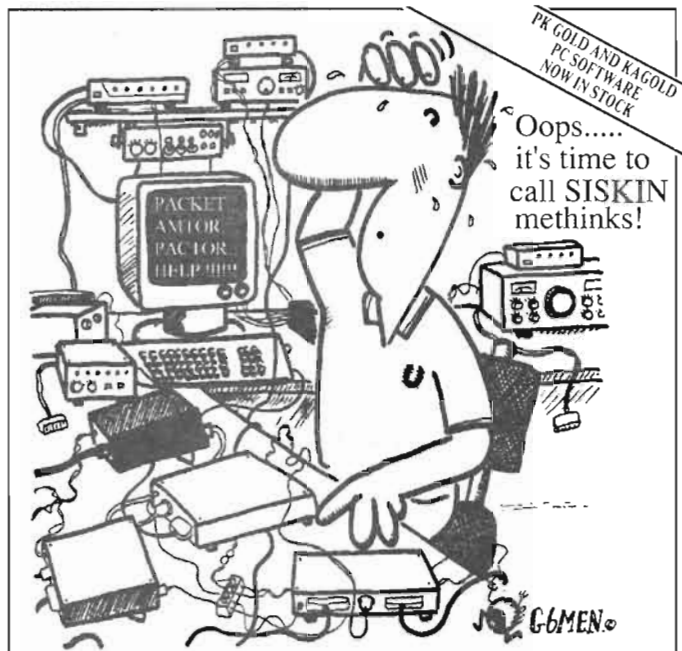
additions affect the mailbox, making it more useful with 'network' BBSs. The features of the upgrade include;

With this enhanced firmware, as well as the KPC-3 automatically initiating a 'forward' of your outgoing mail to another BBS, it can also request a reverse forward when it finishes. Messages stored in your PBBS will receive the R: line from your PBBS showing the date/time received.

When you read messages with the normal R # command, the KPC-3 now won't display those R: lines, but instead will display a short PATH: line, indicating the most recent BBSs that have handled the message. If you want to read the full routing, you can use the RH# command to read the message with all the headers displayed.

A new HTEXT command lets you set your hierarchical address. This is used whenever your PBBS forwards mail to another BBS to provide complete return addressing capability. Other new PBBS additions include the ability to select whether or not to kill private and traffic messages after they've been forwarded, and whether or not to hold messages received over the radio.

Other additions include the PHEARD command which shows you



Poor old RF Byrne is wondering where to start with Digital Radio...he should have phoned Siskin of course! Our latest Digital Radio catalogue has just rolled off the press and it's packed with the up to the minute product news for Packet Radio, PaCTOR, AMTOR, RTTY, Automatic CW, Navtex and FAX for just about any home computer available today.

We are the official importer for Interflex, PacComm, BayCom & Symek Packet Radio products and authorised dealers for Kantronics, AEA & ICS. Our *only* business is Digital Radio so whether you are just starting out or a seasoned 'Pro' debating whether to update why not give us a call today?

Siskin Electronics Ltd.
 PC House, 2 South Street,
 Hythe, Southampton SO4 6EB. Tel: 0703 207155/207587
 (8am to 8pm) Fax: 0703 847754

HRT BACK NUMBERS

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

Please supply back copies of the following HRT magazines (block capitals please);

Month Year

Month Year

Month Year

Month Year

I enclose a cheque/postal order, made payable to 'Argus Specialist Publications' to the value of £2.20 per issue ordered.

Total remittance £.....Date.....

Name

Address

Send your completed form and your remittance to:
HRT Back Issues Department,
Argus Subscription Services,
Queensway House,
2 Queensway,
Redhill, Surrey RH1 1QS

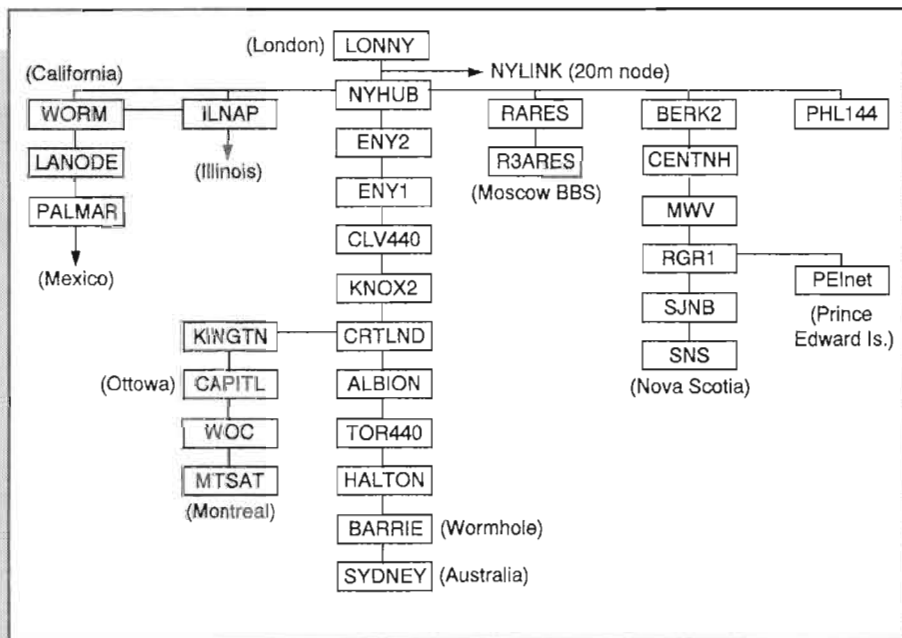
the callsigns of stations recently connecting to your mailbox along with their start and stop times, the DAYSTR command now replaces the DAYUSA command, and lets you customize the format of your Date/time display, and the CWID now lets you enter your choice of text. Contact Steve Jelly G6URJ at Lowe Electronics in Matlock, or indeed any Lowe dealer, for further details.

More International 'Wormholes'

Many amateurs on packet know of the 'wormhole' link between the LONNY

node in London and New York, USA (NYHUB). A recent packet bulletin from Kevin G0KJL @ GB7CRG, detailing a representation of routes to and from the LONNY wormhole, reveals there's at lot more! Moscow, Sydney, Ottawa, Nova Scotia, even Prince Edward Island. Kevin mentions the links may not be operational all the time, and that the wormholes to California and Illinois are not permanent. He adds there's an Internet gateway in Chicago. To access,

International packet 'wormhole' routes from LONNY



connect to iLNAP, then type; tel 44.72.38.50 (note the lower case characters). Log on as "anonymous" with the password "guest", after that Kevin say's you're on your own! One very important point to note, please *don't* download files from BBSs across these wormholes, as the current network can quickly get overloaded as a result.

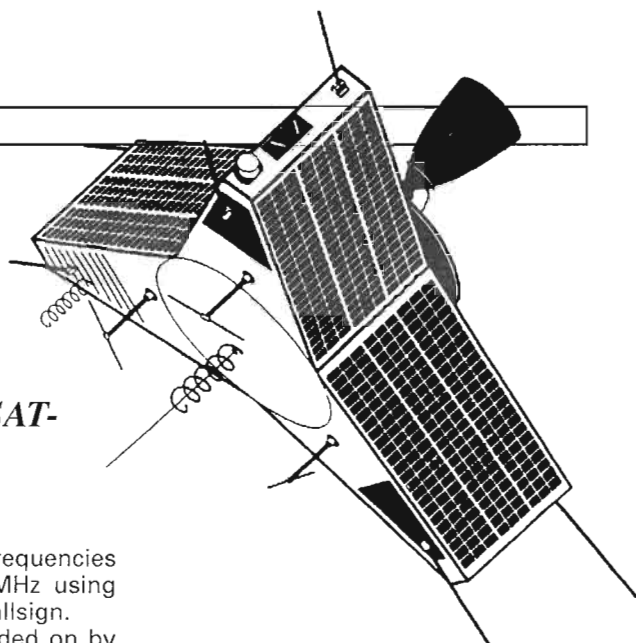
CTRL-Z, End Of Message

With the growing interest in PaCTOR on the HF bands, Peter Waters of Waters and Stanton has told me that they can now supply upgrade chips for owners of the early versions of the MFJ-1278 data controllers. The plug-in chip will add the PaCTOR mode to the menu and also expand the mailbox. Two versions are available; the MFJ-65Agiving PaCTOR and a 32k mailbox, at £76.95, and the MFJ-56B giving PaCTOR and a 128k mailbox at £97.95, prices include VAT and are post free, further details from Waters and Stanton Electronics.

With that, it's 73 from Chris G4HCL @ GB7XJZ until next month. You can contact me on packet either through the BBS or PacketCluster networks, or by post c/o Ham Radio Today magazine at the HRT address published each month.

Satellite Rendezvous

Richard Limebear G3RWL with this month's AMSAT-UK news including the Spot launch



In what was a dramatic launch from the Kourou, French Guiana spaceport, with the launch window almost closing, an ARIANE-40 launch vehicle lifted off in the small hours of 26th Sept to carry seven satellites to orbit; four of these are of general interest to radio amateurs.

KITSAT-2, was built in Korea to a University of Surrey design. Its operational specification is very similar to KITSAT-1. ITAMSAT, an Italian-designed project, carries data at 1200, 4800 and 9600 Bauds with uplinks on the two metre band and downlinks on seventy centimetres. ITAMSAT is compatible with those stations already equipped for OSCARs 16, 19 or 22. EYESAT was built by the AMRAD organisation in the USA, and carries 9600 Baud up and downlinks and an experimental 19.2 kilobaud downlink; again this is up on 2m and down on 70cm. Last to go into orbit was POSAT-1, built at Surrey in conjunction with the Portuguese. The amateur radio use of this satellite has yet to be agreed.

After some consultation with AMSAT-NA, AMSAT-UK, SSTL and the other microsat owners, an agreement on the satellite numbering was reached and is as follows:

OSCAR-24 will be skipped awaiting the final decision from Arsene. Everyone agrees that Arsene is AO-24 but of course the request and final decision comes from RACE.

The first Amateur microsat to be separated was Kitsat-B; that becomes Kitsat Oscar 25.

Itamsat and Eyesat were separated at the same time and since the Itamsat project started some two years before Eyesat, Itamsat becomes ITAMSAT Oscar 26 and Eyesat becomes AMRAD Eyesat 27. It is not yet clear if PoSat will join the Amateur satellite family, if the decision is positive it will be PoSat Oscar 28.

The following is a brief description and current status of each:

POSAT-1 is a 50 kg satellite built by the University of Surrey, for LNETI (Portugal). Its mission is to receive and transmit earth images, determine its position using GPS, make radiation measurements, and receive and forward

messages.

Commercial downlink frequencies are 429.950 and 429.450 MHz using POSAT1-11(or -12) as the callsign.

PoSAT-1 was commanded on by the SINTRA command station in Lisbon during its first pass there and telemetry points indicate that the satellite is in good condition.

PoSAT-1 carries both non-amateur and amateur radio transmitters. During commissioning, PoSAT-1 is operating on its non-amateur downlink; it is hoped that amateur operations will commence after initial satellite check-out. Attitude control operations and camera check-out continue but I have no word as to whether the boom has been deployed.

KITSAT-B is a 50 kg satellite built by Korean Advanced Institute of Space Technology (KAIST). Its mission is to take CCD pictures, process numerical information, measure radiation, and receive and forward messages.

KO-25 was activated on the same day from the Central Command Groundstation at KAIST. It carries five payloads; CCD Earth Imager, Store-and-Forward mailer, Digital Signal Processing Experiment for High Speed Modem tests, Infra-Red Sensor Experiment (IREX), Low energy electron detector (LEED) and it also has a new computer system called KASCOM (KAIST Satellite Computer).

KO-25 has deployed its gravity gradient boom and is operating nominally. After the deployment, KO-25 was confirmed to have an attitude in which the bottom of the spacecraft was looking down at Earth. After some upgrading work on the command station, receiving quality has improved and they now have excellent contact. The keplers for V59 object H still match sightings best.

The file system is up and running but not open for uploads.

EYESAT-A is a 12.5 kg microsat built by Interferometrics (USA). Its mission is experimental monitoring of mobile industrial equipment. It also carries an amateur radio payload by the Amateur Radio Research And Development Corporation (AMRAD) which is a technically-oriented, non-profit organisation of radio amateurs based in the suburbs of Washington, D.C., to

meet the needs of amateurs for a platform to conduct digital satellite communications experiments.

AO-27 was activated on its first pass over the command station near Washington, D.C., and was heard by AMRAD members throughout the area.

The amateur payload has been transmitting 1200 bps AFSK on a part-time schedule during the on-orbit check-out and commissioning of the parent EYESAT-1 satellite. AMRAD members will be preparing information for future release on receiving and decoding telemetry from the payload and on the progress of their experiments.

More recently the 9600 FM downlink was turned on while in view of the command station near Washington. Methods of adding de-emphasis to level the amplitude of the data "tones" while receiving the signal directly from the discriminator of the receiver are of particular interest if anyone has any ideas. The downlink frequency for the 9600 data rate is about 4 kHz lower than when the 1200 baud data rate is in use (436.800 MHz).

The EYESAT Beacon is on 436.8 MHz FM AFSK HDLC. This means you can copy it with a TNC, but the format is not AX.25. You can copy in KISS mode, but not AX.25 monitor mode. Power is currently < 1 watt.

ITAMSAT is a 12 kg microsat built by AMSAT-ITALY. Its mission is to store and forward Amateur Radio messages like AO-16, LU-19, KO-22, and KO-23.

Amsat-I have loaded the software and the BBS is completely open and operating at 1200 bits/sec, just like AO-16 and LO-19 but the eye pattern is cleaner. I have no information yet about operation with the higher speed experiments. Itamsat is using a reduced power of 40-70 mW and will do so until it is considered stable from the energy point of view.

ITAMSAT have published the co-efficient file for the telemetry channels for use with the DTLM program (available from Amsat-UK). ITAMSAT is us-

ing the callsign ITMSAT; but is expected to change to IY2SAT on some future occasion.

Russian Satellites

Nico PA0DLO recently visited the Radio Sputnik ground command station, meeting UA3CR, RA3APR, RV3DR, and the operators of RS3A. They passed on the following information on the satellites;

For a number of technical reasons, command problems, interference and the like, the radio amateur satellite systems RS 10/11 and RS 12/13 cannot presently be switched to modes other than those now in use. Consequently for the immediate future, RS-10 may be expected to continue to operate on Mode-A (2m uplink and 10m downlink) and RS-12 on Mode-K (15m uplink and 10m downlink). RS-11 and RS-13 will remain switched off and in standby mode.

The new Russian amateur satellite system RS-15 is now complete and ready for launch. It will be built into another Cosmos navigation satellite, similar to Cosmos-2123 which houses RS-12/13. It is not known exactly when the launch of the satellite will occur, but as soon as an older satellite in this series of navigation satellites reaches the end of its operational life, the new satellite, with RS-15, will be launched.

Plans are afoot to change MIR's amateur radio equipment. In the future not only 2m but also 70cm and even 23cm operation can be expected. ATV equipment for use aboard the space station is presently being developed in Germany.

UoSat

Controllers at the University of Surrey have been successful in regaining command of the UoSAT-2 (Oscar-

11) spacecraft. The command-lost timer activated in mid-September, and during the next pass over the UK, UoS were able to command the spacecraft to turn on its 70 cm beacon. An examination of telemetry showed that the spacecraft is in good health.

Currently UoS are leaving the transmitters off, apart from occasional telemetry collection on 70cm, until they have a better idea of the power generation etc and while they are commissioning their newer spacecraft. Once the spacecraft is returned to service additional operational activities are being planned for UO-11. Watch the UO-11 bulletins for further details.

MicroSats

LO-19 is now operating with new software; so use the same PB/PG as with all the other digital satellites. LUSAT had been working for nearly two years without interruptions or reloads.

AMSAT-UK News

Ron G3AAJ has just about got through the backlog of mail which built up during his overseas trips. If you are expecting something and haven't received it by Wednesday then shout.

The new printing of *The Guide to Oscar Operating* is selling well after

having been available for only one month, and if you were going to buy a copy of the 1993 Colloquium proceedings you'd better hurry, there's not many left. Amsat-UK now have the ARRL 11th Networking handbook in stock.

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 5-1/4 disk.

EYESAT-A

Uplink: 145.850 MHz
Downlink: 436.800 MHz
Speed: 300 - 9600 baud

KITSAT-B

Uplink: 145.870/145.980 MHz
Downlink: 435.175/436.500 MHz
Speed: 9600 baud

POSAT-1

Uplink: 145.925/145.975 MHz
Downlink: 435.250/435.275 MHz
(435.250 MHz is the primary frequency)
Speed: 9600 bps (38.4kbps probably)

ITAMSAT

Downlink: 435.867 MHz (primary) PSK 1200 baud
435.822 MHz (secondary) PSK 1200 baud
AFSK 1200 baud (FM)
9600 baud (G3RUH)
analog transponder (FM)

Uplink: 145.875 MHz 1200 baud Manchester / 4800 baud
145.900 MHz 1200 baud Manchester / 4800 baud
145.925 MHz 1200 baud Manchester / 9600 baud / exper
145.950 MHz 1200 baud Manchester / 9600 baud

KEPLERS

SAT:	OSCAR 10	UoSat 2	AO-13	PACSAT	DO-17	WO-18	LO-19	FO-20
EPOC:	93278.365519	93290.08412027	93291.97902075	9321/23406536	93294.22052761	93293.77202168	93291.73689884	93286.05864589
INCL:	27.1541	97.8032	57.9233	98.6147	98.6150	98.6153	98.6158	99.0206
RAAN:	2.6311	311.0490	288.8083	15.1060	18.3069	17.8815	16.0691	119.8565
ECCN:	0.6019084	0.0011570	0.7215023	0.0011212	0.0011374	0.0011930	0.0012313	0.0540673
ARGP:	119.6215	334.0183	326.4503	178.7520	169.2905	171.0347	176.5723	179.4597
MA:	312.8723	26.0441	3.7960	181.3697	190.8528	189.1050	183.5546	180.7200
MM:	2.05881098	14.69068128	2.09724992	14.29854858	14.29992505	14.29970770	14.30062069	12.83221389
DECY:	-5.3E-07	2.74E-06	-1.12E-06	5.5E-07	8.2E-07	7.9E-07	7.9E-07	-1.4E-07
REVN:	4955	51461	945	19502	19546	19540	19512	17243
SAT:	AO-21	UO-22	KO-23	ARSENE	KO-25 ???	POSAT (IO-26)	HEATHSAT ???	IMSAT ???
EPOC:	93299.51357557	93292.12954494	93292.44454846	93291.00020504	93292.20664361	93291.43407526	93290.66163050	93289.68053046
INCL:	82.9436	98.4601	66.0843	1.3887	98.6801	98.6791	98.6766	98.6783
RAAN:	315.6432	6.1819	64.0300	113.0212	5.1308	4.3653	3.5922	2.6194
ECCN:	0.0036152	0.0006983	0.0003238	0.2934457	0.0008356	0.0008790	0.0009185	0.0009133
ARGP:	17.8063	294.2221	352.2623	160.7792	187.8461	191.9871	179.7204	184.1077
MA:	342.4350	65.8240	7.8344	216.7640	172.2658	168.1093	180.4002	175.9987
MM:	13.74526379	14.36857525	12.86281279	1.42202686	14.27584941	14.27686814	14.27783917	14.27788155
DECY:	3.8E-07	9.3E-07	1E-08	-5.1E-07	8.1E-07	5.3E-07	-9.62E-06	2.42E-06
REVN:	13748	11846	5582	231	329	319	307	294
SAT:	EYESAT-1 ??	061H (KO-25)	RS-10/11	RS-12/13	Mir			
EPOC:	93289.11726978	93293.18077098	93290.06201884	93292.06028196	93298.24103189			
INCL:	98.6763	98.5788	82.9270	82.9254	51.6176			
RAAN:	2.0610	5.8953	148.5516	190.2557	288.0991			
ECCN:	0.0010043	0.0012182	0.0011614	0.0030765	0.0006301			
ARGP:	184.4594	157.1178	346.1410	60.2849	348.4899			
MA:	175.6498	203.0570	13.9473	300.1362	11.6140			
MM:	14.27975951	14.28010481	13.72324107	13.74027733	15.58464543			
DECY:	7.2E-07	6.9E-07	4.3E-07	1.2E-07	9.848E-05			
REVN:	286	344	31656	13553	43937			