

SEPTEMBER 1996 £2.00

# Ham Radio TODAY

**Pye P5001  
PMR Conversion  
to 2m and 4m**

**Radio Shack DX-394  
Receiver Reviewed**



# Ham Radio TODAY

HAM RADIO TODAY VOLUME 14 NO.9 SEPTEMBER 1996

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**Pye P5001 ex-PMR  
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**Radio Shack  
DX-394 HF  
receiver  
reviewed**

# CQ

## from G8IYA Editorial

### HF for all, or will it be mandatory?

There's been plenty of discussion regarding the mandatory Morse question to be raised at the 1999 World Radio Conference, which will decide 'what it's to be' for amateur radio into the next millennium. In their discussion paper, the International Amateur Radio Union's "Future of the Amateur Services Committee" have concluded that S25.5 (previously RR 2735, i.e. the 'mandatory Morse test') requirement "should be removed as a treaty obligation of administrations". If you'd like a copy of the full discussion document, I've arranged for this to be available from the Ham Radio Today 24hr fax-back service for the benefit of readers. No doubt the Ham Radio Today 'letters' page will be even fuller soon!

#### Articles

A question I'm often asked is "When will such-and-such an article be published?". These mainly come from readers who've heard of a future article 'in the pipeline', the planned Icom IC-706 modification for 4m TX/RX of Chris G4HCL's has resulted in dozens of such queries! Others, naturally, are from authors of submitted articles who are anxious to see their words in print.

I must of course maintain a 'balanced' magazine, to hopefully please as many readers as possible. Right now, if every such article went into next month's issue, it could easily be over 200 pages in thickness. Or maybe that wouldn't be too bad a thing! A major limitation is the matter of available space and budget, and of course, the time

involved in preparing the articles for publication. I have a large pile of good articles here, many that are well-written but on a highly specialised subject, others are very appealing but need substantial Editing, which must unfortunately wait their turn in the Editing queue.

But I'm still on the lookout for original articles. Not necessarily 'general' articles like "How to work DX" or "Beginner's guide to QSLing", but something that hasn't been generally covered, something you won't find in a readily available handbook or operating manual. Like simple construction projects for shack accessories, receivers, transmitters and PAs (incidentally we've a superb Winter project coming up for a 6m PA, by Geoff GJ4ICD).

If you're keen on a certain mode or operating interest, SSTV for example, and have found or even developed some new hardware or software for it, then why not share your experiences? If it's published, you'll be paid a competitive rate for your work. You can even Email us your proposed article, to; [hrt@netlink.co.uk](mailto:hrt@netlink.co.uk)

or of course submit it on PC disk, no need to print things out on paper!

#### Do the 'decent' thing?

With the above in mind, I'm occasionally asked if Ham Radio Today would freely give out articles, planned for future publication, to individual readers. Planned ex-PMR and equipment modification articles are usually the 'favourite'. One amateur recently asked for a future Ham Radio Today modification article (which has taken the author over 40 man-hours of work to date) to be

published in advance on the Internet. This was described as doing the "decent" thing to freely share the information. I think I'll pack up this job!

With the growing use of the Internet, people are becoming used to 'free' information. If you look at the Ham Radio Today Web site (<http://www.netlink.co.uk/users/hrt>) you will indeed find plenty of free information. Complete back issues of the magazine to read, plenty of equipment reviews, a couple of ex-PMR conversions, a construction feature and even a free competition. But everything in this world comes at a price, "there's no such thing as a free lunch". The Ham Radio Today Internet site is an information source on what you'll find in the magazine, with the latest amateur radio news, plus articles which *have* been in past issues, and details (but not the entire articles themselves) of what's in the current, and future, issues.

The future of publishing may well be an electronic on-line version of the latest Ham Radio Today. I have the facilities here, right now, to do it. But until we're all walking around with our multimedia wristwatch databanks and communicators, many of us like something in 'paper-based' magazine form to read on the train, in the shack, or even in bed to send us to sleep.

#### Going, going..

The newspaper headline reads "Motorists rage as hams jam radio controlled locks". Yes, it's 433.92MHz again, the frequency that's been a UK ham allocation since the 1940's, and is now also being

used by car key-fobs. These key-fob users must, *by law*, accept *any* interference to them from other users of the band. But it does look like we're going to have to put up with interference from them, and other non-ham data users of this frequency, for the foreseeable future. But now another 'menace' is rearing its head.

I'm informed that NASA (JPL) plans to launch a Synthetic Aperture Radar (SAR) on a satellite to be placed in a 400km orbit. The SAR would operate in the 400-470MHz range, and I'm told they plan to seek access to the 430-440MHz band for this. It's been reported that JPL claim that the proposed imaging radar will transmit only over land with a typical 1 to 5 minute 'on' period followed by a 10-minute 'off' time. NASA and JPL claim that this "... will result in an insignificant probability of continuous harmful interference to the Amateur Radio service".

Further recent 'band news', unrelated to the above, have been the draft US proposals for the 1997 World Radio Conference. Their Working Group's list of "candidate bands" for commercial Low Earth Orbit satellites included the amateur 2m and 70cm bands. These satellites are intended mainly to offer paging and other data messaging services. Thousands of 'protests' went to them, so maybe they've now reconsidered.

But the writing is on the wall. Will we be reading future headlines of "Pager users rage as hams jam messages" in the year 2000? Maybe we'll be relegated to using HF, the bands no-one else apart from the military might want, in the next century?

# Radio Shack DX-394 HF Receiver

Our Consultant Technical Editor tests this latest widely available short wave receiver on air and in the lab

Many scanner enthusiasts are introduced to the world of short wave listening nowadays when they buy a wide-coverage scanner, having HF coverage, possibly even with SSB, as well as the 'usual' VHF and UHF bands. The limitations of one of these receivers on HF are quickly realised, mainly because of their limited strong-signal handling capability. Sufficiently interested listeners often (naturally?) then progress to a 'purpose designed' HF receiver. The Radio Shack DX-394 comes from the same stable as the well-known Realistic and Netset scanners, and has been introduced to meet the needs of such users, as well as being a 'beginner's set' in its own right for the new Short Wave Listener.

## Knobs and buttons

A quick glance at the receiver shows an impressive-looking array of controls. There's a keypad for direct frequency entry as well as short wave broadcast band selection, and rotary knobs for RF gain, volume, mode, and 'fine tune', plus further buttons for controlling timer and step rate facilities.

The receiver covers 150kHz to 29.9999MHz, with reception modes of AM, SSB with selectable USB and LSB, and



The Radio Shack DX-394 receiver

CV. An LCD panel shows the operating frequency down to 100Hz resolution, and there's an LCD based 'S-Meter' giving readings of S1, 3, 5, 7, 9, +20 and +40. A small clock display also on the LCD shows one of two selected times, GMT and local time for example, and the timer function can be set to switch the receiver on and off for up to five preset periods. A 'sleep timer' of 30 seconds and 60 seconds is also provided, and an LCD backlight dimmer can be switched in for night-time use. The larger plastic tuning knob can be used to step up and down in selectable 100Hz, 1kHz, 5kHz and 10kHz (or selectable 9kHz on MW) steps. Together with this, a smaller 'fine tune' knob can be used to interpolate in between the tuning steps.

A speaker is built into the set's top lid, and a 3.5mm headphone socket is provided on the front panel. Round the back, a further 3.5mm jack

socket lets you plug in an external speaker if you wish. Aerial connections are provided in the form of an SO-239 socket for a 50 ohm coax-fed aerial, and a phono socket for a high-impedance aerial such as a long wire, a metal screw is fitted beneath this for a ground connection. A 20dB aerial attenuator in-line with the 50 ohm aerial connection is provided to help guard against signal overload, a small slider switch on the back panel being used to switch this in or out. As well as all this, for portable listening a small telescopic aerial is supplied, this fitting into an opening on the set's top panel, and an internal ferrite rod aerial is provided for MW and LW reception when an external aerial isn't used.

The set is powered from the mains, as is supplied with a wired-in mains lead and a correctly fitted 13A three pin plug. The set can also be

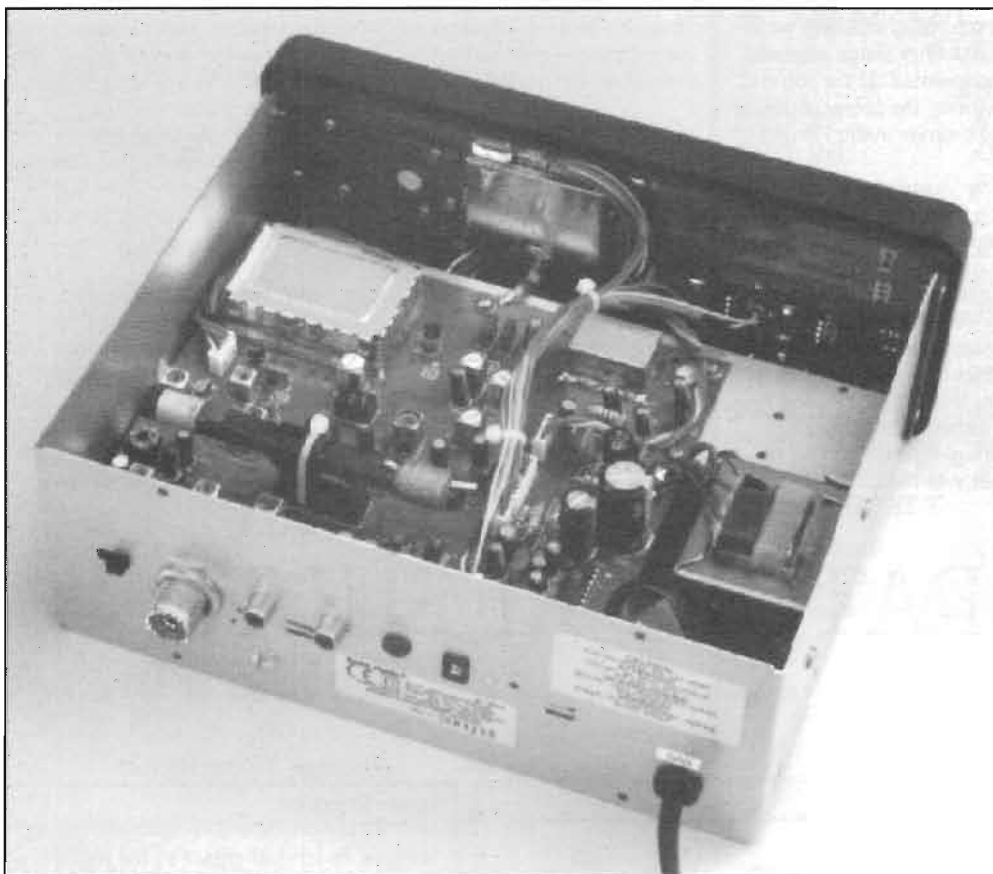
powered from an optional external 13.8V DC supply if you wish, a rear panel DC socket being fitted for use with an optional DC lead.

## Out of the box

I'd seen the set advertised in Ham Radio Today advertisements before receiving the review sample, but it was only when I opened the packing case that I realised the set was smaller than I'd imagined, the actual size being 93mm x 233mm x 230mm. The set was provided with a 30 page user instruction book, which gave brief operating instructions and accessory connection information.

## On the air

I generally used the main tuning knob for 'listening around', and I found this gave a proportionally faster tuning rate the faster I turned it - no doubt an 'inner function' of the set's microprocessor. The minimum step size of 100Hz I found was just about OK for general SSB use. However I found the smaller 'fine tune' control, which was a continuous rotary type like the main knob, tuned in 50Hz steps for interpolation for the more critical listener. Although the main tuning knob had a small 'finger detent', I found this, and indeed the main knob



Inside the unit

itself, too small to use seriously. Maybe I need smaller hands?

The set had 160 memories, plus a quick access 'monitor' memory. The memories I initially found were handy in storing broadcast band frequencies, although it was only the frequency, and not the mode, attenuator or noise blanker etc. settings that were stored. The memories were arranged into 16 'bands' of ten memories each, with ten for each of the selected bands of LW, MW, and SW, plus ten for each of the 13 SW broadcast bands. Each memory can be freely tuned away from, so the 'SW ten' could be used for amateur or utility band memories or for quick band-changing between these. The separate "band" button quickly switches between LW, MW and SW, and the further "meter" button (British readers; this is an American spelling which really means "metre"), rather than selecting a meter function, allows selection of one of the 13 HF broadcast bands.

## Modes

Although not referred to in the manual, I found the CW1 and CW2 control positions,

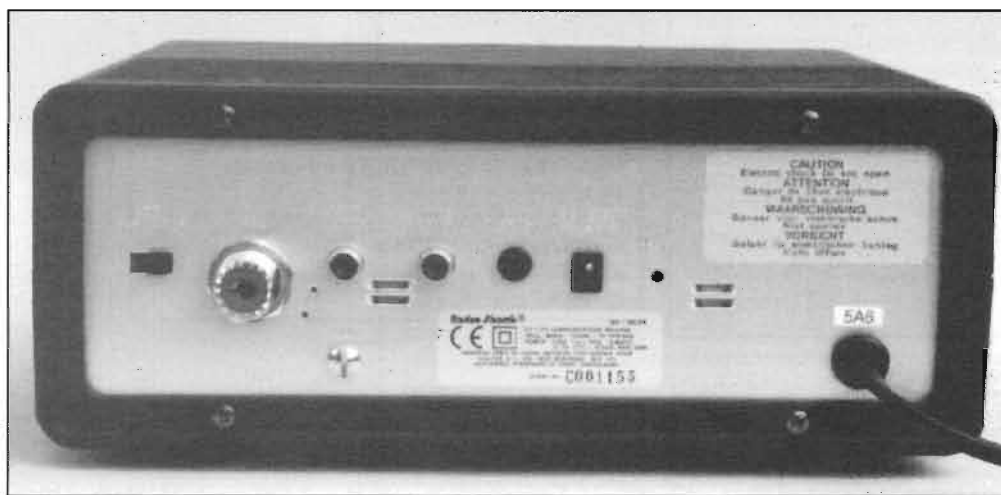
found to be far too wide, with much resultant interference from other stations on the bands, both amateur and utility. With the set connected to my outdoor HF dipole system, I usually found the

of the station I'd tuned to. However, with careful use of the rear panel attenuator switch and the RF gain control, having the former almost at minimum, or by using a physically much smaller aerial to prevent overload, I could comfortably listen to reasonably clear signals. Right now as I'm writing this, on an early Saturday evening, I'm listening to a most pleasant 'ragchew' on the 80m band.

The set has a 'tape' output, which can also be used for data decoder use (e.g. a multimode TNC or one of the very popular and low cost one-IC SSTV/Fax modems, for use with shareware/freeware programs such as JVFAX). Unfortunately I again found very poor results here, due to the wide bandwidth and lack of adjacent signal interference immunity. The 50Hz minimum tuning accuracy with the 'fine tune' also didn't allow 'spot-on' tuning of some data modes.

Although the set also has a multi-programme timer facility, there isn't a corresponding tape switching output to use with the tape audio output. So I couldn't use my VOX-less tape recorder to record HF broadcast band programs while I was away from the set (i.e. at work or asleep!).

The set gave acceptable



Rear panel connections

besides having different BFO offsets, gave two different bandwidths on my review set - the CW1 mode being slightly narrower. The CW2 and SSB bandwidths unfortunately I

wanted signal to be 'pumping' on and off (the S-meter increasing in level when the wanted signal was being muted in this way), dependant upon the levels of signals either side

performance on the broadcast bands, although I found the audio to be rather 'tinny', i.e. lacking in lower and upper fidelity, even with an external speaker plugged in. I'd also

have expected synchronous AM, for better HF broadcast reception quality, to have been fitted on a set like this, likewise FM reception, but this was not so.

## Lab tests

The measured sensitivity of the set was reasonable below 12MHz, above which it seemed to take a slight 'dive' in sensitivity of around 6dB. The 'skirt' selectivity was, strangely, broadly similar on all modes, although as I found on air the

SSB selectivity was very wide. The AM filter shape appeared to be 'pointed' at the top end, explaining the accentuation of middle-range audio I found on air.

The image and IF rejection was quite good, the blocking performance fairly reasonable and quite good at greater separations, although the close-in intermodulation rejection was pathetically bad. It looks here that the 2nd mixer is being overloaded by the rather wide 45MHz 'roofing' filter used. This no doubt was the cause of the

poor on-air close-in signal interference I consistently found on all bands.

## Conclusions

The DX-394 is fine for casual or occasional listening, but in my opinion it's rather lacking in performance and facilities for the serious short wave listener, being little more than a budget HF scanner with SSB reception 'thrown in'. It fills a 'frequency coverage hole' in Radio Shack's VHF/UHF scanner

range, and it could indeed give far better operating flexibility than a low cost wideband scanner in this range. However one must balance the retail price of the DX-394 against the achieved performance in comparison to other similarly, or lower cost, HF receivers.

But then it looks the part, and with its wide availability it'll no doubt sell reasonably well to 'first time' Short Wave Listeners.

*My thanks go to Link Electronics in Peterborough for the loan of the review receiver.*

# LABORATORY RESULTS:

All measurements carried out in USB mode, attenuator off, on 21.40MHz unless stated.

Sensitivity;		
Input level in $\mu$ V pd required to give 12dB SINAD;		
Freq. MHz	SSB	AM
0.15	1.79	5.01
0.50	0.21	0.88
1.0	0.12	0.68
2.0	0.09	0.41
4.0	0.08	0.36
6.0	0.10	0.60
8.0	0.09	0.54
10.0	0.12	0.56
12.0	0.45	2.07
14.0	0.36	1.64
16.0	0.38	1.72
18.0	0.41	1.85
20.0	0.36	1.60
22.0	0.37	1.65
24.0	0.32	1.46
26.0	0.28	1.19
28.0	0.23	1.04
30.0	0.28	1.36

Selectivity;			
	CW1	SSB/CW2	AM
-3dB	2.6kHz	5.1kHz	3.8kHz
-6dB	4.9kHz	6.4kHz	7.2kHz
-20dB	7.1kHz	7.3kHz	9.4kHz
-40dB	8.4kHz	8.7kHz	11.1kHz
-60dB	9.9kHz	10.1kHz	12.7kHz

Blocking;	
<i>Measured on 21.4MHz as increase over 12dB SINAD level of interfering signal, unmodulated carrier, causing 6dB degradation in 12dB SINAD on-channel signal;</i>	
+/-50kHz;	87.7dB
+/-100kHz;	95.8dB
+/-200kHz;	>110dB

Image Rejection;		
<i>Increase in level of signal at the first IF image frequency, and the first IF itself (45MHz), over level of on-channel signal, giving identical 12dB SINAD signal;</i>		
Freq. MHz	Image Rej.	IF Rej.
0.15	76.4dB	>110dB
0.50	71.9dB	107.5dB
1.0	78.5dB	107.4dB
2.0	79.6dB	108.7dB
4.0	81.8dB	>110dB
6.0	79.1dB	>110dB
8.0	80.5dB	>110dB
10.0	78.4dB	105.2dB
12.0	66.3dB	93.2dB
14.0	69.9dB	94.7dB
16.0	70.0dB	93.5dB
18.0	71.0dB	92.1dB
20.0	70.6dB	92.1dB
22.0	71.6dB	90.8dB
24.0	72.2dB	92.4dB
26.0	72.7dB	91.0dB
28.0	74.3dB	87.6dB
30.0	74.5dB	85.5dB

3rd Order Intermodulation Rejection;	
<i>Increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product, measured at 21.4MHz;</i>	
10/20kHz spacing;	25.0dB
20/40kHz spacing;	42.4dB
50/100kHz spacing;	70.5dB
100/200kHz spacing;	80.7dB

S-Meter Linearity;		
<i>Measured at 14.25MHz;</i>		
Indication	Sig. Level	Rel. Level
S1	5.45 $\mu$ V pd	-25.4dB
S3	8.70 $\mu$ V pd	-21.3dB
S5	17.2 $\mu$ V pd	-15.4dB
S7	47.7 $\mu$ V pd	-6.5dB
S9	66.9 $\mu$ V pd	0dB ref.
S9+20dB	393 $\mu$ V pd	+11.8dB
S9+40dB	1.13mV pd	+21.0dB

Audio output;	Attenuator
<i>Maximum audio output, 1kHz, into 8 ohm load, 10% distortion;</i>	<i>Measured at 21.4MHz, SSB, 12dB SINAD levels</i>
1.48W RMS	20.0dB attenuation

# Pye P5001 Ex-PMR Conversion

Tony Skaife G4XIV details the conversion of a  
Pye P5001 VHF AM handheld to 2m and 4m

What might be described as the 'ugly duckling' of handheld radios is the P5000 series from the Pye/Philips group. However, whatever artistic failings these 'talking bricks' may have, it must surely apply only to their external appearance!

Although classed as a hand portable, a P5000 series set bears little resemblance to miniature sets currently available from the Far East. With its sheer bulk you won't forget it's with you. However, it is on the inside that its design features come to the fore. On one double sided motherboard are mounted all the modules that comprise the individual stages within the radio. What's more, is that they are, with one exception, all plug-in modules which simplifies fault finding. The legs on these modules are made of brass and are quite substantial, which aids reliability.

These radios are likely to be in excess of 10 years old. So some wear and tear may be expected, as their original users (e.g. security services) would appear to have used them for anything but a means of communication, if the ones I've seen are anything to go by.

Externally, the P5000 series

all look alike, and unless some honest etching has been scratched onto the identification plate on the rear of the case, one may end up with something you hadn't bargained for. If any doubts exist then a simple look inside will confirm its type. Take off the rear cover and if your's is the same as the one shown here, then it is the AM version.

The P5001 is a 1.2W AM VHF radio which can cover 68 to 174MHz in manufactured band 'variants', with up to 6 crystal controlled channels. An FM version is also produced called the P5002, the high power one is the P5004. I detail the AM version here, the FM one is a much rarer beast.

The radio requires two crystals per channel. Although the crystals are of the plug-in type, they are the wire ended variety that look like they could be soldered. The formula to calculate the crystal frequency for both transmit and receive, depends upon which band the radio operates on (2m or 4m).

Remember that the radio must have been on the band required prior to any frequency change. It will be no use trying to make an 80MHz range radio work on 144MHz, however, it will convert to 70MHz.

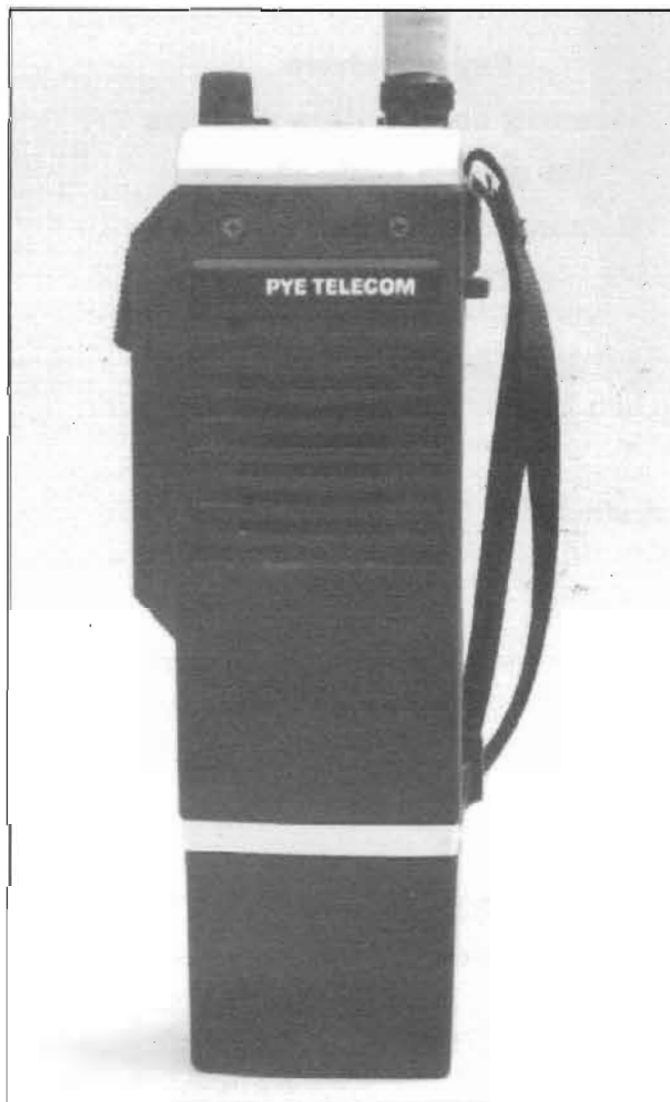


Table 1. Crystal Formula

$2m$	$4m$
$RX\text{ Freq.} = RX\text{ Freq.} - 10.7MHz$	$RX\text{ Freq.} + 10.7MHz$
$\frac{\quad}{3}$	$\frac{\quad}{2}$
$TX\text{ Freq.} = TX\text{ Freq.}$	$TX\text{ Freq.}$
$\frac{\quad}{3}$	$\frac{\quad}{2}$

The crystals required are 3rd overtone types. The crystals for channel(s) 1 (to 4 if fitted), along with their respective tuning coils, are located in a screened section with a lift-off lid on one side of the motherboard. Channels 5 and 6 crystals and coils, again if fitted, are found on the reverse side of the board in a separate and removable metal box.

A fuse is located in the base and is easily accessible, this is a 2A slow-blow type. Down one side is a bulge with a spring-loaded flap that hides the facility socket which is used in testing and connecting external accessories. Further down is the rotary on/off switch.

It is important to remember to turn off the radio before fitting or removing the nicad battery. Most times it should be OK, however if the above precautions are forgotten, the fuse is likely to blow. The nicad battery is a 9.6V pack and an unserviceable one may

be carefully opened from the top and the contents replaced with a pair of wires that can be connected to a power supply capable of 9 to 10 volts at 1A or greater.

Mounted in the top of the radio is a conventional rotary volume control. The volume knob is connected to a brass extension which is in turn connected to the variable resistors which are housed under the aluminium top piece. If the volume knob can be fully rotated through 360 degrees, don't think that the 'vol pot' has had it. More than likely it's just the brass extension that has become loose. To cure this, loosen the grub screw in the volume knob and lift it off. Remove the two head bolts, the top may then be carefully lifted off which will expose not only the brass extension, but the channel change knob and two rectangular buttons.

One button will have a symbol of a loudspeaker, known as 'monitor', and pressing it

opens the mute or squelch allowing weak stations to be heard. The other button will have a musical note symbol, and if fitted, and pressed, will cause the tone unit (if optionally fitted - Tech Ed) to generate 5 or 6 audible tones in sequence on a brief transmission. The channel control knob, if the set is a multi-channel version, also rests on a helical spring so a little care is needed when the top is removed.

A yellow and red LED are also in the top, I've never seen the yellow one used (it's only employed for the Selcall version or in 'Monitor' mode - Tech Ed), but the red one is illuminated each time the radio transmits. Also on the top is the aerial connection, which allows a variety of custom made set-top aerials to be screwed into it.

## Wiring

The internal wiring does have a habit of 'age hardening' and becomes brittle. If tracing a fault, pay special attention to the wires, but don't cause faults by being too rough on them. One common fault that does spring to mind, is one which produces no modulation though still transmitting OK. This may be the result of one or more of the three wires to the internal electret microphone being broken off. Another more likely cause of the fault is to be found on the resistor-capacitor (module 10) board, R4 (2k2) could have a dry joint or even be broken.

The R-C board is located under the loudspeaker and next to the PA block, held in place by two plastic retainers from which it must be carefully lifted. The attached wires don't leave much room to manoeuvre, so once again do take care with that wiring.

Pressing the monitor button will open the mute and the familiar noise will be heard. It must be pointed out that an aerial must be fitted and a channel selected that has a receive crystal fitted. If they aren't then virtually no sound will be heard.

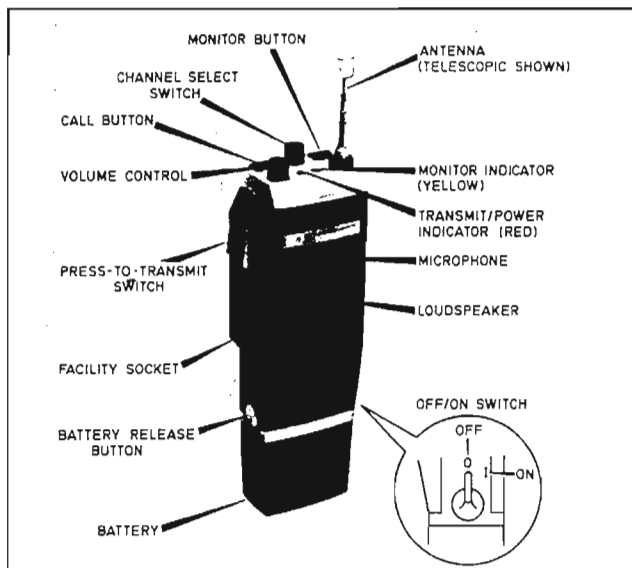
It may also be noticed that the volume control does not reduce the audio to a zero level,

but a simple modification can be performed to change this. Referring back to the R-C board, R1 (1k8) should be removed and replaced with a 33R. However, if you can cope with a receiver where the volume can never be fully turned off, then just leave the R-C board as it is.

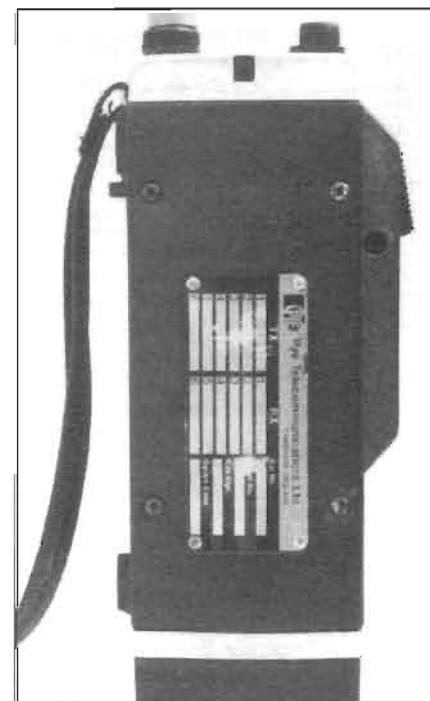
## Transmitter alignment

Ensure you have the radio for the correct band and that crystals are fitted in the appropriate channel positions. A frequency counter, field strength meter, variable power supply unit (set on 10V), an ammeter and a receiver (scanner) will prove useful.

Switch on and while pressing the PTT, monitor the current drawn, this should not exceed 1A. Adjust trimmers 2 and 1, in that order on the PA block (module 11), for best output on the field strength meter. Further increases may be obtained by carefully tuning slugs 1, 3, 4 and



Operating the P5001



Identification plate

5 on module 8 the transmit Osc/Multiplier. All the canned modules are marked with their respective numbers inside a square box, their names are also printed on the motherboard, which helps identify them. All

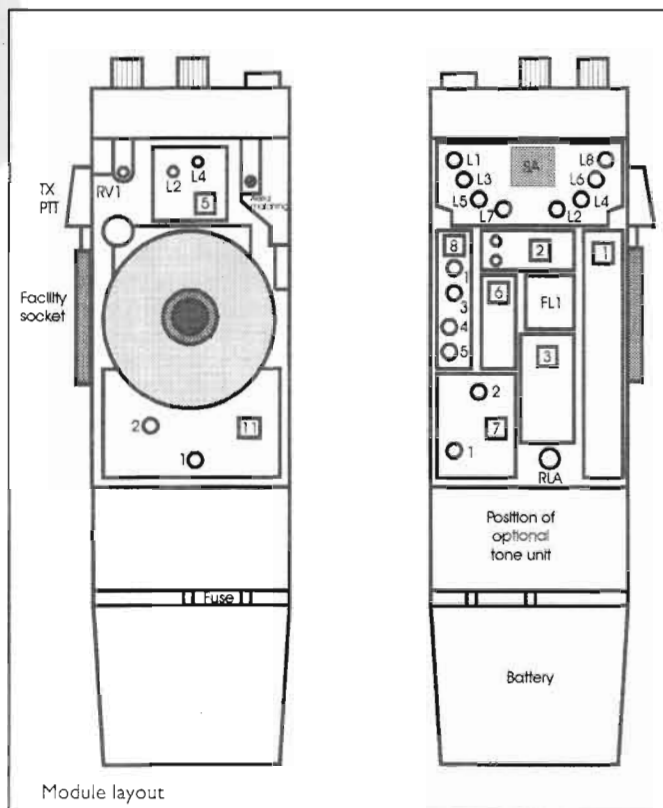


Table 2. Module Identification

Module no.	Module type
1	RF Amp and Mixer
2	Osc/Mult and Voltage Reg.
3	IF Amp and Detector
4	AF Amp
5	Ch 5 and 6 assembly
6	Squelch and AGC
7	TX AF Amp
8	TX Osc/Mult and Modulator
9	Aerial Matching Assembly
10	Resistor/Capacitor Assembly
11	TX PA Assembly

pin connections and trimmers are also clearly marked.

By now the current drawn should be greater than 400mA and the red LED will be on. The final setting of 600 to 800mA should be set by trimmer 2 on module 7. Having achieved a good power out, the counter will show the frequency. Carefully adjusting the appropriate slug (L2, 4, 6, etc.) with a plastic trimming tool through the hole in the lid above the crystals, will pull the transmitter onto the desired frequency. If you do not have a modulation meter, then listening on a nearby receiver will indicate if adjustment is required. To alter the modulation vary trimmer 1 on module 7 clockwise to increase it.

### Receive alignment

The equipment required for

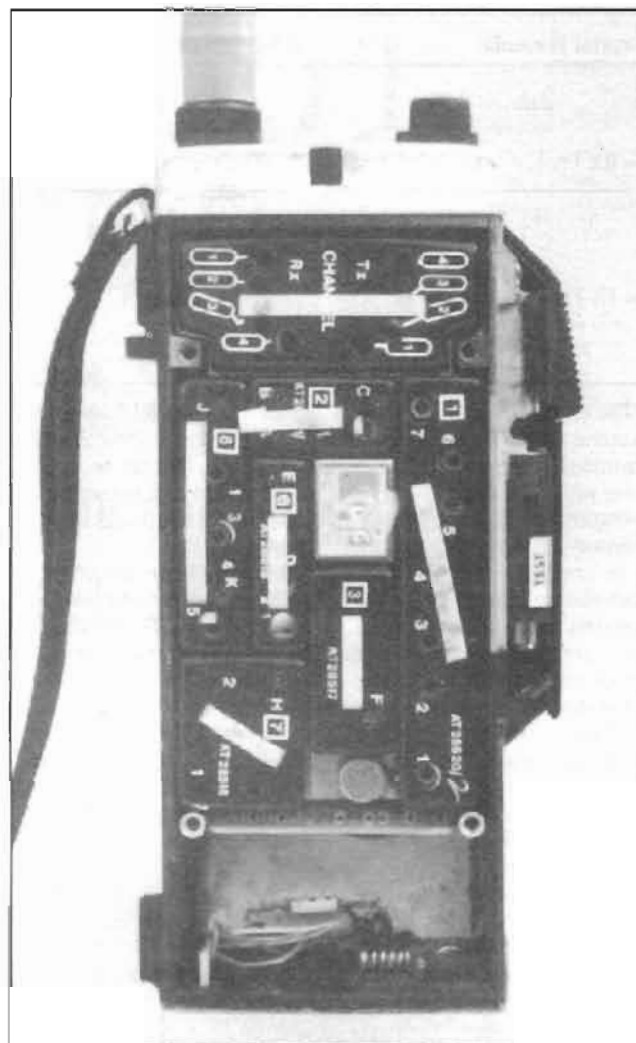
receiver alignment is ideally a signal generator, capable of providing about 40% AM at the receive frequency. Alternatively, careful use of a low power transmitter can be used.

First open the mute on the receiver by adjusting trimmer 1 on module 6. Inject, via an aerial, a modulated signal at the wanted receive frequency. Vary the signal until it can just be identified, then adjust the appropriate tuning slug on the receive crystal for best reception. Further improvement to reception will be made by tuning trimmers 2, 3, 4, 5, 6, 7 and 1 on module 1 for maximum output in the loudspeaker. Switch off the signal source, then re-adjust the mute trimmer until the squelch just closes and the radio does silent. The front and back case lids may now be placed back on the radio.

### Conclusion

Although AM is not everyone's ideal, these inexpensive radios can be found in quite plentiful amounts. Their uses can range from keeping in touch with a pal at the rally, to other communication systems as might be operated by groups who need appropriate equipment to be as cheap as possible. When these P5001 set appear on a trader's stall at the rallies, you might now just know

Internal layout - rear



the right questions to ask. Good hunting!

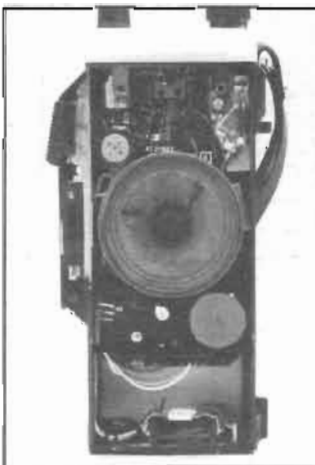
This month's front cover features the P5001, and our thanks go to GWM Radio for the loan of set used for photography.

If you would like to receive a circuit diagram of the P5001, just send an SAE together with

the original corner flash from this article to: P5001 Circuit, The Editor, Ham Radio Today, Nexus House, Boundary Way, Hemel Hempstead, Herts, HP2 7ST. Photocopied corner flashes cannot be accepted, circuits will be available for up to 12 months from this issue publication date.

Any reported updates will be available for at least the next 12 months on the HRT voicebank information line. Tel. 01703 263429 (use with a DTMF phone). Any other queries must be addressed to the author by post, enclosing an SAE if a reply is required, sent c/o the HRT Editor at the HRT address (Ensure you write the author's name followed by the HRT address so that your letter can then be forwarded), or you can telephone Tony on 01904 330502.

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Internal layout - front

# Ex-PMR Conversions In HRT

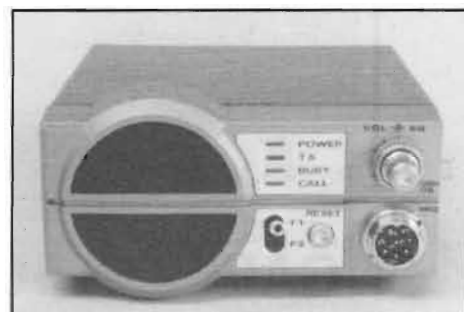
Looking for information on converting that private mobile radio rig? Here's a complete list of the conversions we've featured

## Radio Featured

Pye A200 Amplifier for 2m, 4m, and 6m  
A200 'M' band conversion to 2m  
Burndept Ex-Police UHF portable to 70cm (models BE439 to BE470)  
Burndept BE448 mobile to 2m  
Pye Europa MF5/MF25FM to 2m and 70cm  
E band Pye Europa to 4m  
P band Pye Europa to 4m  
M band Pye Europa to 2m  
Pye M294 A, B, and E band to 2m and 4m  
Pye M294 M band to 2m  
Pye MX294 (synthesised) to 2m and 4m  
MX294 conversion update  
Pye M296 to 70cm  
Pye MX296 (synthesised) to 70cm  
VHF Pye Olympics, M202 range including M band, for 2m and 4m  
UHF Pye Olympics, M212 range to 70cm  
Pye PMR2 high power remote mount to 2m FM  
Pye PF1 Pocketfones to 70cm  
PF2/PF5 Pocketfones to 70cm  
PF2/PF3 Pocketfones to 4m  
Pye PF85 UHF portable to 70cm  
Pye PFX synthesised UHF portable to 70cm  
Pye P5001 VHF AM portable to 2m and 4m  
MF6AM VHF AM Reporter to 4m  
SR1 Pager to 2m monitor receiver  
Pye SSB 130 100W HF rig  
SMC545L1 and SMC1045L2 to 70cm  
SMC545L1 and 1045L2 update  
Storno CQP 4662, 4663 & 4664 synthesised handhelds to 70cm  
Storno CQM 5114S (synthesised) to 2m  
Storno CQM 5662S (synthesised) to 70cm  
Storno CQM 644 (synthesised mid-band) to 2m  
Storno CQM 713E conversion to 2m  
Storno 900 to 2m packet  
Trio TK-701S VHF mobile to 2m  
Trio TK-801S UHF mobile to 70cm  
Pye W15FM series Westminster to 2m and 4m FM  
Pye W15AM and W30AM Westminsters to 4m AM  
E band Westminster conversion to 6m

## Appeared in issue dated

Sep 1986  
Apr 1987  
Dec 1990  
Jul 1990  
Mar 1989  
Sep 1987  
Jan 1991  
Aug 1991  
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Mar 1987  
May 1992  
Oct 1994  
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Mar 1986  
Sep 1987  
May 1989



SMC 1045L2



SMC 545L1



Pye P5000 Portable

P band Westminster to 4m and 6m  
 M band Westminster to 2m  
 W15U Westminster to 70cm  
 P Band Pye Whitehall to 70MHz

### Add-on projects to use with your converted PMR rig;

10-Channel Scanner  
 Crystal controlled tone burst  
 Plug-in Toneburst for the Pye Olympic  
 PROM control board for the Sorno 5000  
 VFO for 4m and 6m ex-PMR rigs  
 New Aerial for the Burndept handheld  
 DC to DC Converter for Handhelds  
 Fast Nicad Charger

### Useful Alignment Aid Construction Projects

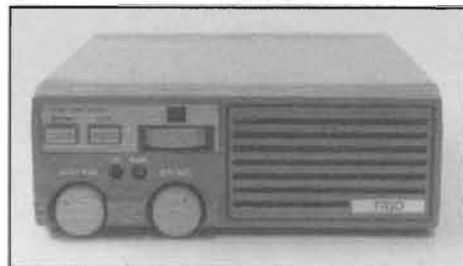
Modulated Noise Source  
 RF Sniffer

### PMR features

Choosing And Using Ex-PMR Gear  
 Using Ex-PMR Rigs For VHF And UHF  
 Where To Find That Ex-PMR Gear

Nov 1990  
 Mar 1991  
 Apr 1986  
 Jan 1995

Trio TK-801S



Apr 1992  
 Aug 1992  
 Mar 1993  
 Apr 1996  
 Nov 1986  
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 Jul 1992  
 Aug 1994

Sorno 5000



Jul 1995  
 Apr 1995

Pye PMR2



Apr 1996  
 Aug 1992  
 Jul 1994



Pye M290



Sorno QCM644

### Photocopies and Back Issues;

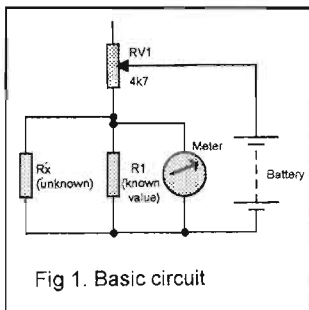
You may obtain back issues for the last twelve months from; Ham Radio Today Back Issues Dept., Nexus Subscriptions Services, Tower House, Sovereign Park, Lathkill Street, Market Harborough, Leicestershire LE16 9EF. *Subscriptions Hotline*; 01858 435344, *Enquiries Hotline*; 01858 435322. Please telephone first to ensure the availability and price of the issue(s) you require, as copies of some magazines have run out due to popularity.

For photocopies of articles older than twelve months, and indeed of the ones sold out, write to; Photocopies Dept., Nexus Special Interests Ltd., Nexus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST. A charge of £2.75 plus £1 UK P/P (overseas plus 20%) for the first article, £2.00 for follow-up articles applies (cheques payable to Nexus). State HRT Magazine, article title and issue it appeared in. Please allow up to 28 days from receipt of order for delivery.

Note: All four conversions in Sept 1987 appear in the same article entitled "70MHz - The Band That Time Forgot", therefore only one photocopy for that issue is needed.

# Low Reading ohm-meter

Brian Kendal G3GDU shows how to build a unit to test very low resistance values



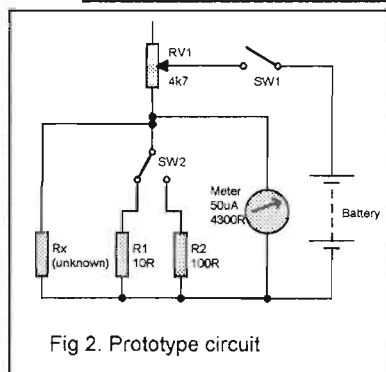
With resistance, it could be said that it's quite simple to check the value with a multimeter. Unfortunately, on many such meters the lowest calibration point is one ohm, and that cannot be read to any degree of accuracy, whilst required resistance values may only be a fraction of this. The answer, therefore, is to construct a dedicated Low Reading Ohmmeter in which values down to 0.1 ohm can be read with reasonable accuracy.

and the meter will read half scale.

## Initial trials

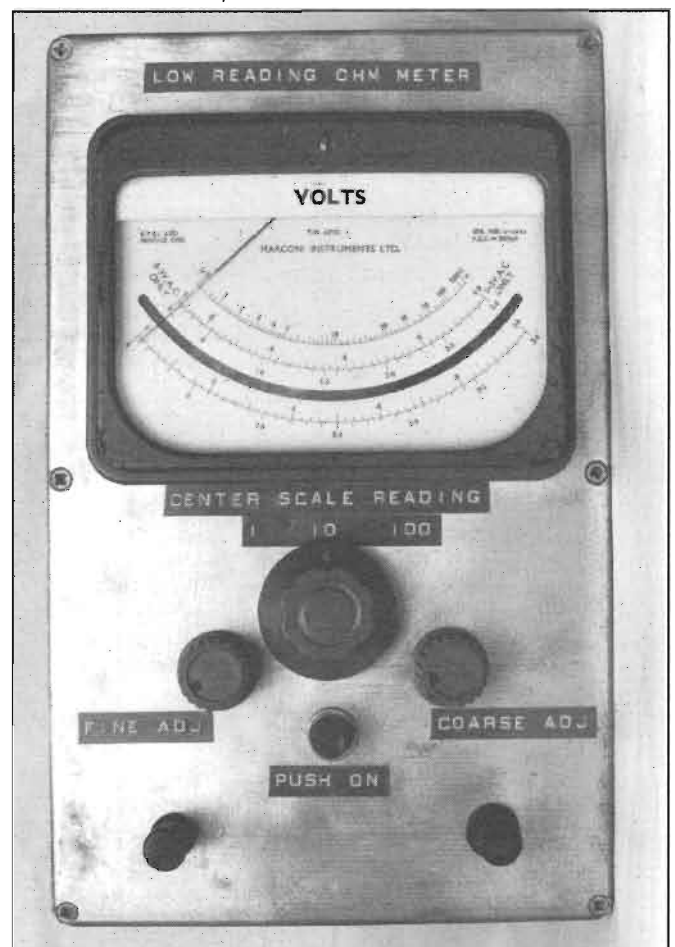
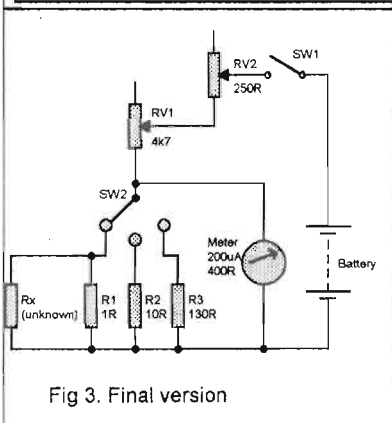
For my initial trials I decided to use a Maplin

FM98G movement, which is a 50mm meter with 50 $\mu$ A full scale deflection (FSD). This has a resistance of just over 4000 ohms which therefore requires a potential of about 0.2V to indicate FSD. For the known



## Design

There are several ways in which a Low Reading Ohmmeter can be designed, but probably the most simple is to measure the voltage drop across a known value resistor which is being fed from a high impedance source. The unknown resistor is then placed in parallel with that of known value. Due to the high impedance source, the current flowing in the circuit will stay substantially constant, but the voltage across the two resistors in parallel will vary with the value of the unknown resistor. For example, in the simplest case if the known and unknown resistors are both of the same value, then the voltage drop will be halved



Final version of the low reading ohm-meter

resistor, I selected a 10 ohm, 2% resistor and fed this through a 1k linear potentiometer from a single cell battery. The circuit was mounted in a 100mm x 75mm Eddystone diecast aluminium box. The few components could easily be mounted under the lid. To preserve battery life, a push switch can be fitted and "banana" plug sockets used for external connections.

I made a number of calculations to determine the calibration of the meter and then compared these with readings obtained from measuring a number of low value resistors, mainly commercial meter shunts with accurate marked values. My tests indicated that, with this circuit, resistor values from 0.1 to 500 ohms could be read with reasonable accuracy. At that point I decided to extend the versatility of the instrument by adding a further range, switching to an alternative known resistor of 100 ohms. This extended the useful range up to 5000 ohms.

Further tests showed me that a similar accuracy to the lower range was being obtained, and at that point I attached a calibration graph to the meter, I found this held good for any meter sensitivity and, with multiplication or division by 10, for the high or low meter ranges.

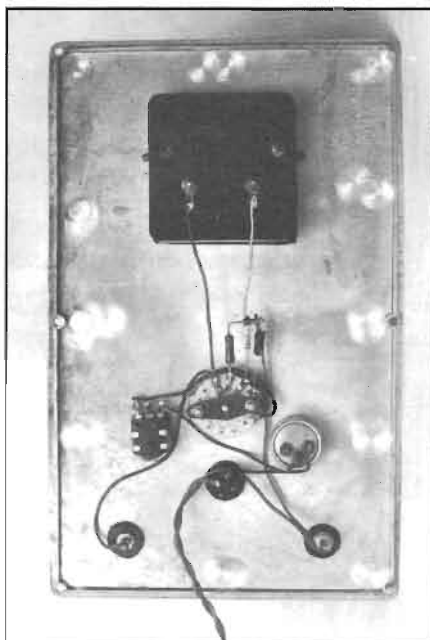
## Further development

Very quickly, my Low Reading Ohmmeter became an indispensable item and a few weeks later, my discovery of a very elegant 125mm, 200 $\mu$ A Marconi movement in my junk box gave thought to further developing the meter. Construction proceeded in a similar manner to the prototype, but I gave thought to an additional range. This, of course, meant that the toggle switch would have to be replaced by a Yaxley type, but really no other circuit variation

was necessary. The additional range used a known resistor value of 1 ohm.

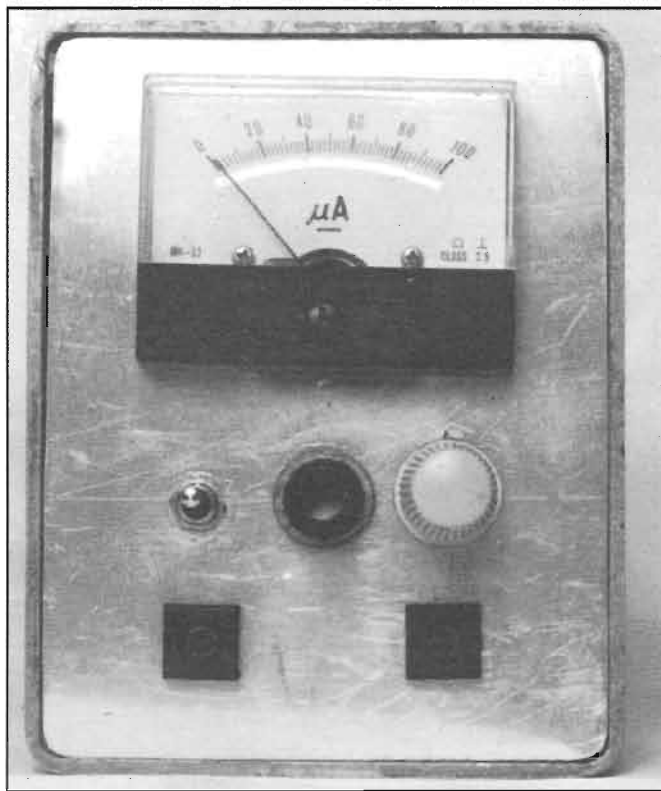
A series of accuracy tests, similar to those I previously made, I then carried out and found two problems. The first was that the adjustment of the potentiometer was very "touchy" and the second was that the readings on the high range were inaccurate.

The first problem I solved in a similar manner to the way which we used to 'bandsread' the tuning of home built receivers. A second low value potentiometer wired in series with the existing potentiometer did the job. The second problem caused rather more concern, until I checked the resistance of the meter movement. This proved to be only 400 ohms instead of the 1000 ohms or more which I had assumed. Although the lower value made little difference on the lower ranges, it made a noticeable degradation of accuracy on the high range. However, by increasing the value of the known parallel resistor to 130 ohms, the combination of that and the resistance of the meter movement now became very



Internal view of the second version

Prototype version, calibration scale attached to the side of the box



close to the required 100 ohms and the accuracy (and calibration) of the instrument was restored.

## Practical alternatives

Although I used a Maplin meter in my prototype and a rather more elegant meter in

my final version, these are by no means the only meter movements which can be used. In practice, I'm sure that many constructors have suitable alternatives in their junk boxes. The only criteria are that the sensitivity should be 200 $\mu$ A FSD or better and that the meter resistance should be reasonably high. Even if it is too low, remedial action can be taken as I did on the high range of my final version of the instrument. Whatever meter sensitivity you use, the values in the remainder of the circuit can remain

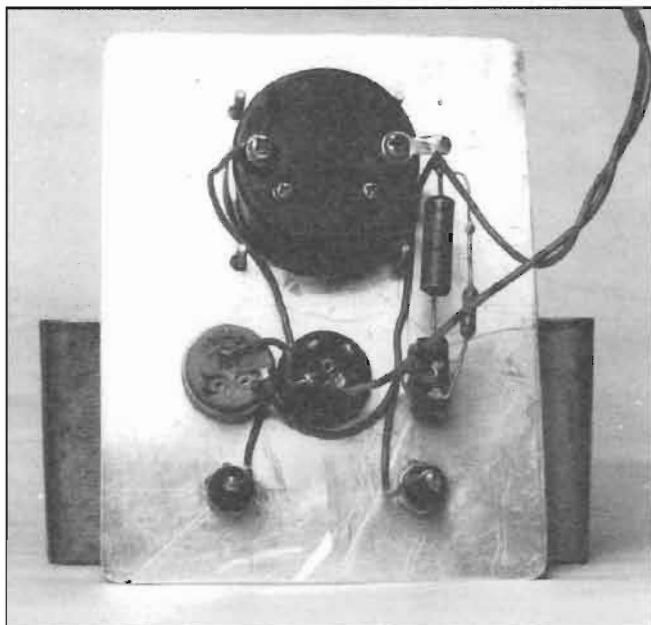
unaltered.

Construction could be further simplified by omitting the range switch, for with only a 10 ohm known resistor, values down to 0.1 ohm will be indicated which will meet the basic requirement, high values of resistance can be measured on your station multimeter.

## Using the meter

The first stage in using the meter is to set the adjustment potentiometer. This is performed by depressing the meter switch and adjusting the potentiometer for full scale meter indication. If two series potentiometers are being used, set the lower value potentiometer to mid scale and then the higher value to as close as possible, making the final adjustment with the lower value. You should make this adjustment each time the range is changed.

The unknown component is then placed across the test terminals and the meter will indicate its value directly. Note that if test leads are



Prototype wiring

being used, the resistance of these will be included in the reading.

## Results

Both my prototype and the final versions of this low

reading ohm meter have proved invaluable in my workshop. However, the final version gives three distinct advantages. The larger scale made readings both more easy and more accurate; the ready calibrated scale was more

convenient than consulting a calibration graph or table, and the additional low range was reasonably accurate down to very low resistance values.

The sensitivity on the lowest range is surprising. It will even measure the resistance of 300mm or so of hook-up wire.

The construction of a low reading ohm meter, in either prototype or later version has proved both simple and inexpensive. A similar project using components to hand would doubtless prove equally effective.

Nevertheless, particularly for those of us who are now well past the first flush of youth and whose eyesight is deteriorating by decibels per year, it will rapidly become an indispensable item in the workshop.

Any queries regarding this project must be addressed to the author, Brian Kendal, G3GDU, c/o the HRT address (ensure you write the author's name followed by the HRT address

## Calibration

Resistance Ohms	Meter % reading
1	9
2	16.5
3	23
4	29
5	33.8
6	37.7
7	41.2
8	44.5
9	47.5
10	50
20	67
30	75
40	80.3
50	84
70	87.5
100	91.3
500	98

so that your letter can be forwarded) enclosing an SAE if a reply is required.

Any reported updates will be available on the Ham Radio Today voicebank information line, Tel. 01703 263429 (use with a DTMF phone).

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# Between the Satellites and the Sea

3A/F1RWD and 3A/F1IXQ relate a tale of their satellite DXpedition

If a DXpedition is your idea of adventure, choose with care where you are going. I'd read tales of landings on beautiful islands swarming with crabs, mosquitos, and other charming creatures; or perilous departures aboard inflatable boats in the pounding surf while sharks lurk, awaiting a moment of inattention to devour the operators clutching precious logbooks. The accounts sent chills scurrying up and down my back as I read them. I'd even read of operators deserted on an island north of Scotland without a single drop of whisky on hand. Indeed, great care is necessary when choosing your destination.

We chose Monaco for our satellite DXpedition. First of all, it's easily accessible, the trip isn't very dangerous. Secondly, Monaco is civilized, although in its own way. For example, if you walk around shirtless (the men that is!) in the port of Monaco you will be stopped rather quickly by a nice policeman who will "warn you of the hazards of sunburn" and encourage you to put on a shirt. It's a similar story for aerals. They will explain to you that it really is not necessary to put those nasty things up on your roof since everyone has cable TV here, with at least a few dozen channels available. Now that is civilization.

## Friends

So, on to Monaco, and our friend Marcelle. She loves radio and was already studying for her licence. What's more, she had agreed to house us. Well, there

DXpedition QSL card



are expeditions and there are expeditions. Orbiting amateur satellites are nice, they come and go. But in between passes there is time to relax a bit, tan, play tourist, laugh, and take a boat ride. Then back to the microphone for the next pass.

In your youth you are often long on energy but short on money. These exploits are possible only if you have the nerve to try them. In the process you might even meet some pretty helpful folks when calling friends and trying to get the necessary OKs. You go to the homes of people you don't know very well who receive you like a king, feed and house you, find other operators who share the bottle of champagne from the radio club in Monaco, and give you official IARU recognition you hadn't even thought of asking.

## Equipment

Before leaving home we threw some equipment in the car, an FT-736R and some aerals; two 11 element yagis for 2m and a 21 element yagi for 70cm. Our 'guru', F1NZC, put together a

UHF amplifier in an incredible burst of inspiration and energy. F1BL fine-tuned a homebrew preamplifier with skill and tender loving care. All this, and the rotor from the F6KDC radio club found a good home on the roof and balcony of our hosts, where one room was transformed into a radio shack.



Monaco location map

Next, the satellites. The friends back in our home town were keeping a keen ear out during the first Oscar 13 pass. We accorded them just enough

time to say "bonjour". Then came the moment of silence which ties your stomach into a knot. Not to worry though, the pileup arrived and was roaring all over 145.895MHz.

## Contacts

3A had not been active on satellite for over two years. We made around 500 contacts, including a couple of direct QSOs. The big disappointment was the twelve storey apartment building next door. It prevented any contacts to the west until the satellite reached at least 60 degrees elevation. Our apologies to the Americans.

No report is complete without one anecdote. Our congratulations go to DD1UH who contacted us via five different satellites; Oscars 10, 13, 20 and 21 and RS10. The last one was just for sporting interest!

Our hostess was amazed as she discovered this mode of activity, and quickly started cramming full-time for her licence exam. Marcelle is now licensed as 3A1MD with VHF-only privileges and is continuing for her full licence. She's currently active on satellite, so watch out for this keen YL from Monaco! A big

'thank you' to Marcelle and her family. We also extend public thanks to F8HT and Radio Communications Systems who provided the QSLs.

# SCANNERS

## Bill Robertson finds that a UK VHF/UHF scanner directory database is now available on disk



The MVT7100 from Yupiteru

Derek Porter from Edinburgh sent me a letter to say that he's recently taken up scanning, and has opted for the Yupiteru MVT7100, saying he finds it an excellent package, especially with its coverage of 100kHz right up to 1.65GHz. Derek says he felt he must have the scanner's 'bible' as a reference, adding that he bought *Scanners* 3, which he says is a very good book indeed. He's kindly sent some airband frequency updates for his area, not detailed in the book, which he hopes will be of interest to readers of this column - thanks Derek.

### UK Scanner directory on PC disk!

Regular readers may remember that a while ago I was searching for a UK VHF/UHF scanning directory database on PC disk. Well, it's happened, and I'm pleased to say I now have a quite comprehensive frequency directory, together with user information etc., available. As well as all the data being stored in plain ASCII text format, so that you can import it into other applications (maybe even your PC based scanner control

program!) or print sections or even all of it. I've successfully used the shareware 'List' program to provide an instant 'look-up' by name, user, mode or frequency with the scanner database.

In anticipation of having my 'hand bitten off' with piles of disks and SAEs in the post, I'm pleased to say that I've managed to arrange for copies to be made available to readers for just the cost of a disk and return p/p (£1.00 inclusive in the UK, overseas airmail at cost - Ed) through this month's Ham Radio Today Software Offer. The disk includes the 'List' program and a simple scanner 'batch' file to run the frequency/user look-up. See elsewhere in this issue to get yours, before they run out! Please note that as far as I'm aware, this database contains *nothing* that isn't already available in printed book form (although at rather a higher price!), the difference is in the quick 'look-up' and 'search' form it's available in.

### Sporadic E on your scanner

One morning in May at around 7.40 to 8.10am, Neil from Liverpool says he received numerous signals in the 65-73MHz range on his scanner, some fading but all very strong. These appeared to be Russian FM radio, with classical music, weather reports, and children's stories, although Neil didn't manage to get any station IDs. He asked if anyone else could confirm this, and whether anyone could offer an explanation?

Coincidentally, Jim in Amsterdam also heard these that morning, confirming they were

wide band European FM broadcast stations.

Well, this is your introduction to *Sporadic 'E'* propagation! It's where VHF signals are reflected (refracted?) from intensely ionised areas in the 'E' layer of the ionosphere. There are a number of theories on how these areas are produced, ranging from wind shear to thunderstorm activity, but the end result is a highly reflective layer which usually 'shows its head' by allowing propagation of VHF signals from one regional area to another, usually over a distance of around 1000 miles or so. Private mobile radio users in the VHF 'low band' of 68-88MHz occasionally have great problems with this, where their semi-local communication is occasionally completely wiped out by foreign signals. If you're senior enough to remember VHF TV in the UK, you may also remember the screen displays of 'Do not adjust your set' due to this 'foreign interference', usually on the Band 1 VHF TV range.

We're now well into the 'Sporadic E period', so don't be surprised if you also start hearing new exiting stations on your scanner occasionally! As it's name implies, the phenomena is sporadic, with such 'lifts' lasting anywhere between just a few minutes to a few hours. If you have wideband FM reception capabilities on your scanner, try tuning around the 47-80MHz range, particularly in the morning and late afternoon. The propagation will usually start on the lower frequencies, but can sometimes extend to 100MHz and beyond. Sporadic E on 145MHz has been reported a number of times in the past, for example with Hungarian and Austrian stations (including Budapest Airport on VHF!)

coming into the UK at strong signal strengths, this 'opening' lasting for around 20-25 minutes.

For more details of such 'openings', *Scanners* column readers could do a lot worse than take at least an occasional look at Geoff Brown's *VHF/UHF Message* column in the magazine each month.

### HF and Volmet

Decklin from Birmingham says he's new to short wave listening, but asks if there is a list available of stations that transmit continuously to a defined schedule, which are receivable in the UK in order to help with aerial and receiver comparisons.

For checking propagation from around the world on short wave (HF), there is a network of amateur radio beacons on 14.100MHz, which transmit sequentially, i.e. each beacon transmitting for a short period, one after the other. Each beacon transmits its callsign in CW, so you can check which country each transmission on that frequency is coming from. You'll usually need a narrow filter to receive these, as this section of the band is also used for data communication, but with a small 'gap' at 14.100 specifically for the beacon service.

Alternatively, for a 'quick check' of receiver sensitivity, I often use the 'Volmet' transmissions. These are continuous meteorological reports, designed for reception by aircraft personnel. They detail temperature, cloud cover, etc. for various locations, and on tuning in you'll quickly see that they are automatic announcements from a digitally stored 'voicebank'.

On HF, you'll find Shannon

Volmet on 3.413MHz, 5.640MHz, 8.957MHz and 13.264MHz, RAF Volmet on 4.722MHz and 11.200MHz, all upper sideband. For 'DX', you'll find New York Volmet transmits on 3.485MHz, 6.604MHz, 10.051MHz and 13.270MHz. (I've taken these from the 'HF Oceanic Airband Communications' book, 3rd edition, by Spa Publications). On VHF AM, depending on your location in the UK, you'll find Volmet Main on 135.375MHz, South on 128.6MHz, and North on 126.6MHz.

## Indoor aerals

A message from Cliff asks for advice on the best indoor scanner aerial to use with a base scanner, for all bands. This is a rather wide-ranging question of course, but my advice would be to firstly check which locations are available for an aerial. Is loft-mounting feasible? Or balcony, even window, mounting? The idea here is to get the aerial as much in the 'clear' as possible, because no matter *what* aerial is used, its performance will depend much on *where* it's sited. I could easily recommend the 'best' as a hand-rotatable log-periodic yagi, like the Create CLP-5130 series but if this is used in, say, a living room, besides leaving little room for anything else it will work a lot better mounted as high as possible and as much 'in the clear' as possible. So the answer here is, first find the site with the 'best view', radio-wise, for your aerial, and then see what will practically fit.



Peter Longhurst of Garex Electronics with the 'Nomad' scanner aerial.

For a 'do-everything' compact aerial, e.g. for window mounting, you could try the 'Nomad' scanner aerial from Garex Electronics. This is specifically designed for indoor use, and will hang from a window curtain rail as well as being very suitable for hanging in the loft if one is available. Both passive and active (i.e. with an in-line preamp) versions are available.

## Shuttle communications

Following on from my comments on receiving the cosmonauts on board the Mir space station, the Americans do of course also have the occasional trip around the Earth, in the Space Shuttle. When the astronauts are on-air (usually during their rest periods) with amateurs on the ground their 'downlink' frequency is 145.550MHz - the same as the Russian station. Why not take a listen next time the Shuttle is up there above your location?

## In-car handheld scanners

Many readers use a handheld scanner for general listening, using this in the car as well as in the home. But a common limitation of using a handheld scanner in a car, when travelling at speed, is usually the low available audio output. Even if an extension speaker is plugged in, you may find there just isn't enough. But here's an idea. Most cars have some form of in-car entertainment, usually a radio/cassette player. A readily available accessory is a portable CD/cassette adapter, which allows you to play a portable CD player through your car's existing radio/cassette system. Using one of these adapters, with the 'earphone input' lead connected instead to your handheld scanner's audio output socket, gives you plenty of audio - even with front/rear fading if your system has this!

## UK PMR users go to scrambling

The latest news as I write this is that certain two-way radio

## Scottish airband frequencies

119.875MHz Scottish control, mainly private guidance  
123.375MHz Scottish control  
124.500MHz Scottish control - most active channel  
127.275MHz Scottish control  
127.650MHz KLM or general control frequency  
128.675MHz Pennine control  
129.225MHz Scottish control  
134.775MHz Scottish control, mainly US/Canadian flights  
135.275MHz Area control

users are to be allowed to scramble their transmissions, using 'simple' scrambling methods. I imagine this would typically employ analogue methods, such as inversion scramblers, indeed low-cost off-the-shelf ICs from semiconductor suppliers as well as ready-built add-on modules are already available for this in the UK. These are designed to be fitted to existing two-way radios, both mobile and handheld, and naturally can be added fairly easily.

Now, companies such as Ramsey Electronics also sell kits for such speech inversion scrambler / descrambler units to amateurs and listeners, and advertise these in US magazines (selected Ramsey kits are available in the UK from Waters and Stanton Electronics and Maplin Electronics). Maybe with the introduction of PMR scrambler usage in the UK, we'll soon be seeing their wide availability here as well?

## International Listener's Contests this month

The International Listener's Association have a couple of contests, this month and the next. The first is the *Amateur Radio SWL All Britain/Eire Contest* which takes place from 0001UTC August 1st to 24.00UTC August 31st, so if you're quick you should be able to join in the fun. The aim of the contest is to log as many amateur stations as you can in the counties of Great Britain and Eire. Entries must show the callsign, UTC, date, location, county, and if the station is located in the county 'capital' (e.g. For Bedfordshire, Bedford, for Warwickshire, Warwick etc.) the capital also. The final score will be the total number of QSOs x total counties x total county capitals (as additional 'multipliers' if appropriate). A summary sheet should be included showing the details

above, and entries should be postmarked by Sept 20th.

The second contest is the *British Postcode Contest* which takes place between 0000UTC Sept 1st to 2400 Sept 30th. Entries should show the callsign, MHz, UTC, date, QTH and postcode area (e.g. CW for Crewe, MK for Milton Keynes, BL for Bolton etc.). Entries should be postmarked by Oct 20th. Entries for both contests are open to all interested listeners, and should be sent to the ILA Contest Manager, Kenneth Bumell, 91 Mabllins Lane, Coppenhall, Crewe, Cheshire CW1 3RG.

The ILA produce a regular journal, 'Just Listening' with scanner and SWL listening hints and information, together with an annual members handbook, these are sent free of charge to members. You can get membership information pack by sending an A5 sized SAE to the International Listeners Association, 1 Jersey St., Hafod, Swansea, SA1 2HF.

## New UK Scanning Directory

I was recently asked about the new 5th edition of the UK Scanning Directory. The good news here is that I should shortly have a copy coming in the post (it's being printed at the time I'm writing this), with a review hopefully due in next month's issue, watch out for it.

*Bill Robertson is pleased to hear from readers and will answer queries through this column - address your letters to: Bill Robertson, c/o HRT Editor, Nexus, Nexus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST, or by fax or email to the Ham Radio Today direct Editorial contact points.*

Please remember that reception of some services may not be permitted without appropriate authority. The RA's information sheet on 'Scanners' has full information for the UK.

# Letters

## Letter of the month

Dear HRT,

At the age of 66 years, I have recently decided to return to my favourite hobby. My first interest in radio was at the age of 15 years (51 years ago!). I thought it would be interesting to hear from enthusiasts from as far back as the 40's and 50's. Also to compare the results achieved from the very modest equipment (much of it ex-WD bits), plus many early circuits etc.

I became an SWL using only a home made two-valve battery set, working as office boy at that time. I used to post QSL cards (typed on a postcard) to stations heard from many countries, one received from USSR (Russia), unusual at that time from behind the Iron Curtain. I still have a few select QSLs left now. I also still kept my early log book from 45 - 48, with plenty of DX recorded during that very good sunspot period. This two-valve battery set cost

all of 30/- (£1.50) and I still have the circuit details, but alas not the set.

After my National Service abroad, then getting married, my hobby had to take a back seat. It's only this last year I decided to take up the reigns again, to update my knowledge from valves to transistors etc. and take the RAE in May this year. By the end of July I should know the results - it's been a long wait from 1948 to 1996 to get my callsign! I hope!

Trusting this will create some interest in the early days of radio etc.

Mr. W. H. Booker, SWL

### *Editorial comment;*

*Many thanks for your letter Mr. Booker, it's great to hear from a keen enthusiast who's 'discovered' the hobby again. We wish you luck with the RAE, and hope to hear a new callsign on the bands soon! If any readers would like to share their experiences, we'll be pleased to publish the letters in Ham Radio Today.*

## CQ, CQ

Dear HRT,

I am reading the letters in the July '96 edition, there seems to be an awful lot of letters from people using the Internet. What's up with them, can they not use the very same computer to format their own letterheads and write a comprehensive letter? Or is it that they are totally unaware that letters are *still* a wee bit cheaper than using the phone lines to send even short notes? Perhaps these people have more money than good economic sense!

After that, one or two letters were of interest. G3YRT seems a little detached from reality, with regards to the RA Civil Servants. They may well have a few licensed amateurs in their ranks, but they *are* Civil Servants. They are more likely to pass information on to their bosses than they are in any way, shape or form, to assist in the better and free-flow of information to their fellow amateurs, *unless* of course, it has something to do with the routing of the Morse code exam.

Neil Haulker provided a good chuckle, and hit the nail on the head. There are far too many amateurs sitting out there, hearing CQ calls on all bands, yet do not feel the urge to reply. Yet, as Neil so readily put it, they are the first to jump in with

both feet in their mouths, should you or I go and make some mess up, whether it's as Neil suggested or your Morse key is chirping, or you leave your mic keyed up too long. You could, like myself and a friend, be a couple of wind-up merchants, and smatter your QSOs with the odd bit of CB jargon. That really sets them off, you'd think, from the many varied reactions, that one's use of the odd bit of CB jargon, one had placed one's self in the category of being some form of low life.

However, on the serious side, one of the main reasons for having *any* form of amateur radio licence is to make contact, by whatever mode and upon whatever frequency band you have a current licence for. So why, in the name of intellectual sanity (whatever that is!), do amateurs ignore any and all CQ calls? Is it due to being microphone shy? Or are they just bone idle and lazy? It will not kill you to key the mic, and I am certain that even if you sound as though you've a mouth full of pebbles or gargling, we will all be grateful for your reply to our simple CQ calls.

J. Davis-Bolton, G4XPP

### *Editorial comment;*

*We're all in it to communicate to each other, but it's a fact of human nature that some people are more 'choosy' than others!*

## £10 for 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 (normally paid during the month following publication). So write in with your views, to: *Letters Column*, Ham Radio Today, Nexus, Nexus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST, or fax your letter direct to the Editor's desk on 01703 263429 (fax letters for publication *only*, for general readers queries please see the "Readers queries" section in the "Who's Who and What's What in HRT" section at the rear of this issue), or Email to [hrt@netlink.co.uk](mailto:hrt@netlink.co.uk). Please keep your letters short, we reserve the right to shorten them if needed for publication. Letters must be original and not have been sent to any other magazines, and must include names and addresses plus callsign if held. Reader's views published here may not necessarily be those of the magazine

# TONE BURST



By GOMEN



Er...well, I was just telling Rod about that time in '78



## SSTV anyone?

Dear HRT,

I have read just four issues of HRT to date and all ready, I am hooked! I particularly enjoy reading both the ex-PMR conversion features and HF Happenings. There appears to be something for everyone within the pages of your magazine - class A licensees, scanner users and short wave listeners alike. However, I would like to see a feature on slow scan TV. I am interested in this area of amateur radio, but know very little of how to go about transmitting and receiving SSTV pictures.

Finally, whilst reading your feature on the new class 'M' callsign holders, I noticed a callsign I dearly love to have. It was Ben Clarkson's: G7WHO. As well as being a keen radio amateur, I am also an avid Sci-fi fan. The

last three letters need no explanation if you have ever watched a certain time travelling Doctor on TV. My own callsign happens to be G7WHE, which is close, but not close enough. Never mind eh!

I wish Ben all the best for the future and a long and happy association with amateur radio.  
Graham Cheadle, G7WHE

### Editorial comment;

We're glad you enjoy reading the magazine Graham, and we do try to cater for a wide cross-section of amateur radio interests. With the growth in the use of PCs within our hobby, and the availability of software such as JVFAX and MSCAN, SSTV really has 'taken off' with amateurs who otherwise would have seen the cost of the necessary equipment to have been prohibitive. Right then, budding authors, how about something on SSTV for our readers?

## First club on the net?

To: hrt@netlink.co.uk

I think we are probably the first radio club in the UK to have it's own web page and certainly the first with a web page the quality of ours. It can be accessed through:  
<http://www.gifford.co.uk/~pas/sim/barc.html> It is not yet complete but we are working on it.

David Treasure G4ZBT, Hon. Secretary. Bristol A.R.C.

### Editorial comment;

Well done David, with the growing use of Internet by communication enthusiasts it's good to see a 'go-ahead' club using this medium to inform present and prospective members of the club's benefits.

## Virtual test gear

Dear HRT,

Reading through the June '96 issue of Ham Radio Today I came across the ARRL Handbook Review (page 9). Reading through this I noticed that a 1.44Mb 3.5in disk was included containing assorted software, including a PC-based voltmeter and VSWR indicator. For those of us (and I am sure there are many) who prefer to write our own software and experiment, I am sure that you would like to know that there is commercial software available that allows us to do this.

Produced by National Instruments in Newbury (Tel. 01635 523545), there is Labview for Windows / Windows NT and Labwindows CVI. The first is a graphical programming language for virtual instrumentation (anything from an ammeter to an SWR meter to a full function oscilloscope), the second is a combination of graphical programming and C for virtual instrumentation giving both speed and ease of programming. Both can be used to take readings via a PCMCIA slot / card. I have found them both (and other products of theirs) very interesting and useful.

Hope this information will be of help to many.

C. Booth

### Editorial comment;

(Tech Ed's reply); I know the NI Labwindows program, I've had full information and an evaluation demo copy here for a while. However, as this software comes at a cost of over ten times that of the ARRL Handbook and software combined, it really is in the 'professional' rather than amateur league. But then it does give an very professional level of performance, and is certainly worth looking at if one can justify the initial outlay.

**more  
letters  
next  
month**

# From my notebook

## Geoff Arnold G3GSR discusses the importance of ergonomics in ham radio equipment

"Ergonomics - The scientific study of man in relation to his physical working environment; the adaptation of machines and general conditions to fit the individual so that he or she may work at maximum efficiency". (The Chambers Dictionary)

At first sight, that may seem a bit of a mouthful, but in fact it describes a science which is vital if we are not to spend our entire working and recreational lives suffering some degree of frustration. A shining example of this need for sympathy of man and machine is in the design of the equipment which we buy and use - possibly even design and build for ourselves - in our radio hobby.

That equipment has changed enormously over the decades, as a result of advances in technology, and where once valves, knobs, dials and analogue tuning scales ruled the roost, we now have integrated circuits, press-buttons, keypads and digital read-outs - and, of course, microprocessors in everything.

I've talked before about operating desks, and different ways of fitting equipment so as to make it accessible for operating and for maintenance. When you go along to a dealer to look at a new rig or receiver you're thinking of buying, it is vital to have some idea of what the arrangement of your own operating position will be like. Otherwise, you may find that a set which seems to handle well in the showroom will feel quite different when you get it home.

### Scale Direction

To explain what I mean, I shall go back first to those old receivers with tuning scales, often printed on the back of a glass dial, with a moving pointer coupled to the main tuning capacitor via a system of pulleys, drums and cords. They could work quite well, providing the designer got the layout right in the first place, and also provided that the cord had not stretched or broken and been replaced by an inexperienced hand. If everything was not perfect, the pointer could jam or flap about, and maybe not even reach the end of its designed travel. The biggest problem almost always was that the pointer would sit some distance behind the scale, so that there was some degree of parallax - an uncertainty as to just where the pointer was, and therefore what frequency or wavelength the set was tuned to.

The usual procedure for judging where the pointer really lay, was to move the head about, probably whilst closing one eye if you wanted to achieve best accuracy. This was easy if, as most frequently was the case, the scales were horizontal and the pointer travelled from side to side along them. Then, you simply had to move your head from side to side to allow for parallax - an easy movement of the neck.

If, on the other hand, the scales were arranged vertically, and the pointer travelled up and down, the head movement involved when trying to judge the true position of the pointer was also up and down, requiring you either to lengthen and shorten your neck, or else to move the whole of the upper part of your body. Definitely not as easy as wagging your head slightly from side to side - I am sure that I'm not alone in hating sets with vertical scales!

### Seeing the Marks

Since the coming of digital electronics and the 7-segment readout, analogue tuning dial and pointer arrangements have all but disappeared, and with them that parallax problem. However, amidst all the keypads and buttons on a modern radio, there will usually be at least a few controls operated by the more traditional knobs, for gain, variable filters and the like. The choice of a suitable design for these control knobs and the layout of the markings around them are a challenge for the equipment designer and, if he does not get it right, a potential headache for subsequent users.

First, the knob must be of a suitable shape and size for the particular application. The type that is more or less cylindrical in shape, with just

a tiny pointer at its base, or perhaps even only a line engraved down one side of the cylinder, is all right for a 2-position or 3-position rotary switch, because the pointer or line should be visible at all positions. It would not be very satisfactory, however, for a potentiometer with a 270-degree travel.

Mind you, if you have the set installed so that its front panel is nowhere near at right angles to your line of sight, you could be left wondering where even a 2-position switch is set to. Most front-panel layouts are designed on the assumption that the equipment will be sat flat on a desk-top, with the operator looking slightly down on it. The result of that is that each label should be positioned above the control to which it refers, where it is clearly visible. If you were to recess such a piece of equipment into the desk-top, so that the front panel is nearly horizontal, you will be looking at all the controls from underneath, and the knobs would hide the labels. Similarly, much of a 270-degree scale surrounding a pot would be hidden.

This is what I mean by recommending that when you go shopping for a new rig or receiver, you take account of how you plan to install it. If you simply sit it on a desk-top, you will be looking at the front-panel controls from above. If you recess it slightly

into a desk-top, so that the panel is at right-angles to your line of sight, or sit it on a shelf above other equipment, you will be looking at the controls from straight ahead (usually the ideal situation), but if you recess it more deeply, you will be looking at the controls from underneath.

Obviously, what effect all this will have will depend on the shape and style of the knobs chosen by the equipment designer. Large skirted knobs have less tendency to be obscured by being looked at from an angle. To my mind, one of the outstanding front panel designs for openness and legibility was the Racal RA.17 communications receiver. As things like switches and potentiometers have got smaller and smaller, front panels have followed suit, but there is less scope for achieving a good layout, as fingers have not got correspondingly slimmer.

In fact, it is all too easy to design a front panel looking at it from the back, based on the body shapes and sizes of the various controls to be accommodated, then discover that there wouldn't be room for the operator to adjust one control without moving another. Worse still, that the knobs actually overlap - I know, I've fallen into the trap myself!

Having held up the RA.17 as a paragon of front-panel design, albeit of a bygone era, I have to admit that it falls down in another aspect, the wear-resistance of the panel markings. It's a problem with any equipment where the markings have been silk-screen printed, rather than being engraved into the front panel itself, or into screw-on labels. A similar problem can occur with markings incorporated into the anodising of aluminium panels.

Engraved markings are usually filled with paint in a contrasting colour, generally white. With use these will of course tend to be obscured by accumulations of the 'gunge'

produced by a combination of dust and sweaty fingers, but at least you can gently wash the dirt away with a little water and an old tooth-brush or similar. If the worst comes to the worst, you can do a little retouching with a fine artists' brush and paint or even typists' correcting fluid. You can do the same to engraved lines, dots and arrowheads on the knobs themselves. All this providing, of course, that you have a steady hand and nerve.

## On the Button

Obviously where the button and keypad controls found on modern rigs are concerned, there isn't the same problem of seeing 'round' control knobs. However, the remarks about engraved, silk-screened or anodised labels still apply, especially where they are on the keys or buttons themselves, so that they are subject to constant wear.

With microprocessor controlled rigs, designers all too often tend to get carried away in finding 'clever' things to do with the processor's spare capacity. This sometimes means that a second set of functions are allocated to buttons or a keypad, identified by being printed in a different colour. That almost certainly will have involved the use of silk-screen printing, so look closely at the way the labels are laid out.

If you already use a rig with a keypad for frequency entry, check to see that the layout of any new rig you're considering is the same, otherwise you will find yourself entering the wrong digits. It's a great pity that the world's authorities didn't get together and decide on a single standard layout for calculators, computers and telephone keypads at the dawn of the digital age, instead of the variations we have to cope with now.

The layout of groups of related buttons will vary considerably from equipment to equipment; the thing to

look for is that the arrangement is at least logical. That a manufacturer should produce an HF rig with the mode selector buttons in a vertical row, with the 'LSB' button located above the 'USB' button indicates a strange thought process (or perhaps a total lack of one!).

## Connections

Any piece of radio equipment will need some external connections - power, antenna, key, microphone, loudspeaker, data in and out, for example. Many of these are conventionally placed at the rear of the set, and need to be allowed for when you are working out how deep your operating desk or shelf needs to be to accommodate the connectors and their cables. You could add as much as 150mm to the equipment depth for a PL259 or 'N' type plug and a heavy coaxial cable, for example.

For some types of connector, 'right-angled' versions are available, which will require less depth behind the equipment, but some of these can be troublesome at VHF and above, producing a very high VSWR. (Geoff is referring to low cost or poorly designed PL-239 right-angle types here, not constant-impedance N or BNC plugs - Tech Ed).

## The Book of Words

"When all else fails, read the instructions" (Anon.). An old saying, but one which is today more true than ever. The ideal design of any piece of equipment will be such that any user familiar with its purpose, will be able to operate it to a basic level without needing to read the owner's handbook.

Unfortunately, especially with modern equipment, this is all too often not the case. It is often said that the best person to ask for help in sorting out the operation of a new state-of-the-art video

recorder is a 6-year-old child, and I think that the same applies to many other items of electronic and electromechanical equipment.

What really gives us people of more advanced years trouble, is that when we do admit defeat and refer to the handbook, it is so poorly written as to be almost unusable. Instead of giving instructions for setting up functions in a nice, easily followed flow-chart format, with the absolute minimum of waffle, the handbook writers feel the need to dress everything up in wordy prose.

I've found this particularly annoying in a couple of appliances from outside the amateur radio field which I've acquired over the past couple of years. One was a video recorder - I'm still trying to find out how to make use of some of the clever features on that - but worse still was a combined telephone, answering machine and fax.

At least the video will sit there happily while you try to decipher the next stage of a programming process from the handbook. The telephone/fax combination, on the other hand, demands that you enter the next instruction in the sequence within a few seconds, otherwise it times out, throwing away all the information you've given it so far, and reverts to its 'standby' condition. What a masterpiece of industrial design! In sheer frustration, I've resorted to drawing up my own flow-charts for the various functions I'm interested in, which now make the whole thing manageable.

Drawing up such flow-charts is rather like drawing your own block diagrams of a complex piece of equipment. By the time you've learned enough about the equipment to produce the diagram, you find you understand it well enough that you no longer need the simplified information. However, the time devoted to it is never wasted, for you have a good memory-jogger to refer to in the future, when you will undoubtedly find that you've forgotten some of the fine points.

# QRP corner

The Dayton Hamvention is known throughout the world as one of the premier amateur radio events. This year's trip was my sixth visit in the past seven years. I only missed one because of a request from four Very Important Persons who were arriving at the brand new channel tunnel site at the formal opening.

The Hamvention, as it is known to the Americans, is a 'Mecca' for radio enthusiasts throughout the world, not only to walk the flea market and the inside stalls but to meet old friends at the various events staged by different groups outside the arena.

If you walk around the fleamarket looking closely at each stand, but not dawdling, you should be able to visit each stand once during the weekend with luck. I do it at the trot / fast walk pace, glancing at each looking for specific things that I'm interested in. This way I'm able to visit them all twice!

The outside events include a DX dinner for those DX chasers, a meeting of the FOC members, and of course a gathering for us QRP fanatics. This year there was a 'first' for Dayton. Three members of the QRP ARCI

## Dick Pascoe G0BPS reports on the fun to be had in meeting QRPers from around the world

decided to put on a complete day of talks, each of just thirty minutes. They asked all those interested to offer their services for a talk specifically for QRP enthusiasts.

Normally we have a 'block' booking at the Days Inn hotel (south Dayton) and this year was no exception, with a gathering at one or two of the hospitality rooms every night.

As the Hamvention doesn't start until Friday, the Thursday was dedicated to the QRPers attending, and over one hundred booked to take part in this first event of its kind. Twelve different speakers, each a leader in his / her field, gave a talk on their pet subject. George G3RJV of course talked about construction. The down side was that it all started at 7am! Yes, seven in the morning, only the American would organise an event that started at this time of the day.

It appears that they had agreed for so many speakers to talk that they had to start at that time to get them all in. Even with this log jam of hi-tech speakers, limited to 30 minutes each, although George G3RJV managed to get his talk extended to an hour. His talk was exciting, interesting and he had all listening on the edge of their seats, in my opinion his talk alone was well worth the \$30 entrance fee. Incorporated in this fee was a copy of each paper submitted by each author, a file to keep it in and a new book. George's personal notes went to about 60 pages, the interest was so great that several attendees asked if they

could be copied!

This event was also the launch of three new books, each aimed at the QRP operator. The one included in the entrance fee will become a standard throughout the world. Written by Paul Harden NA5N it will be an essential part of any homebrewers library. It gives details of hundreds of components, circuit ideas, and tests of many of the more well known US projects over the past few years. The rear section of the book is a collection of 'yellow pages' giving details of QRP kit manufacturers, their names and addresses, and an up-to-date list of known QRP clubs.

The next book is printed by the G-QRP club, and is a copy of a book from Australia. It is a must for those interested in homebrew projects, it's available from George G3RJV. The last of the three was also from the UK, "Introducing QRP" which sold almost 100 copies at the show. Written by your's truly, it provides an easily-read introduction to the history and skills of low power operating in the UK. It's priced at £6.95 plus £1.00 p/p (cheques payable to Mr. R. Pascoe), and is available from me at the address at the end of this column.

The Friday night Banquet is another event that the visiting QRPers must attend. The meal is almost an aside to the evening as the other events take the fore. The speaker this year, Frank K5AKN, gave information on bicycle mobile operations. He described how he'd put together his station on his bike and tested out

several aerials before getting one that worked well on the back of a bicycle. An interesting and entertaining talk as the food slid down.

### QRP Hall of Fame

Mind you, we were late. George and I had invited the staff of the RSGB stand to join us for the meal, which started at 7.00pm. The show closed to the public at 6.00pm and we left at 6.15 with a 30 minute drive to the hotel, shower in the 85degree heat and 85% humidity, plus the flat tyre on route. Oh well! But we were in time for the inductions to the QRP ARCI (Amateur Radio Club International) Hall of fame awards. George G3RJV had been inducted into the hall of fame in 1992 with Doug DeMaw W1FB, Randy Rand AA2U, Roy Lewallen W7EL. This year he got his wall plaque to match his 1992 certificate.

The new inductees to the ARCI hall of fame were announced, they were, (in no order) Brice Anderson W9PNE, Tom Davis K8IF, Wes Hayward W7ZOI, Rick Littlefield K1BQT, CF Rockey W9SCH, Ade Weiss W0RSP and our very own George Burt GM30XX. Some of these names may be unfamiliar to many UK operators, but to those of us who are in contact with the US on a regular basis, many are well known.

Tom was president of the ARCI and instrumental in getting them to accept 5W as their power level for QRP. Wes is famous for his great books

### Introducing QRP

Dick Pascoe G0BPS



An introduction to QRP in the UK  
(One of today's greater challenges in  
Amateur Radio communications)

Introducing QRP, by Dick Pascoe G0BPS

including his "Solid State Design for the Radio Amateur". Rick is the man that evolved the 'standard' NE602 / LM386 circuit, many well-known amateurs have used his building blocks in their design. Rocky has been known for his contributions to the 'Quarterly' magazine for many years, he has led a number of builders with his wealth of information in his articles, also for his book 'Regenerative Receivers' which now graces my desk! Ade is best known for his 'MilliWatt' magazine that only lasted a few years yet has been reprinted at least twice! One of the very best proponents of using under one watt for contacts and also a prolific writer with books such as 'The History of QRP' and the highly collectable 'The Joy of QRP', a major influence in QRP for over 25 years.

Finally our own George Burt, GM3OXX. What can we say? Let's start with the ONER, the OXO and many other circuits that have become firm

favourites around the world. As G3RJV says "the ONER must be the most built circuit around the world", thousands of kits have been sold and built. GM3OXX always runs homebrew equipment with a power level of always under one watt. He is the archetypal, but extremely modest 'been there, done that, got the T shirt' type in QRP. A truly impressive record and very well deserved. Well done George.

The Saturday at the hotel is a less formal affair with all the 'traders' showing their wares. The G-QRP club was there and your's truly had to jump on a chair and sound off about what we had for sale. Fitting head neatly into a ceiling light before moving to a clearer spot. The pizza arrived late and we all starved to a shrivel but enjoyed ourselves.

This year, a few of our US helpers decided to get a stand of their own so Bill N8ET, Pat WS8T and Roy W7EL were in another hall some hundreds of

yards away. Just as well that Graham G3MFJ and Tony G4WIF offered to man the stand and help all three days.

This year the change of date from April to May cost me another 30% on my normal air fare, up to £400 (Gatwick-Detroit) now plus the cost of the hire car at £300 for the 10 days which we split. If you would like to join us next year, let me know very soon as hotel rooms are very scarce that weekend. You will have to pay your airfare, the hotel at £55 per night per room (not per person) and your food. The fun is enormous and I consider the cost well worth it (just ask Graham or Tony!) The down side is the swollen ankles from standing on concrete all day, the feeling of being totally exhausted after four days of 6.00am to midnight stints. The Yanks sleep for weeks to get fit for this, we go there jet lagged!

Our stand this year was different from the past as we has a guest with us. Bruce Franklin of Index Labs helped

out on the stand with the latest 'QRP Plus' on show for the first time. It attracted a lot of interest and we think he sold a dozen or so during the weekend.

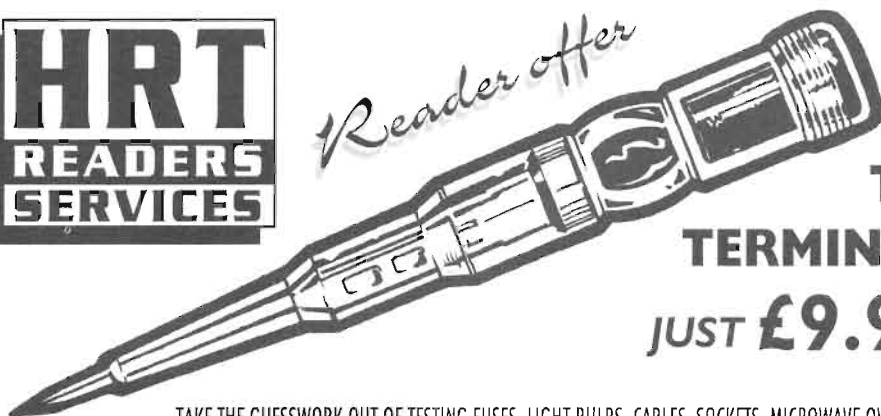
Martin F Jeu from MFJ also helped out for a while as did a few other Brits, including Peter and Jeff from Waters and Stanton Electronics who joined us on the stand to sell a few SPRATS and badges. Next year we will have Bruce from Index back again and also a few helpers from the NorCal (Northern California) club

Well, that's it again for another month. Next time it will be a shorter report on my trip to Friedrichshafen and the QRP goings on there with George G3RJV, together with the famous Roy Lewallen W7EL and his family who will be staying with me for a while during his UK tour.

News, views to me by packet to GOBPS @ GB7RMS, by post to Seaview House, Crete Road East, Folkestone CT18 7EG, or via HRT Editorial by email, or fax.

**HRT**  
**READERS**  
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*Reader offer*



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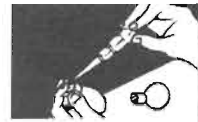
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# VHF/UHF message

## Geoff Brown GJ4ICD shows how you can now try getting a contact with Saudi Arabia on 50MHz

Samir OD5SK, who is stationed and working in Saudi Arabia, reports via the Internet that HZ (Saudi Arabia) may soon become active on 50MHz. This follows long painstaking negotiations between many parties. Samir did notify me via Tom DL7AV regarding this information earlier in the year, however, I was naturally asked to keep things confidential until negotiations were completed.

The last and only time that Saudi was worked from the UK on the 6m band was in 1989/90, when G3HBR worked the local club station, HZ1AB. Samir reports that there are a few stations who already have equipment for 50MHz. This is very encouraging news for the future as we start to see the conditions for F2 propagation rise towards cycle 23, however, it may well be possible to work Saudi Arabia via multi-hop Sporadic 'E', as many have already done to 9K2 (Kuwait) and JY (Jordan) also see 'Sporadic E Reports'

*later - Ed.*

Having been involved in two major 50MHz expeditions during the past few years I feel confident that, given a dedicated operator and reasonable equipment (100 watts), that distances of up to 8000km can be achieved via multi hop Sporadic 'E' in the peak summer months of June and July in the northern hemisphere, and December and January in the southern hemisphere. This puts Saudi well within reach, as Riyadh is only 5200km from the UK. There are exceptions though, like the contact in 1994 between Jordan and the USA at nearly 10,000km, which I believe is still a World 50MHz 'ES' record. Sadly though, the ARRL do not accept mode distance claims!

News from the RSGB's VHF manager David Butler states that "Talks have been held between the amateurs in Monaco and the TV broadcast companies". It was hoped that 3A2 amateurs would be permitted on 6m this summer, and so, by the

time you read this information, you may have already worked Monaco (3A2) on 50MHz. However you may have not, as Frank PA3BFM contacted Daniel 3A2LZ (who is known to be very interested in operating on 50MHz). Daniel states that he knows nothing about the negotiations, confusion reigns!

### Sporadic 'E' reports

*April/May:* The first major European Sporadic 'E' opening transpired on the 21st April, conditions throughout Europe lasted for around five hours, the MUF climbed to over 70MHz and many reports were received of S9+ signals on 50MHz from SP to G, I to G, YU to G. It was interesting to note that Japan and the USA had massive openings at least ten days before Europe did.

April 27/28th saw over 15 hours of 50MHz 'ES', the MUF rose to over 100MHz, and stations up to 1800km were worked. WA10UB

reported 48.250MHz TV from Spain on the 28/29th.

May openings produced EH7AH on the 2nd, EH8ACW on the 9th, which by the way was the best opening so far. WA10UB also copied Video from Spain on the 9th.

May 11th was unbelievable; EH3CUU in JN12FE worked 4K6D in LN40 at a multi-hop distance of over 3840km, this was a very early start for multi/chordal hop Sporadic 'E'.

May 12th featured EH8BPX on double hop again, and Bob WA10UB reported over 300 minutes so far this year of 48MHz TV from Spain.

Several expeditions unfortunately left it too late in sending their news to me (and others!) for publication. For instance, the PA gang notified the world on May 11th that they would be active from 4L (Georgia) for the last two weeks of June. Now, how *do* you spread good news like that? Well, the information was passed around via the Internet, as were many other late expedition bulletins. It would help in future if expedition groups give at least a couple of months notice to the journals, this may also help in sponsorship of the expedition. Otherwise, late news is as much good as an



144MHz EME operator Graham F/G8MBI



23cm EME'r Jean-Pierre FIANH

ashtray on a motorbike

A nice report came in from Israel, when it was reported that on 14th of May, Chris 4Z5JA and Arco 4Z5DB worked 7Z500 (Saudi Arabia) in LL44JQ on 50.110MHz CW, the QSL info is via WIAF.

Also on May 14th was an extensive opening via Auroral 'ES' to JX7DFA on Jan Mayen Island in the Arctic circle. Many G's, PA0's, SM's, DL's, and OZ's worked the station. But alas he was not audible in GJ. Ah well, maybe another time! But thanks for all the phone calls to warn me it was going on.

The 15th produced a report from Eric F5JJK (IN87), ex 5T6E, that he copied the ZD8VHF Beacon on Ascension Island from 1931z to 2009z, this was also reported by Roger G4HBA.

The 18th was a remarkable day, and some really fine DX was worked on 50MHz and

144MHz. 50MHz reported countries worked from the UK, were; UX, ER5, 4X6, 5B4, SV, HA, LZ, YU, YO.

On 144MHz Alan GJ4ZUK made a fleeting contact with YU, and your's truly worked LZ's in KN22.

Having had such a fine opening, and so early in the season for 144MHz to open, I decided to divert all my energies to the next day. Sure enough, both bands opened again. This time, Alan GJ4ZUK worked 9H, LZ and YU on 2. On 50MHz, 4X6UJ and EH8BPX were the best DX I heard, but where was that 7Z500 station? The answer was "working G3SYC"! Yes, apparently Brian G3SYC in Yorkshire had the one and only contact with 7Z500, he was also copied by a Novice in the same area.

The distance seems to be about 5300km and appears (writing this in early June) to

be the best DX so far this season.

On the 20th, Bob WA10UB reported the first transatlantic opening with EH8BPX at 2130z. JX7DFA was again into the UK and Holland, and to top it all the JW beacon (Svalbard, in the Arctic Circle) was reported by Nick G3K0X. Others reported that day were 4X6UJ and 5T5BN, both at around the 3600km distance.

May 22nd started with an unbelievable opening on 50MHz. By 0800z the band was wide open to Israel, with 4Z4TT at S9 plus in many parts of the UK. Underneath his signal was the 7Z in Saudi Arabia, but sadly nobody worked the 7Z. Stations in Europe were heard chatting to each other on 50.110MHz which blotted out the DX. I now have a theory why people chat to fellow Europeans on 50.110MHz, and the answer is simple - *less VFO wear!*

Later that day, KP4A in the Caribbean worked EH8BPX in the Canaries.

On the 23rd things went mad. In the afternoon my business organisation was receiving calls of interference to radio reception on Band 2. That was my cue to get on the radio, and what a day. The XYL manned the shop, but I was warned that she could become the ex-XYL! What would we do without them?

Two solid hours of 144MHz ES to LZ, I, Z31, YU, and SV (Greece), I even worked a new square, the first for ten years. 50MHz was also in full bloom with reports of Russian stations on the band, like R3VHF, RA3ZG, UT8AL and plenty more.

The 24th was even better. On 144MHz, OH's were calling CQ at 0700, incredibly via 'ES'. I must say that these openings were very unusual for May, we never see so such intense ES openings so early.

There seemed to be much shorter skip on 50MHz throughout the day. The day progressed and the only

other significant report was from Keith G4FUF who worked a string on Ukrainians on 144MHz.

Burnout occurred on the morning of the 25th, when things were dead. Time to get some work done. Later in the day things livened up a little, with the CU3URA beacon (Azores, HM68) into Spain/France and the UK at up to S9. Sadly though, there was no sign of the FY7VHF beacon in French Guiana (South America).

50MHz beacons LA7SIX (JP99) and JX7DFA were into PA0 and the UK in the early morning of the 26th (0020-0130z). But interestingly, Per SM4POB worked JX6DFA (Jan Mayen) at 2130z on the 25th and the JX was in for 40 minutes. Per also worked TF3BM in HP94, at 23.04z, and heard rumours that VE8HL had been worked earlier in the evening from SMO.

At 1720z the same day, TR8CA was heard in Jersey at 519. It was later acknowledged that he worked a few Europeans, it seems that the mode was multi hop Sporadic E, as reports were received of extensive openings to EH9, CT3, and EH8. On the following evening of the 27th, TR8CA (Libreville, Gabon) was S9+. The 28th brought the biggest USA opening into Europe so far. W1/2/3/ and 8's were worked, and EH8BPX worked NOLL at a distance of 7300km.

Well, another month gone by with lots of DX worked. My apologies for not including the 50MHz beacon list as promised, as there have been some super openings to report. The beacon list will be included in a future edition.

News and views please to: Geoff Brown, TV Shop, Belmont Rd, St Helier, Jersey, Channel Islands, or via Email to equinox@itl.net, or even packet at GJ4ICD@WD5B or GJ4ICD@GB7GSY, or GJ4HXJ@GB7GUR - we even have a phone; Tel. 01534 877067.

# DATA connection

Our resident data SysOp Chris Lorek G4HCL seeks the answer to why hams prefer wired rather than wire-free data communication

Having just returned from a short Middle Eastern business trip (just lasting a couple of weeks but it seemed a lot longer!), I'm busy 'catching up' with events in the UK. So, my first comment here is to apologise for any delays in replying to reader's packet and Email messages, all have been answered by now.

## PC sound card packet?

I recently read a brief but interesting Email message from John G4VWL, which got me thinking very hard. John asked if anyone had investigated the use of a PC's sound card as the basis of a packet TNC? We currently have sound card programs for SSTV, Fax and so on available for use with a PC sound card, so why not packet radio? It's certainly within the realms of possibility, with today's computers having faster processors, and as John suggests, the PC's parallel port or the speaker driver could be used for the PTT. We have systems such as BayCom which use a simple modem for the packet interface, i.e. simply handling the audio tone to logic conversion and PTT switching, so a PC sound card decoder

'add-on' could be a very logical progression. Further advantages could be DSP filtering add-ons for the PC sound card decoding, which indeed are already available (they've also been offered through the Ham Radio Today Software Service). If anyone has information on developments in this line, please do let me know, I'm always contactable by packet, Email, fax, or with a phone message!

## Little response?

An Email from Phil G1LKJ says that recently he posted some bulletins both to RNARS and also to other subjects on AX25 packet radio, and in most cases he's had absolutely nothing back, which Phil says never used to be the case a few months ago. Are people using packet less, or maybe just using it for 'personal' mail? Or are they changing over to the Internet? In the current issue of AMSAT-UK's 'Oscar News', which landed on my doorstep a couple of days ago, Ron G3AAJ in his very readable 'waffle pages' mentions that less and less people appear to be using the satellites, possibly because of the Internet, which Phil also comments on.

Are we all becoming 'wired'?

Are we using phone modems via the Internet instead? If so, why? It certainly isn't cheaper, as a landline modem arguably costs around the same as an TNC, and being amateurs we would probably already have a rig, power supply and aerial to use with the TNC. Most Internet users must pay for the call costs as well, which is usually the most expensive part (my son's Internet phone bill, for just local calls via BT over the last quarter, was £280 - that's over £1,000 per year!). In my opinion, the one big reason is *speed*.

How can 1200 baud packet radio, with a throughput of, say, 100 baud or less on a typical busy channel, equate to the high speeds of 14k4 or 28k8 landline modems for information retrieval? The landline system gives instant international linking, the packet system throughput is only to your local BBS or node. Try 'node hopping' across the country on packet for a 'real time' QSO and you'll soon become extremely bored and frustrated.

The *difference* is in linking. We have fast Internet backbone links, usually a minimum of 64kbits/s but commonly in the Megabits per second range, but these come at a price. We *could* have the same across the country

on packet radio. German amateurs were probably the first to 'show us the way' in Europe, with their high speed UHF and microwave packet links, these even handling digital voice over packet. I've said it a number of times before, the answer here is to support your local packet group, and if you have specialist skills you can offer, then do so.

If we don't get our act together, maybe packet could go the way some other modes have, in becoming a slow, almost obsolete method of communication used only for recreational use by the enthusiast, with other more efficient modes of communication (at a cost!) for 'real' communication. Like HF SSB compared to a GSM cellphone (i.e. tap a number into a handheld whilst I'm in Abu Dhabi and I'm quickly chatting to G8IYA in the UK).

Think about it, we *have* the ability to make packet a fast, a wire-free worldwide TCP/IP 'Internet' system for amateurs. All we need is the effort to do it.

## Maxpak news

Maxpak, the Midlands AX25 packet group, have sent me their latest *Digicom* newsletter, which besides containing plenty of group and local node/BBS information, has a very interesting feature on DAMA, i.e. Demand Assigned Multiple Access (a new method of handling packets?), by Detelf DK4EG. This protocol aims to reduce the problems of 'hidden terminals' with users having problems in accessing their local



© digicom from Maxpak

node or digipeater due to the BBS/node hearing stations the connecting station doesn't. The system description is extremely interesting, but it's far too lengthy to detail here I'm afraid. However the Digicom Editor, Joe G4VYA, has kindly offered to make it available on disk as an ASCII text file if anyone requires a personal copy. You can contact Joe by post; J. Jacobs, 17 Cotswold Drive, Abingdon, Wolverhampton, WV7 3DQ, on packet; G4VYA (@ GB7MAX, or Tel. 01902 373975. While you're at it, if you're a packet user in the Midlands area then why not also ask for details on this very active group?

Further news from Maxpak is that the GB7AP node is now operating from a new aerial system at a lower height, to hopefully improve local access (less QRM from the DX!), and that the installation of a 9k6 144.525MHz node is now in hand and, once operational, will give direct 9k6 high speed access to the GB7MAX BBS.

## Packet Radio Operator's Manual

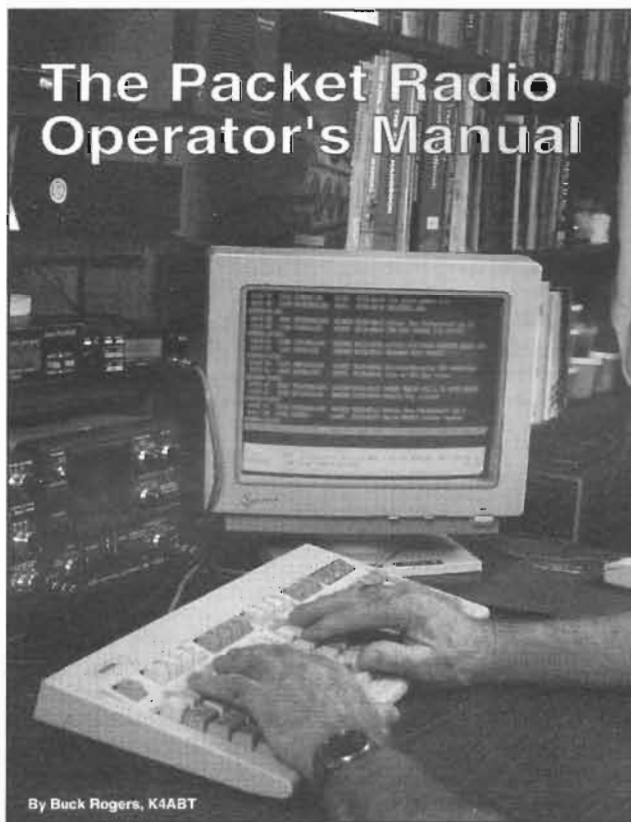
I'm often used to seeing a number of 'Beginner's guide to getting started in packet', type books, but this isn't one of them. It's different. It's something for the user who's got his TNC going, and is interesting in the 'next step', whether this be running a network, BBS, or even video over packet. The author even says in his first sentence of the introduction that "This manual is not intended as a beginner's guide or as a packet primer".

Instead, it gives you plenty of

information to show you the much *wider* world of packet, as well as giving an insight to the meanings of those many commands your TNC throws back at you! You'll also find useful information on using nodes and gateways, as well as a guiding hand on getting your own network system up and running. There are even details, including TNC track layout positions, of modifications such as enabling flow control when two or more TNCs are connected back-to-back in a diode matrix cluster.

Communications: Packet Radio RFI Causes and Cures; The Packet Bulletin Board Service; Solar Power; Where are the Bauds; plus several appendices including many transceiver to TNC connection diagrams, TNC RS-232 matrices, and plenty more.

It's written by Glynn 'Buck' Rogers K4ABT who's a well-known authority on packet in the US. He's also written several other books on packet, and has a packet column which I read each month in the US 'CQ Magazine'. He shares his



The Packet Radio Operator's Manual

Now, where *was* this book when I needed it, years ago! For budding hilltop node SysOps, there's information on backup power supplies and solar power chargers, plus 9600 baud modifications, including connection points with typical transceiver component layouts.

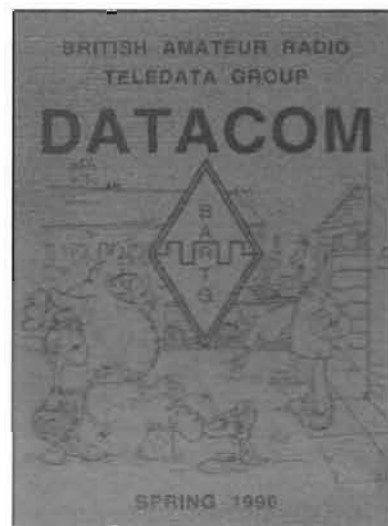
Chapters in the book include; The First Question; Building a Packet Station is Easy; Packet Radio Networks; Conference Nodes, Bridges and Gateways; Packet Video; How to Build Switches, Nodes, and Gateways; Dual Ports, Backbones and Trunks; Aerials and Digital RF

valuable experience in this book, which I believe could be very useful indeed to packet groups as well as individual SysOps, and indeed anyone wanting to progress 'that bit more' into the mode.

ISBN 0-943016-04-5, softbound, 162 pages, it's priced at £14.50 in the UK and you should be able to obtain it from your bookshop or a number of specialist radio dealers. My thanks go to Gazelle Book Services Ltd. in Lancaster (Tel. 01524 68765) for the provision of the review copy.

## BARTG 96

A reminder that the British Amateur Radio Teledata Group's rally is next month, on September 15th at Sandown Park Racecourse in Esher, Surrey. There's a bring and buy again this year, and the doors open at 10.30am. You'll find that a location map plus more details will be available by fax



Datacom, the quarterly journal of the BARTG

(hopefully!) from 1st September 96 onwards, maybe earlier, on the 24hr Ham Radio Today fax-back service. I make a point of never missing this excellent event if I can help it, which is of interest to all with an enthusiasm for data over radio. If you can't make it but you're interested in the BARTG, their contact details are in Ham Radio Today each month at the end of the 'Club News' section.

## CTRL-Z, end of message

That's it for this month. As always, please *do* let me know what you're up to in the ham radio data communication side of things, or indeed what your local group are doing. If you'd like a specific topic covered in this column, or a question you'd like to ask, just get in touch and I'll try and help. You can contact me either direct via packet, or via post, fax or Email c/o the Ham Radio Today Editor. Until next month, 73 from Chris G4HCL @ GB7XJZ.#48.GBR.EU

# Satellite rendezvous

## AMSAT-UK news collated by Richard Limebear G3RWL

The higher powered engineering beacon on Oscar 13, on 145.985MHz is (as this is being written) currently *on* for two periods: MA 0-25 and MA 90-100. This beacon is about 6db stronger than the general beacon (which is *off*), so facilitating telemetry collection at perigee when the omni-directional aerals are in use. The Engineering Beacon is PSK only; it does not transmit CW or RTTY.

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

channels, and the 20 status bytes. The WEBTLM-1 frame is the same format as WEBTLM-0, except is not real time. The WEBTLM-2 frame is the same format as WEBTLM-0, but is sent as a burst upon command. The WEBTLM-3 frame is the same format as WEBTLM-0, but is sent individually upon command. The WEBTLM-4 frame is 'human' readable, accepting a command to store telemetry and status during a certain period. The WEBTLM-5 frame

operational, with no noticeable degradation of the image quality after nearly five years in orbit.

UoS intend to continue imaging, however this may be discontinued at any time if the transputer system which is used to process the imagery is required for other purposes. Due to the amount of traffic on UoSAT-5 the number of images will be kept to a minimum, probably around one image per day.

### Techsat

Preliminary information about the Israeli TECHSAT says that the launch has been set for July 28th 1997. The payload is more or less the same as on the previous (failed) launch.

### Sarex

The next shuttle mission carrying SAREX is due to be STS-79, scheduled for launch on Aug 1st this year, i.e. it should just about be up there by the time this magazine hits the shelves.

### Orbital data updates

Last month I mentioned that, to try and improve the availability of up to date orbital data, UoS would upload the most recent Keps for all amateur spacecraft to UO-22 each Monday. This is causing some

### Amsat Oscar 13 Schedule (*provisional*) to 2nd Sept 1996

Mode-B:	MA 0 to MA 140	
Mode-BS :	MA 140 to MA 240	
Mode-B:	MA 240 to MA 256	Alon/Alat 220/0
Omnis:	MA 250 to MA 140	Move to attitude 180/0, Sep 2nd

### Webersat

Webersat experienced a software crash in April. Initial operating software has been reloaded several times by groundstation controllers, and the satellite is believed to be currently transmitting telemetry, OBC status, and beacon frames. The digipeater is temporarily off.

When Webersat has been successfully reloaded, it will be sending several new telemetry frames. The WASH-0 frame is the time (four bytes as seconds after 1-Jan-70 UTC, least significant byte first) and EDAC counter (one byte) of the last 50 single-event upsets detected in the EDAC RAM. The WEBTLM-0 frame is a real-time 4 byte time, then 100 channels (as one byte channel number, one byte value) of: 67 measured telemetry channels as at present, 13 calculated telemetry

is also human readable, rejecting a command to store telemetry and status during a certain period. The WEBTLM-6 frame is again human readable, this indicating the start or finish of moving the data in the RAMdisk. The WEBTLM-7 frame is a four-byte time, indicating the requested data for that time is not available. The WEBTLM-8 frame is also human readable, indicating that PHOTO or SPECT frames will temporarily stop sending for up to 15 minutes, or will resume.

### UoSAT Oscar 22

Recently the UO-22 Earth Imaging System was loaded and an image was taken of the Western Sahara. This image was the first image from UoSAT-5 in approximately two years and it proved the system to be

### JAS-2

The Japanese amateur satellite, JAS-2, is scheduled to be launched in August. This means it will probably be the next amateur satellite to fly. A preliminary licence was issued in March: 8J1JCS is assigned. JAS-2 carries both linear (analogue) and digital transponders.

### JAS-2 frequencies

Analogue mode  
Uplink: 145.900 - 146.000MHz  
Downlink: 435.800 - 435.900MHz (inverted)  
(same as FO-20)  
Output power: 1W

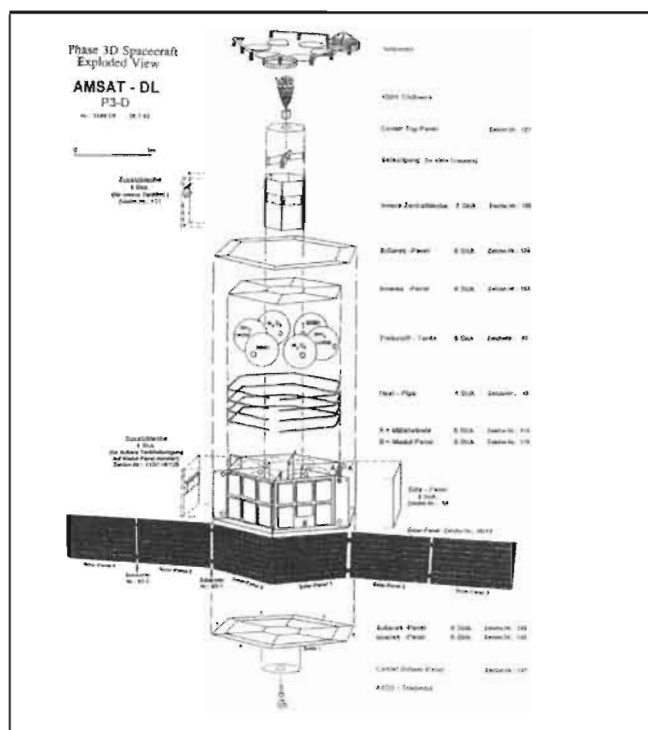
Digital mode, 1200bps BPSK(NRZ-I), same as FO-20  
Uplink: 145.850, 145.870, 145.890, 145.910MHz  
Downlink: 435.910 MHz

Additionally, 9600bps FSK will be available on JAS-2. 9600bps FSK (NRZ-L)

Uplink: 145.870 MHz  
Downlink: 435.910 MHz

Digitalker, FM voice, max 25 seconds  
Downlink: 435.910MHz  
Output power: 1W

CW telemetry  
Downlink: 435.795MHz  
Speed: 12WPM  
(same as FO-20)



difficulties on the terrestrial packet network. I would be grateful if stations who would be seriously disrupted by the cessation of this service would notify me.

## NA Kepler listing review

WA5QGD, AMSAT-NA's Orbital Data Manager, recently reported that his study to review which satellites should be listed in AMSAT's weekly Keplerian bulletin is now complete. Based on the information contained in a number of user comments, Ray plans to drop only ARSENE and FY-1/2 from the current AMSAT-NA Keps bulletins.

Another change is that the AMSAT-NA Keplers will be sent in two files instead of three. One file named orbs\$xxx.amsat will have the AMSAT format Keps and the second file named orbs\$xxx.2l.amsat will contain the NASA two-line elements.

## FodTrack tracking program

XQ2FOD has announced the release of a new version of his FodTrack satellite tracking program. FodTrack controls the Yaesu G5400 and G5600 AZ/EL satellite aerial rotators through simple hardware interfaces. The

new version also includes improved control of Icom transceivers, speeds up control of Yaesu transceivers, adds frequency parking for Icom and Kenwood (Yaesu don't need it) transceivers, and fixes a division-by-zero bug.

## 1996 Tucson symposium

The 1996 AMSAT Annual Meeting and Space Symposium will be held on November 8-10, at the Holiday Inn, City Centre in Tucson, Arizona USA. This is the second call for papers to authors who wish to submit for this event. As always, the scope of the papers should be on topics of interest to the amateur satellite service.

Topics may include, but are not limited to: The Life and Times of AO-13 Building a Phase-3D Ground Station Phase-3D Construction Topics DSP-93 Integration AMSAT Field Operations What's Next for AMSAT After Phase-3D? Final versions of all papers should be received by August 15, 1996. Submissions and enquiries should be made to Dave Burnett, WD8KRV: By Internet: wd8krv@amsat.org By Mail: G. D. Burnett, 4809 E. Pima #223, Tucson, AZ 85712 USA.

## Information sites

Whilst on the subject of Internet and web pages I have some new addresses. The National Space Development Agency of Japan (NASDA) (<http://www.nasda.go.jp/>); P3D (<http://www.amsat.org/amsat/sats/phase3d.html#NEWPAGES>); and Amsat-France ([http://ourworld.compuserve.com/homepages/amsat\\_f](http://ourworld.compuserve.com/homepages/amsat_f)). The French page supports both English and French languages and includes a lot of pictures.

## Oscar 10

It's currently available in mode-B when in view but *please do not attempt to use it if you hear the beacon or the transponder signals FMing.*

modem designed mainly for linear satellite transponder use. It uses SQPSK (Staggered Quadrature Phase Shift Keying) and strong forward error correction to achieve reliable operation at very low signal to noise ratios. It accomplishes this in no more bandwidth than that currently used by uncoded 1200 BPSK. (i.e. it will still fit in ordinary SSB transceiver bandwidths.)

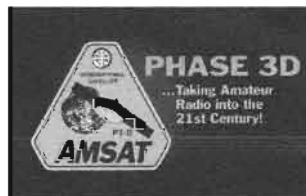
Phil has a prototype running in test mode and it's performing quite well. He has written some notes on the design and included them on his web page. Comments and suggestions are welcome. Phil's modem web page may be accessed at the following URL: [http://www.qualcomm.com/people/jkam/modem\\_memo.html](http://www.qualcomm.com/people/jkam/modem_memo.html)

## Latest Keplers

## AMSAT-UK

Did you come along to the AMSAT-UK Colloquium last month? If so, I hope you enjoyed yourself, and hopefully benefitted from the many lectures and discussions.

If Ham Radio Today readers would like further information about Amsat-UK, contact: AMSAT-UK, c/o Ron Broadbent MBE, G3AAJ, 94 Herongate Rd, London, E12 5EQ. A large SAE gets you membership info, SWL's are welcome. All new joiners get the USAT-P tracking program on 5-1/4 disk.



A copy of the latest Keplers is available on request by mail or packet; my mailbox is GB7HSN but please note that Amsat-UK Keplers are put out on packet fortnightly anyway and sent to KEPLER @ GBR.

The latest satellite Keplers as supplied by AMSAT-UK are also available by automatic fax retrieval from the 24hr Ham Radio Today fax-back line, 01703 263429 (use with a personal DTMF, i.e. 'touch-tone', phone/fax keypad - follow the voice menu), request fax document 53 from the satellite voice menu for this month's. You can also get a copy in the post by sending an SAE together with the original corner flash from this column to the Ham Radio Today Editor, marking your envelope



The Phase 3D satellite, due to be launched soon, have you contributed yet?

## New satellite modem

Phil Kam KA9Q has been making good progress on an experimental 1200 bps packet

'Keplers' and stating whether you want *all amateur satellites* (one A4 page) or *all satellites* (10-15 A4 pages - you'll need an A5 or A4 sized SAE with postage for 100g for this).