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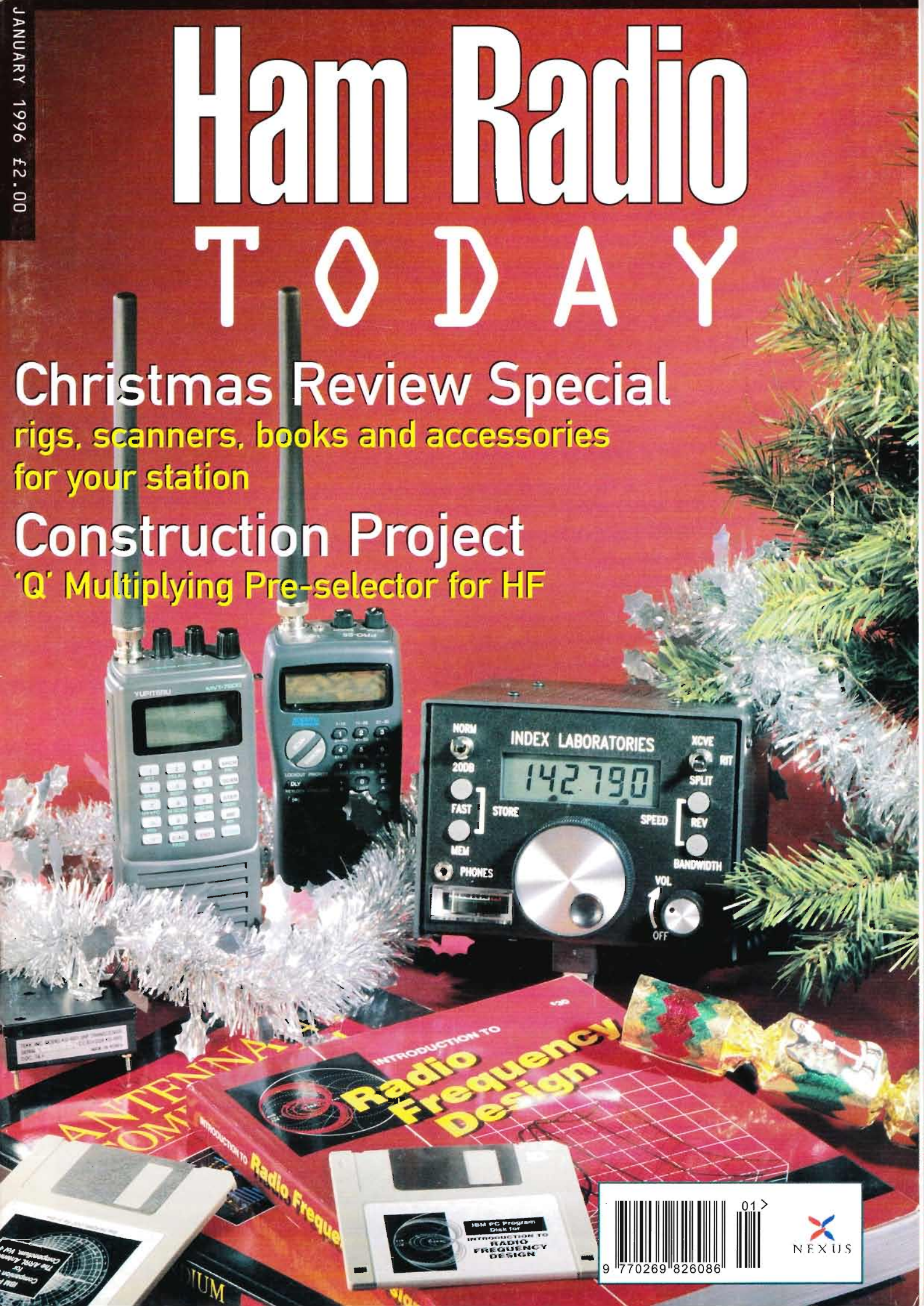

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Ham Radio TODAY

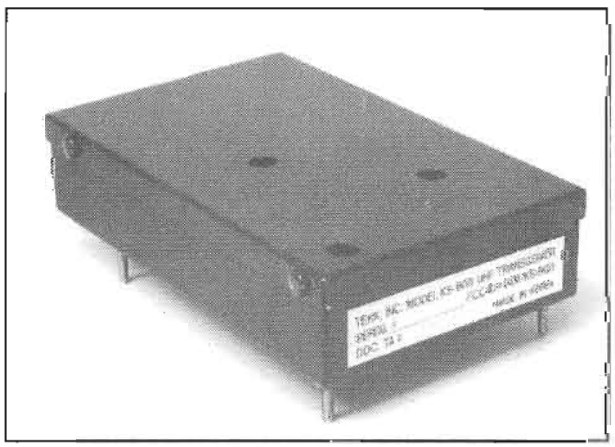
HAM RADIO TODAY
VOLUME 14 NO.1
JANUARY 1996

REGULAR COLUMNS

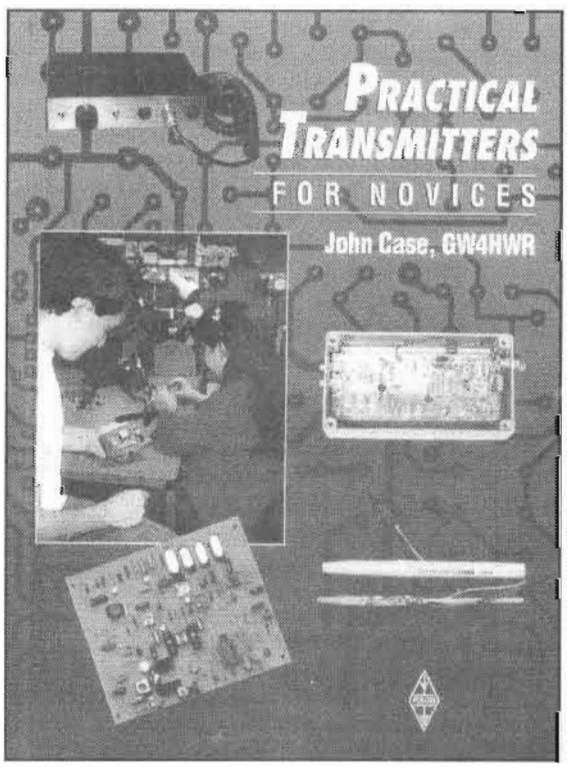
REVIEWS

CONSTRUCTION PROJECT

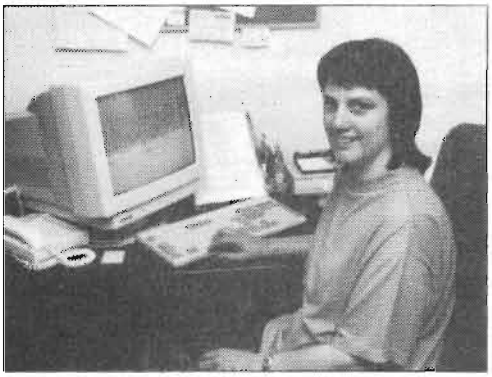
NEWS & VIEWS



T-Net Micro Packet Transceiver Reviewed (see page 22)



Book Review - Practical Transmitters for Novices (see page 21)



CQ from G8IYA

Editorial

EMC? Who cares?

It's only the end of October as I write this, but my mind is firmly on December, which means a lot to many amateur dealers, especially kit manufacturers.

Whilst walking around the Leicester exhibition last week, I noticed that a number of such kit dealers were doing quite a brisk trade. Popular choices were small 'add ons' for an amateur or SWL station, in particular various interface units to link between a rig and PC, to allow a low-cost start with weather satellite reception, packet, AMTOR, and so on.

Now regular readers will know from my comments in the past, that from the end of this year it will be illegal to "place onto the market" any gear like this that doesn't have a 'CE' mark, meaning that it's compliant with documented EMC emission and immunity standards. If you're a small business selling either kits or ready-made electronic equipment, and you're not confident that the product meets the requirements, then about £2000 is the 'going rate' for having a sample of your product tested for you. If it fails, you have to get it modified, and then get it tested another time, and again until it passes. Manufacturers can, if they wish, currently test amateur gear themselves. That's if they have the appropriate test gear, which I'm told can cost upwards of £60,000 for just a 'minimum' setup.

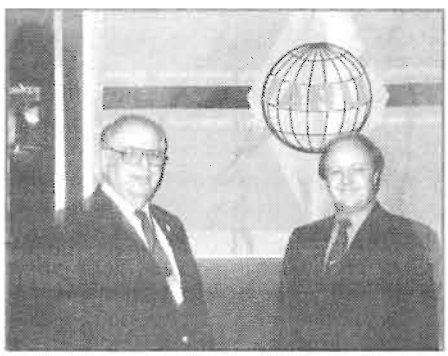
This would probably cause little problem to the 'big name' Japanese manufacturers, they'll often have this already. But, at the time I write this, I've not seen any amateur transceiver sporting a 'CE' mark . In fact, the only such sets I've come across have been one particular brand of handheld scanner receiver. What's going to happen to all the rest? Time's running out!

It's interesting to note that my son's Sega 'Saturn' games console is CE marked, but it stops working whenever the trap dipole in my garden is fed with above 10W 80m. "Nothing we can do about it" says the shop. Here's the 'thorn'. It probably *is* sufficiently immune to the RF levels and frequencies required under the European directive, but where does this leave amateurs? No more excuses of "it's the hi-fi/TV/computer to blame, it lacks immunity and needs extra filtering". Will more amateurs be sampling the challenges of QRP operation in future years?

The World Wide Web

From on-air discussions, as well as virtually every 'information technology' TV program I come across, the Internet World Wide Web is expanding at a phenomenal rate. One site that's assisted this, in its own small way, is that of Ham Radio Today On-Line, our Web site. If you have Internet access with a web browser, then take a look at *http://www.tcp.co.uk/~slorek/* where you'll find the work of our monthly software offer compiler, Steven Lorek. He's done a superb job in providing a Ham Radio Today information area, with details of what's happening in the magazine, the current issue's content, any updates such as construction articles or rally changes, and pending copyright permission from the publishers, even complete past articles such as ex-PMR conversions and rig reviews. There's one-button 'click access' to these, as well as to a wide range of information areas and sites such as the UK's Radiocommunications Agency, the RSGB, and many, many others.

Readers may know we've been on the Internet, with a published email Editorial address for some time, and we've offered all readers a free Internet email facility and provided cover-mounted PC disk software for this (full details in the March 95 issue). *Are we, again, pioneers in being the first UK ham magazine to have such an Internet 'Web' facility?*



The Secretary of the International Amateur Radio Union, Larry Price W4RA (left), with Ham Radio Today's Consultant Technical Editor, Chris Lorek G4HCL, at Telecom 95 in Geneva

Review special

As usual for this month's issue, you'll see a number of reviews of equipments which aren't expensive 'up-market' transceivers and the like (these you'll find in last month's issue, with the FT-1000MP and IC-706 reviews!). This month there's a collection ranging from a commercial HF QRP transceiver, a couple of the latest handheld scanners, right down to some interesting volumes for your radio station's bookcase. I hope you enjoy them.

WRC 95

By the time this appears, following discussion at the World Radio Conference (WRC) in Geneva, we may know a little more about the state of Morse code as a mandatory requirement. At the recent Telecom 95 event in Geneva prior to the conference, my Consultant Tech Ed met Larry Price of the IARU (International Amateur Radio Union) and had an interesting discussion regarding the possible outcome. Whatever happens, Morse will continue to be a popular mode amongst the amateur fraternity for some time. It's also fairly EMC friendly, and in the UK at least we can all use it no matter what class of licence we hold. But what of the future?

It just remains for me to wish all readers, throughout the world, a happy and peaceful Christmas, see you in these pages next year!

Realistic PRO-25 Review

The Editorial review team test Realistic's latest handheld

Realistic have recently become very 'modern' in the cabinet design of their handheld scanners, the PRO-25 being no exception. Housed in a smart grey plastic case (complete with 'CE' mark on the rear!), the European version tested here covers 66-88 (in 5kHz steps), 108-136.975 (AM, in 12.5kHz steps), 137-174 (in 5kHz steps), 406-512 (in 12.5kHz steps) and 806-956MHz (in 12.5kHz steps). As such, it covers many of the 'action bands' of interest around Europe, including of course the 4m, 2m, and 70cm amateur bands together with VHF airband, marine, and the like.

The set is internally powered by four AA cells, and you can use either normal or rechargeable types, a 'charge' connector being fitted at the side of the case for in-situ nicad charging. The set doesn't come with batteries or charger, although you'll usually find they're available as an option. Next to the charge jack is an external DC input connector, which you can use to power the set from an external 9V DC regulated negative earth supply.

The scanner has 100 memory channels, arranged into 10 banks of 10 channels each, plus 10 'monitor' memories for temporary frequency storage. In 'search' mode, where the scanner searches for activity between the 'lower' and 'upper' limit frequencies you've programmed at any time, it steps though the frequencies at a fast 100 steps per second. In 'memory scan' mode, it goes through the programmed channels at up to 50 channels per second - in either case, it's very fast!

You can scan the channel banks in any combination , as well as selectively locking channels in and out of scan within the banks. The 'secret' of the fast memory scan mode is that the set cleverly examines the actual frequencies stored, and scans these in the order which gives the fastest speed, typically in frequency order (to give minimum offset 'jumps' in the set's synthesizer), rather than in channel order where these could be stored in 'jumbled up' order.

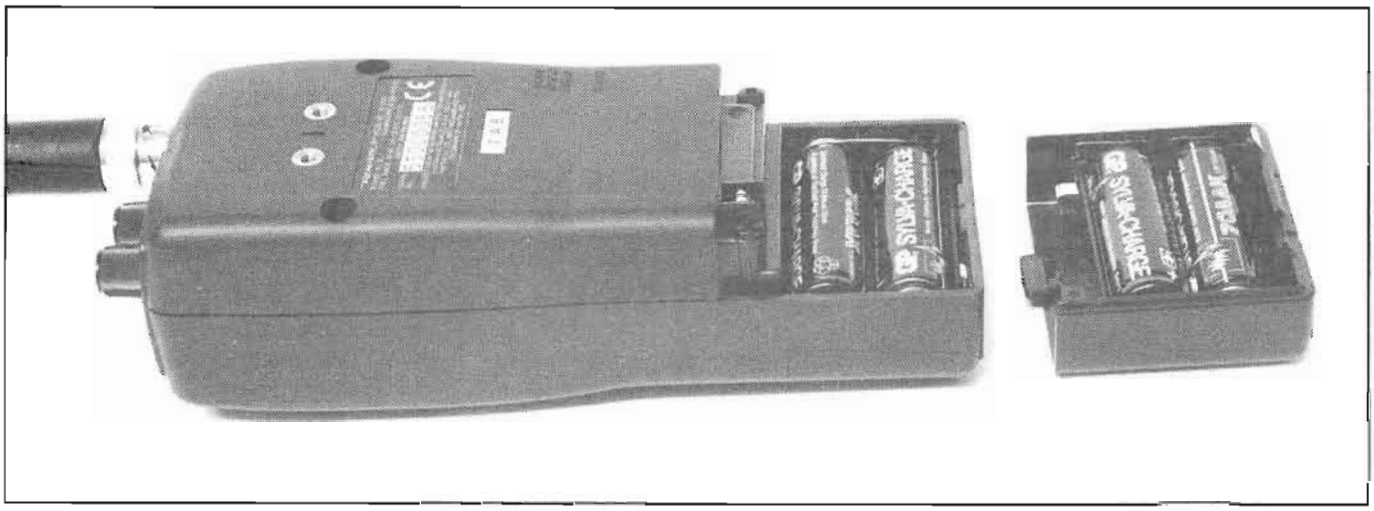
Together with this, a 'priority' channel check mode is available, where a selected channel is automatically checked for activity every two seconds regardless of what the scanner is doing otherwise. The front panel keypad is used to directly enter frequencies and memory channel numbers, and large 'Scan' and 'Manual' buttons are fitted for easy control of the set.

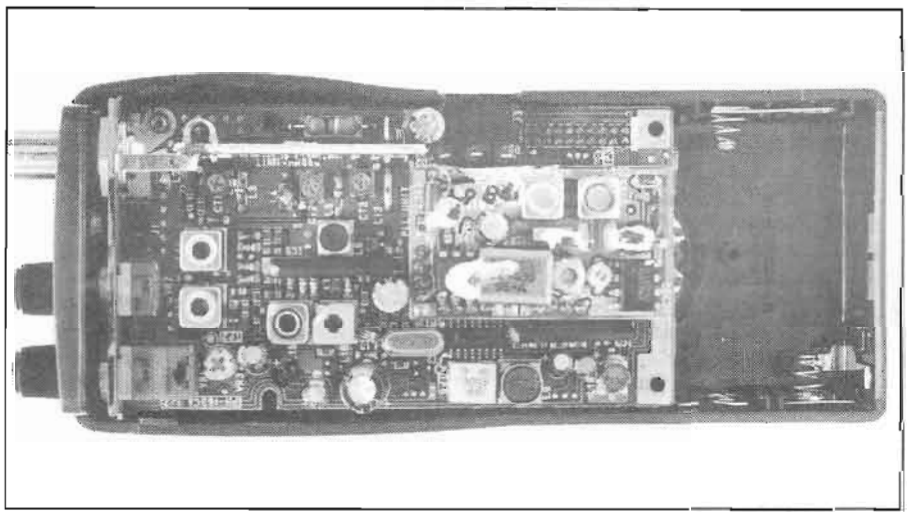
The set measures 156mm x 62mm x 43mm and weighs 230g without batteries. It comes with a flexible set-top aerial, attachable belt clip, and a user instruction book written in English and French.

On the air

Whenever the set is switched on, it always starts in 'scan' mode, automatically scanning through your programmed channels and banks, remembering the information (such as selected banks etc) it had stored each time it was switched off. This I found quite handy (apart from the very first time before I'd programmed anything in, when it was scanning just blank channels!). For each listening period, I just needed a quick twist of the on/off/volume knob with no further button pushing operations.

The 'keylock' button doubled as an LCD backlight button. Pressing it momentarily nicely illuminated the set's display for 15 seconds. Keeping it pressed for a couple of seconds disabled all the keys apart from the large 'Scan' and 'Manual' buttons. There was no backlighting facility for the keys unfortunately, making nighttime programming such as bank selection a little more difficult. However, I soon found I could operate the most commonly-used buttons by 'feel' alone, especially so with the two large (and most often used) scan and manual buttons which I found very handy. My most common operations, when scanning, are when I find an interesting signal, and I often want to 'hold' the set on that frequency for a while. A press of the 'manual' button did this, a press of the 'scan' button resuming the scan when needed. Trying to locate the small 'manual' or 'halt' key on other scanners for this is sometimes a little difficult, when driving for example, before the signal disappears and the set whizzes off to another active channel.





I found the 10 'monitor' memories handy when looking for activity in 'search' mode. Each time I pressed the 'Mon' button when the set had halted on a frequency, programmed that information into the next available 'Mon' channel, automatically incrementing the channel number each time. I could then manually listen to each monitor channel by selecting it, or transfer it into a 'normal' memory for subsequent scanning.

My main only operational 'gripe' was the 5kHz channel steps on VHF, these being inappropriate for the 12.5kHz or 25khz spacing we use in the UK. To put it another way, the scanner would otherwise have stepped through the channels several times quicker, this making Realistic's otherwise fast 'Hyperscan' scanning speed considerably less useful than it first appears. The set also couldn't be programmed to the absolute correct VHF frequency in the case of 12.5kHz channel offsets, half these channels thus needed to be 'off frequency' by 2.5kHz, although I found this didn't cause too much of a problem during reception. Another slight 'niggle' was that AM was only available on the aircraft band, no other ranges. All this shows that set was designed primarily for the US market and not countries like the UK.

When operating the scanner out and about, with just the set-top aerial, I found it to be reasonably sensitive, although at normal listening volume I found the internal speaker tended to 'rattle' a little. Plugging in an earphone overcame this, although here the set gave a low, but constant, 'hiss' from the earphone when the squelch was closed. At home, the set connected to my rooftop aerial, it suffered only a little from other strong signals in adjacent bands, although I did find the odd problem or two of unwanted frequency reception. This I found was due to the very poor 'image rejection' of the set, where it received unwanted signals at 21.6MHz (i.e. twice the 10.8MHz IF) away from it's programmed frequency. Thus, I received distorted AM airband signals on VHF FM channels, and suffered from 'double reception' in the UHF ranges. Again, maybe this was a 'US' incorporation, where their residents aren't allowed to listen to cellular phones operating around 900MHz, US scanners having that country's particular 900MHz cellular sections removed from keypad entry or search ranges. No problem, just enter and scan the 'image' frequency range! The supplied handbook usefully gives full details on this 'image' limitation and shows exactly how to work out the image frequency relationship.

Lab Tests

The results show the set performed reasonably well in most aspects, apart from the 'image' problems I found on air. In fact, at 900MHz the totally *unwanted* (in the UK) image frequency was received *better* than the *wanted* frequency. The 12.5kHz adjacent channel rejection was fairly poor, however due to the 2.5kHz frequency error on 12.5kHz offset channels, any better figure could have caused distortion problems during reception.

Conclusions

The PRO-25 is smartly styled, it's easy to operate, and has reasonable on-air performance in most respects. It's very poor 'image' performance, coupled with inappropriate US-based channel steps, are the only things that let it down. However, as a readily-available set on the high street, I'm sure it'll be purchased by many as their 'first' scanner, and will, again I'm sure, result in many hours of pleasant and interesting listening for the set's owners.

My thanks go to Link Electronics in Peterborough for the loan of the PRO-25 for review.

LABORATORY RESULTS:

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

Sensitivity;

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

Freq.	Level
66MHz	0.27
70MHz	0.28
80MHz	0.35
88MHz	0.30
108MHz	0.47 (AM)
120MHz	0.49 (AM)
130MHz	0.46 (AM)
136MHz	0.47 (AM)
145MHz	0.30
165MHz	0.33
174MHz	0.39
406MHz	0.26
435MHz	0.23
450MHz	0.26
500MHz	0.32
512MHz	0.25
806MHz	0.46
850MHz	0.27
900MHz	0.25
934MHz	0.26
956MHz	0.3

Intermodulation Rejection;

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

25/50kHz spacing;	57.5dB
50/100kHz spacing;	62.1dB
100/200kHz spacing;	61.4dB

Maximum Audio Output;

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

336mW RMS

Image Rejection;

Difference in level between unwanted 1st IF image and wanted signal levels, each giving 12dB SINAD on-channel 145MHz FM signals;

145MHz;	23.0dB
435MHz;	7.4dB
935MHz;	-2.6dB

Squelch Sensitivity;

Level of signal required to raise receiver squelch

Threshold;	0.25µV pd (8dB SINAD)
Maximum;	0.81µV pd (26dB SINAD)

Adjacent Channel Selectivity;

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

+12.5kHz;	10.2dB
-12.5kHz;	9.6dB
+25kHz;	62.9dB
-25kHz;	62.7dB

Blocking;

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

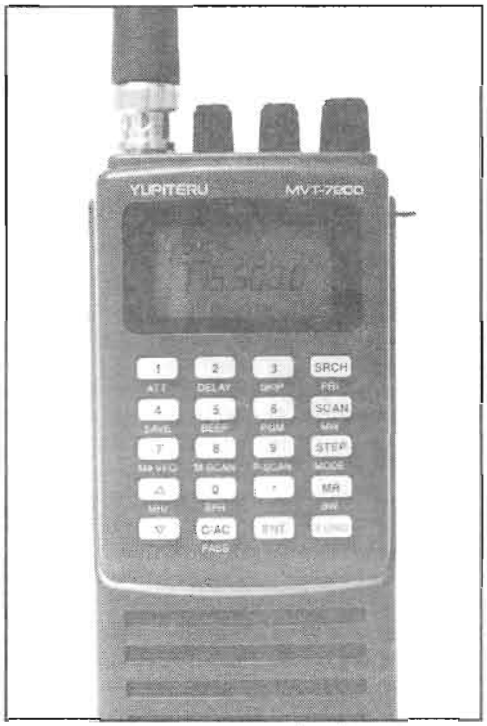
+100kHz;	65.6dB
+1MHz;	83.4dB
+10MHz;	94.9dB

Yupiteru MVT-7200 Wideband Scanner Review

Ham Radio Today's Consultant Technical Editor examines a tiny power-packed all-mode monitor

When I tested the MVT-7200's predecessor, the MVT-7100, in the April 1993 issue of Ham Radio Today, I marvelled at its tremendous coverage, from 500kHz right up to 1650MHz, with all-mode reception including LSB and USB. With the MVT-7200, Yupiteru have sensibly retained all the good features of its predecessor (it even looks identical to the MVT-7100 apart from the lighter grey colour of the case) but have upgraded the technical performance.

First off, and in my opinion a very worthwhile, improvement is that of a narrower, higher performance SSB filter - very important for HF use in crowded bands. An AM 'narrow' bandwidth mode has been added, and a built-in rod aerial has been fitted for better Low Frequency reception. Also, the earlier set came with a telescopic whip fitted to a BNC plug, to mate with the set's aerial connector. This would easily get broken in use (which I mentioned in my review, stating also that I replaced this to a flexible helical for day-to-day use). It looks like Yupiteru have been listening because the MVT-7200 comes with a wideband flexible helical as standard. Other 'upgrades' mentioned are better selectivity and bandpass filtering (very useful!), together with an added 125kHz channel step for wideband FM (totally useless, at least over here!).



Total control

If you're not a regular reader and you missed the MVT-7100 write-up, you could be asking 'What do I get?". In a few words, rather a lot! Picture the scenario; after you've listened to the crew on board a transatlantic jet taking off, you then follow their progress across the ocean on HF SSB. Or tune into amateurs, utility stations, broadcasters, shipping, and many more right across the frequency range, from the small box you're carrying with you in your top pocket. If you've an amateur licence, add a small homebrew HF transmitter, any mode, and you'd have a portable go-anywhere battery-powered station for worldwide communication!

To do all this, the MVT-7200 offers AM, FM, Wide FM, USB and LBS reception, plus 'Narrow AM' in this model, together with programmable channel step rates of 1, 5, 6.25, 9, 10, 12.5,20, 25, 50, and 100kHz rates on AM and FM, these plus 50Hz and 100Hz on LSB and USB, and 50, 100 (and now also 125kHz) on Wide FM. The set usefully 'remembers' which step you've programmed for each mode, reverting to this each time you change mode.

1000 memory channels are fitted, arranged in 10 banks of 100 channels each, which you can scan through to your heart's desire. 10 'search range' banks are also fitted, these come preprogrammed, with what appeared to me to be Japanese type bands and channel spacings, but can easily be changed to your needs, with lower and upper limit frequencies, channel increment, and mode, programmed. Usefully, up to 500 'pass' frequencies can also be stored by the set, such as constant or other unwanted transmissions or 'birdies', which the set then ignores whenever it searches out new active frequencies for you.

A number of scan 'modes' are fitted, including bank scan (up to four banks can be scanned at any time), program scan (up to 100 channels from 10 banks holding 10 channels each), mode scan (all channels programmed with a given reception mode, i.e. AM, FM, WFM or whatever), and priority scan (automatically checking a channel every few seconds). The large LCD shows you what the set is doing, frequency and mode-wise, and an nine section bargraph display along the bottom of this gives you an indication of the received signal strength.

The front panel keypad is used for controlling most of the set's operating features, and a top panel mounted click-step rotary knob also lets you manually tune around in your selected frequency steps - especially useful on HF when tuning in SSB or utility signals as well as AM broadcast stations, as an alternative to the keypad up/down buttons. Side-mounted buttons are fitted for backlight illumination, 'monitor' (which opens the receiver squelch), and a sliding keypad lock. The usual 3.5mm jack socket is also fitted for use with an earphone or external speaker.

The scanner weighs in at a light 320g, measuring 64mm (W) x 155mm (H) x 38mm (D). and a belt clip and wrist strap are supplied as carrying aids. The scanner is powered from four AA sized nicads, which are supplied with the set (although my review sample seemed to have these missing!). A 'battery save' circuit automatically cycles the receiver on/off

quickly when it's in standby mode on a given quiet frequency, to make the nicads last that bit longer, you can even vary the on/off ratio of this. To complete the picture, a plug-in mains power supply/charger is also provided, plus a 12V DC lead terminated in a car 'cigar lighter' plug, both of these also performing 'double duty' in charging the nicads.

On the air

Without further ado, I started by programming the set up with plenty my favourite local VHF/UHF frequencies. I must say, I didn't run out of available channels - and with each bank holding up to 100 frequencies I was pleased to be able to arrange these in banks of differing listening 'interests'.

The 10 'search' banks I quickly reprogrammed also, I was very happy in having all these available at my fingertips to find new 'active' channels without having to reprogram just one bank each time, as I usually have to do with lower specification sets. The review period also coincided with a planned visit to a couple of countries in mainland Europe for a couple of weeks, so besides operation from around my home, I took the opportunity of testing the set in many different localities and listening situations including harbour and airport locations.

When searching across the bands for activity, I found the 'pass' frequency function extremely useful. In search mode, whenever the set 'locked up' on an unwanted signal, I just needed a two-button press to program that frequency into the set's pass memory bank, the set then carrying on searching and automatically skipping that frequency on each subsequent search. The eventual result, just interesting signals to listen to in this mode!

Overall all, I found the set relatively straightforward to use. Changing modes was a multi-button plus 'twist the knob' function, but then other operations I found to be fairly easy. All this is a personal opinion, different users will have differing thoughts, so I won't dwell on it here. The instruction book gave very clear instructions on programming and operation, which I found easy to understand and put into use.

Even with my rooftop VHF/UHF aerial at home connected to the set, I found very few problems in unwanted signal reception, even at 12.5kHz offsets from my tuned frequency. But the 'ultimate' rejection of strong nearby signals I found wasn't as good as a 'top of the range' receiver, or, for example, an amateur VHF/UHF handheld.

HF

As well as VHF and UHF listening, I often checked to see what the set was capable of on the HF bands from varying locations. Using the set-top aerial, the answer was, not very much apart from the occasional strong broadcaster. However, connecting my outdoor HF trap dipole to the set, or even just a length of wire thrown out of a hotel window, brought in stations from around the world. Amateur, utility, broadcast, you name it, they were there!

On tuning around on SSB across the 20m and 15m amateur bands, I found reception pleasantly easy, and surprisingly without the 'splitch' and 'splatter' from adjacent frequency stations that I thought I'd have found with such a handheld set. Listening around on LF, e.g. 40m and 80m, especially at night, was a different matter though. The initial result was often just a 'mush' of noise with a large external aerial attached. However, the set usefully has an internal switchable attenuator fitted, and with this enabled I found I could receive signals reasonably well, although plugging in an external in-line attenuator in as well usually made things a lot better with my home-based external HF aerials connected. The problem in these cases was that the wanted signal was also attenuated, sometime to the degree of being inaudible. However, stronger signals, such as utility broadcasts (weather fax transmissions and the like) usually came through quite clearly, and I successfully downloaded plenty of data, weather maps, etc. from these. For this, the MVT-7200 held its tuned LSB frequency well over several hours with little, if any, problem of frequency drift. Although the specs say the range extends upwards from 500kHz, I found the set actually tuned right down to 100kHz, useful for long wave listening in Europe with an external aerial attached (although the set was rather 'deaf' down there!).

Broadcast bands

When tuning around on the HF broadcast bands using a 1kHz or 5kHz step rate with the rotary knob, the receiver's audio 'blanked' briefly each time I changed frequency. On using the keypad up/down buttons, at first I thought this didn't happen until I tested more carefully by disabling the keypad 'bleep' function (which was set to 'on' as default until you went in and took the time to disable it manually). This 'bleep' on each tuning step, which didn't occur with the rotary knob, simply masked the otherwise silent audio gap between frequencies, which thus still occurred whatever method of tuning was used. I found this very tiresome in use. Thankfully, LSB/USB tuning in 50/100Hz steps didn't suffer from this 'synthesiser glitch' on *every* step, although a glitch *did* occur once every 10kHz when tuning.

I found the 'Narrow' AM mode to be virtually useless, on HF as well as VHF, the bandwidth of this was far too narrow for any sensible listening. Testing the set on medium wave without an external aerial plugged in, the supposed internal aerial didn't seem to be doing much on the set I tested - I could only just about hear the very strongest Medium Wave AM stations, even with the set used outdoors in the clear. VHF Broadcast Band II reception was very good however, the set's tiny speaker giving surprisingly good audio quality.

At night, the backlight worked very well, this also illuminating the translucent keypad. A quick press of the side-mounted 'light' button switched the backlight on for a few seconds, depressing this button for over a second made the backlight stay on permanently until the button was pressed again - useful for nighttime use, especially when mobile. I did however find that the display, both day and night, couldn't be read at all when viewing from above, e.g. with it standing upright on a desktop. The set needed to be tilted back quite a bit for any sense to be made of the display. Yupiteru should, I feel, have resolved this limitation, which was also present on the MVT-7100.

Lab tests

The lab results show the set to be quite sensitive around the 'middle' of it's range, but decreasing at the very edges of its coverage becoming very noticeably insensitive at the lower frequency end.

The SSB selectivity was surprisingly good for such a small set, I was most surprised, although this did back up my findings on air. Separate selectivity measurements for AM (Narrow) showed an identical bandwidth - it looks like Yupiteru have used the SSB filter for this narrower bandwidth AM setting. But, again as found on air, in my opinion it was virtually useless for sensible listening on this mode.

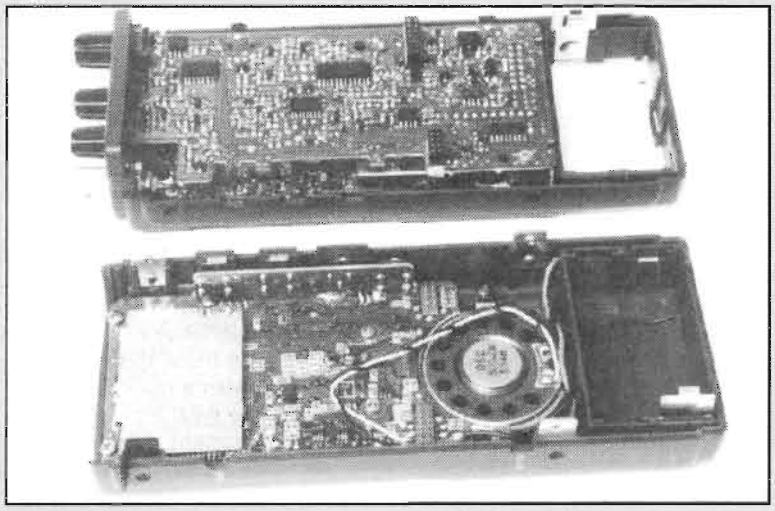
Conclusions

I found the MVT-7200 to be a portable 'powerhouse' in terms of listening flexibility. Wherever I was, whatever I was doing, the set gave me a wide choice of 'listening in' to activity both in my locality, and throughout the world, on HF, VHF and UHF. The better SSB filtering is certainly an improvement over the MVT-7100, likewise the flexible aerial. Add a length of insulated wire terminated in a BNC plug and you've a complete portable listening station which, although not giving the 'ultimate' in performance in every respect, goes a very long way towards this in a self-contained 'do-everything' portable all-mode receiver.

My thanks go to Waters and Stanton Electronics in Hockley for the loan of the review scanner.

LABORATORY RESULTS:

All measurements using fully charged nicads, on 145.0MHz, FM, attenuator off, unless state



S-Meter Linearity;

Indication	*Sig. Level*	*Rel. Level*
1	0.30µV pd	(-30.8dB)
2	0.40µV pd	(-28.2dB)
3	0.55µV pd	(-25.5dB)
4	0.79µV pd	(-22.3dB)
5	1.15µV pd	(-19.1dB)
6	1.82µV pd	(-15.1dB)
7	3.08µV pd	(-10.5dB)
8	4.63µV pd	(-7.0dB)
9	10.4µV pd	(0dB ref)

Blocking;

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

+100kHz;	66.5dB
+1MHz;	86.2dB
+10MHz;	94.6dB

Intermodulation Rejection;

Measured as increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD onchannel 3rd order intermodulationproduct

25/50kHz spacing;	Blocking limited
50/100kHz spacing;	65.1dB
100/200kHz spacing;	64.5dB

Sensitivity;

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

Freq.	SSB	AM	FM	WFM
500kHz	6.34	16.9	9.30	-
1MHz	2.27	6.42	3.90	-
2MHz	0.28	0.78	0.43	-
4MHz	0.16	0.42	0.23	-
6MHz	0.19	0.46	0.26	-
10MHz	0.11	0.30	0.16	-
20MHz	0.10	0.23	0.13	-
30MHz	0.09	0.24	0.15	0.36
50MHz	0.09	0.30	0.19	0.33
100MHz	0.12	0.35	0.22	0.38
145MHz	0.13	0.31	0.28	0.49
250MHz	0.16	0.40	0.26	0.53
435MHz	0.13	0.33	0.25	0.48
700MHz	0.31	0.81	0.45	1.26
935MHz	0.19	0.52	0.30	1.06
1300MHz	0.31	-	0.50	1.49
1500MHz	0.69	-	0.90	2.41
1650MHz	1.02	-	1.27	3.48

FM Adjacent Channel Selectivity;

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

+12.5kHz;	31.0dB
-12.5kHz;	39.7dB
+25kHz;4	0.5dB
-25kHz;	51.9dB

AM/SSB Selectivity;

Single-signal bandwidth measured in SSB, AMN, and AM modes;

	SSB/AMN	AM
-3dB	2.31kHz	13.28kHz
-6dB	2.58kHz	14.25kHz
-20dB	3.31kHz	17.45kHz
-40dB	3.88kHz	21.68kHz
-60dB	4.84kHz	41.75kHz

Image Rejection;

Difference in level between unwanted (+910kHz) and wanted signal levels, each giving 12dB SINAD on-channel 145MHz FM signals;

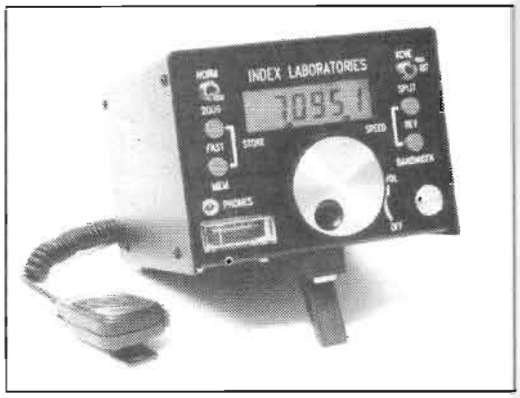
75.6dB

Maximum Audio Output;

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

328mW RMS

Index 'QRP Plus' Review



Ham Radio Today's Consultant Tech Ed looks at the performance of this fully synthesized low power set from the US

The *QRP Plus* has been enthusiastically talked about in the 'QRP Corner' column of Ham Radio Today magazine for some time, and until now demand has often outstripped supply in the UK! But fortunately the UK importers, Waters and Stanton, now have stocks available, nicely in time for our 'Christmas Review Special'.

The *QRP Plus* is a low power HF CW and SSB transceiver, giving all-band operation from 160m to 10m. But unlike other 'amateur band only' QRP rigs, this set also has general coverage receive built in, from 1.8MHz to 29.7MHz. It's fully synthesizer controlled with an LCD frequency readout, and has 20 memory channels, split frequency operation, and fast/slow tuning rates. There's even an Iambic keyer built in for CW.

In use, the transceiver automatically selects the correct sideband for SSB for you depending upon the band you've tuned to, i.e. LSB below 10MHz and USB above 10MHz. A 2.4kHz bandwidth crystal filter is supplemented by a digitally controlled switched capacitor audio filter (SCAF), this having a variable audio bandwidth from 2.4kHz down to 100Hz.

Controls

The large tuning knob is used for a number of purposes besides frequency change. With a press of the 'Bandwidth' button it adjusts the audio filter bandwidth, with the 'Mem' button it acts as a memory channel change control, and by pressing the 'Rev' and 'Bandwidth' buttons together it alters the CW keyer speed, in each case the frequency, bandwidth, or speed is shown on the large LCD. An edgewise meter indicates signal strength on receive from audio-derived AGC, and shows relative power output on transmit. Round the back, a small preset knob allows you to adjust the CW power output, from zero up to 5W or so, and screwdriver-adjusted presets are fitted for SSB mic gain and CW sidetone level.

A stereo type three contact 3.5mm jack socket is used for the microphone, wiring details for this are given in the user manual, and a suitable mic is available as an option. On CW, full break-in operation is provided, a press of the Morse key (or a touch of the paddle) being all that's needed to place the rig on air.

The *QRP Plus* measures 139mm(W) x 102mm (H) x 158mm (D), and comes with a user handbook complete with internal circuit, layout, and alignment details. The set requires an external 13.8V DC supply at a nominal 1.5A.

On the air

Listening around the bands using the set was, unsurprisingly, very easy - with such an uncluttered front panel there were few things I could do wrong! There was no 'band change' as such, however the memory channels could be used for this, a quick twist of the tuning knob whilst keeping the two left hand buttons pressed performing this duty.

I found the set's receiver, on the LF bands, coped with unwanted strong signals on the same and adjacent bands fairly reasonably. I found SSB signals sounded very 'woolly', probably due to the filter being rather narrow, although the 'skirt' bandwidth of the fitted crystal filter appeared fairly wide - with resultant 'splitches' from strong adjacent SSB stations. Likewise on my transmitted SSB signal, I didn't get many good reports and I usually sounded as I was talking through a thick handkerchief, even with different microphones plugged in.

CW was far better though. Here, the filter bandwidth appeared a lot more suited, and the variable bandwidth audio filter was a pleasure to use. With this being an audio filter combined with audio-derived AGC, I often had to be careful in heavy QRM conditions, as narrowing the resultant audio bandwidth could sometimes cause problems from adjacent signal overloading.

I often noticed audio 'clicks' from the receiver on the 'rising edge' of signals, i.e. for the fraction of a second before the AGC had time to cope and adjust itself, and I often wished for an RF gain control on the set. A strange 'occurrence' I noticed, only on USB reception (i.e. above 10MHz, naturally 'quieter' bands), was the odd unwanted out-of-band signal being received. But then again, with such a small set I thought this possibly wasn't surprising.

Lab tests

The crystal filter selectivity measurements confirmed what I found on air, this also explaining the effect on SSB transmit with the crystal filter being employed by the set for SSB transmit filtering as well. The receiver gave reasonably good performance against strong signal overload at separations of 100kHz and over.

Conclusions

The Index Laboratories *QRP Plus* is quite a difference from the usual 'run of the mill' QRP rig, in that it offers the benefits of full synthesizer control, digital readout, memories, digitally controlled audio bandwidth, and the like, this naturally being reflected in the selling price. I found the set easy and fairly pleasant to use on air in CW mode, although the filtering for SSB was rather too narrow.

My thanks go to Waters and Stanton Electronics for the loan of the review transceiver.

LABORATORY RESULTS:

RECEIVER;

All measurements carried out in standard audio bandwidth, attenuator off, unless stated.

Image Rejection;

Increase in level of signal at the first IF image frequency (+100MHz), and the first IF itself (50MHz), over level of on-channel signal, giving identical 12dB SINAD signal;

Freq. MHz	*Image Rej.*	*IF Rej.*
1.8	>110dB	60.6dB
3.5	>110dB	52.0dB
7.0	>110dB	54.4dB
10.1	52.5dB	57.9dB
14.0	51.9dB	64.9dB
18.1	52.6dB	68.3dB
21.0	52.5dB	73.9dB
24.9	51.7dB	82.4dB

Sensitivity;

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

Freq. MHz	*Level*
1.8	0.73
3.5	0.63
7.0	0.61
10.1	0.59
14.0	0.60
18.1	0.58
21.0	0.61
24.9	0.60
28.5	0.60

Blocking;

Measured on 21.4MHz as increase over 12dB SINAD level of interfering signal, unmodulated carrier, causing 6dB degradation in 12dB SINAD on-channel signal;

+/-50kHz;	81.5dB
+/-100kHz;	95.0dB
+/-200kHz;	>110dB

3rd Order Intermodulation Rejection;

Increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product, measured at 21.4MHz;

10/20kHz spacing;	Blocking limited
20/40kHz spacing;	Blocking limited
50/100kHz spacing;	81.4dB
100/200kHz spacing;	78.8dB

S-Meter Linearity

Measured at 14.25MHz;

Indication	*Sig. Level*	*Rel. Level*
S1	-	-
S2	1.17µV pd	-34.4dB
S3	1.44µV pd	-32.6dB
S4	2.34µV pd	-28.4dB
S5	4.90µV pd	-22.0dB
S6	9.10µV pd	-16.6dB
S7	18.0µV pd	-10.7B
S8	31.7µV pd	-5.8dB
S9	61.1µV pd	0dB ref
S9+10dB	111µV pd	+5.2dB
S9+20dB	140µV pd	+7.1dB
S9+30dB	293µV pd	+13.6dB

Selectivity;

-3dB	1.07kHz
-6dB	1.46kHz
-20dB	1.91kHz
-40dB	2.40kHz
-60dB	8.79kHz

S-Meter S9 Level;

Freq. MHz	*Sig. Level*
1.8	58.9µV pd
3.5	44.7µV pd
7.0	39.3µV pd
10.1	42.1µV pd
14.0	61.1µV pd
18.1	43.8µV pd
21.0	44.7µV pd
24.9	48.6µV pd
28.5	50.2µV pd
29.5	46.6µV pd

TX Power

Measured in CW mode, powered from stabilised 13.2V DC using supplied DC lead;

Freq MHz;	*Power;*
1.8	7.09W
3.5	7.55W
7.0	8.06W
10.1	9.24W
14.0	7.65W
18.1	8.88W
21.0	6.94W
24.9	7.40W
28.5	5.35W
29.5	5.56W

TRANSMITTER;

Harmonics/Spurii;

Freq (MHz)	*2nd*	*3rd*	*4th*	*5th*	*6th*
1.8	-60dBc	-72dBc	-68dBc	-55dBc	-61dBc
3.5	-54dBc	-66dBc	-64dBc	-67dBc	<-80dBc
7.0	<-80dBc	-67dBc	<-80dBc	-72dBc	-76dBc
14.0	-67dBc	-78dBc	<-80dBc	-77dBc	<-80dBc
18.1	-56dBc	-74dBc	-78dBc	<-80dBc	-75dBc
21.0	-74dBc	<-80dBc	<-80dBc	<-80dBc	<-80dBc
24.9	-69dBc	-79dBc	<-80dBc	<-80dBc	<-80dBc
28.5	-52dBc	-68dBc	<-76dBc	<-80dBc	<-80dBc
29.5	-53dBc	-69dBc	<-77dBc	<-80dBc	<-80dBc

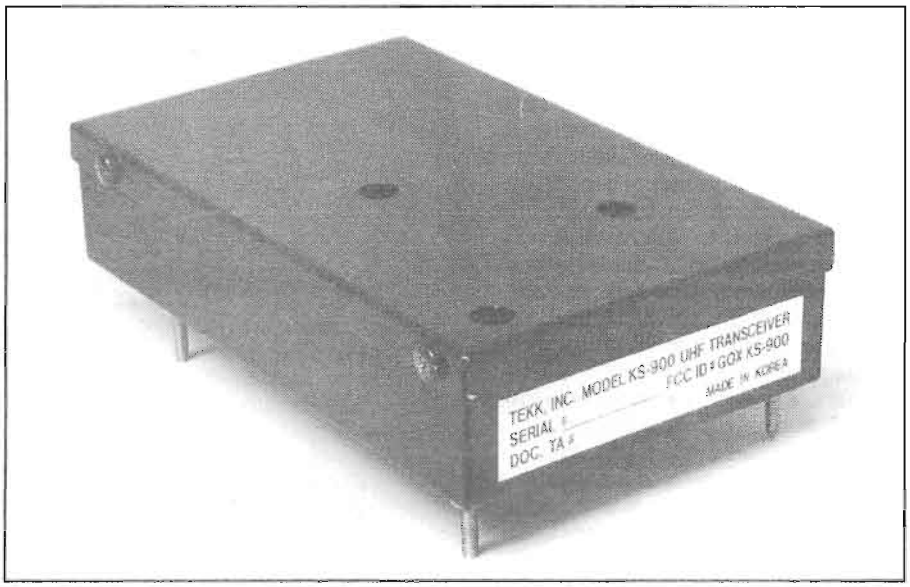
SSB IMD Performance;

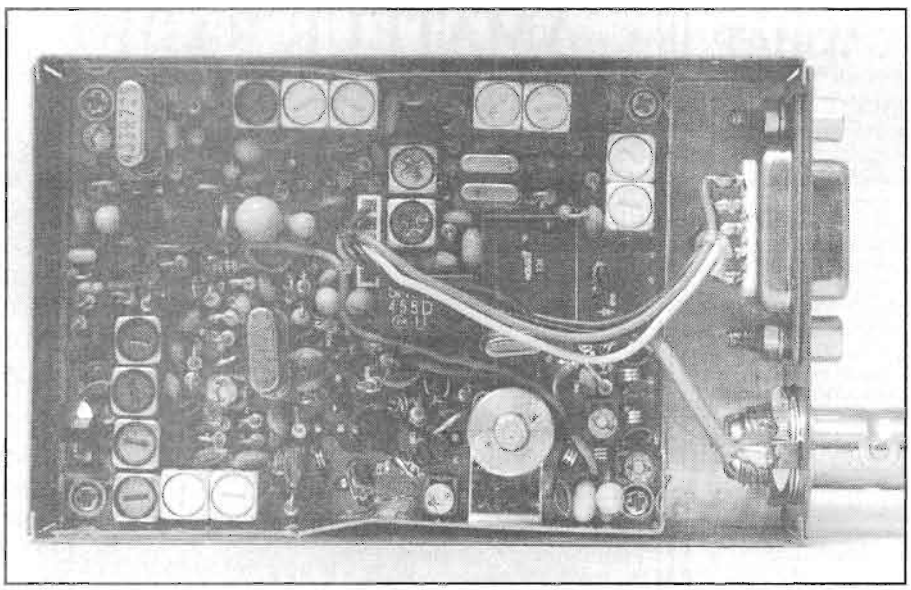
Measured on 14.25MHz with a two-tone AF signal, results given as dB below PEP level, measured on 14.250MHz at 3.0W PEP;

3rd Order	*5th Order*	*7th Order*	*9th Order*	*11th Order*
-23dB/-22dB	-38dB/-31dB	-51dB/-40dB	-55dB/-48dB	-59dB/-58dB

T-Net Micro Packet Transceiver Review

*A mini review by the Editorial team of a mini **70cm packet transceiver unit***





I see many messages on the packet network, asking for advice on suitable transceivers for 9600 baud. A number of 'upmarket' (and thus very expensive) transceivers sport a 9600 baud port, but who wants to pay over £500 for a rig just to keep on, say, a single 70cm channel? The T-Net Micro transceiver has been made with this role in mind. It's a tiny 2W 70cm transceiver, crystal controlled on a single frequency. 'Tiny' is the right word, measuring just 55mm (W) x 20mm (H) x 88mm (D) it's smaller than even the tiniest TNC.

The specifications claim a flat audio response on both transmit and receive, this being essential for 9600 baud packet as well and helping things for 1200 baud use. A fast transmit 'attack' time of 8mS is given with direct FM on transmit, an input of 50mV RMS giving around 3.5kHz deviation. On receive, a fixed audio output level of 750mV is provided.

The transceiver is powered from a 7.5-12.0V (9.6V nominal) external DC supply, and draws just 20mA in receive mode. The only connections are a BNC for the aerial, and a 9 way D-type socket for power, PTT, and TX/RX audio. The UK suppliers, Siskin Electronics, can supply a suitably wired lead to interface the unit directly to most popular TNCs.

The transceiver comes fully operational on 70cm, and a user manual is supplied which gives full crystal, circuit, alignment and test details.

Lab Tests

You'll see from the measured performance figures the transceiver certainly isn't a 'toy rig'. It has a very good standard of technical performance indeed, meeting or exceeding that of many synthesised amateur 'black box' transceivers.

On transmit, the resultant deviation with 50mV input audio gave 3.14kHz deviation, which I found was flat to within 1dB between 20Hz and 10kHz (falling to 1.24kHz at 20Hz, 0.84kHz at 12Hz and 0.52kHz at 10Hz). On receive, the audio was again flat, at 333mV RMS output with 3kHz input deviation, and flat to 1dB between 30Hz and 6kHz (falling to 234mV at 20Hz, and 124mV at 10Hz).

Conclusions

This rig should provide a complete 'plug in and go' transceiver for fast packet radio needs, and is particularly suited for 9600 baud. All you'll need to do is to adjust the audio levels (e.g. for TX deviation), and away you go. The T-Net is currently priced at £189 inc., crystalled on the 70cm frequency of your choice.

LABORATORY RESULTS:

All measurements taken with transceiver powered from stabilized 9.6V power supply, with CCITT filtering for receive measurements (due to zero deemphasis being incorporated in receiver audio o/p), unless stated.

RECEIVER;

Intermodulation Rejection;

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

25/50kHz spacing;	71.8dB
50/100kHz spacing;	71.7dB

Blocking;

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

+100kHz;	89.7dB

Adjacent Channel Selectivity;

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

+12.5kHz;	15.9dB
-12.5kHz;	37.3dB
+25kHz;	79.9dB
-25kHz;	83.7dB

Sensitivity;

Input level required to give 12dB SINAD;

With CCITT filtering;	0.24µV pd
Measured 'flat';	0.83µV pd

Image Rejection;

Increase in level of signal at 1st image frequency over level of on-channel signal, to give identical 12dB SINAD signal;

72.9dB

TRANSMITTER

Harmonics;

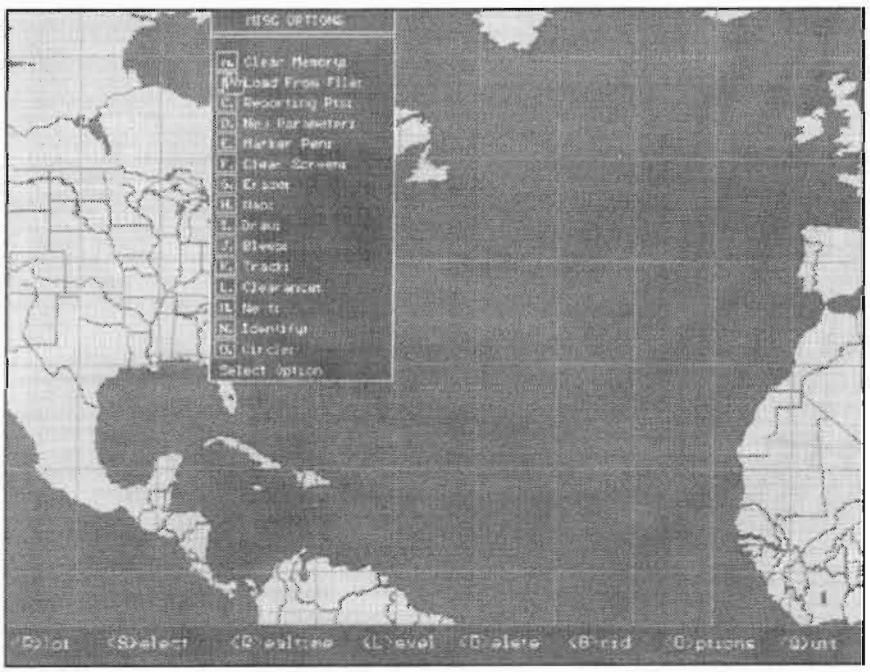
2nd Harmonic;	-68dBc
3rd Harmonic;	-65dBc
4th Harmonic;	-64dBc

TX Power;

2.35W

SCANNERS

Bill Robertson provides an insight to POCSAG paging transmissions on your scanner



Airplot software is readily available (see text)

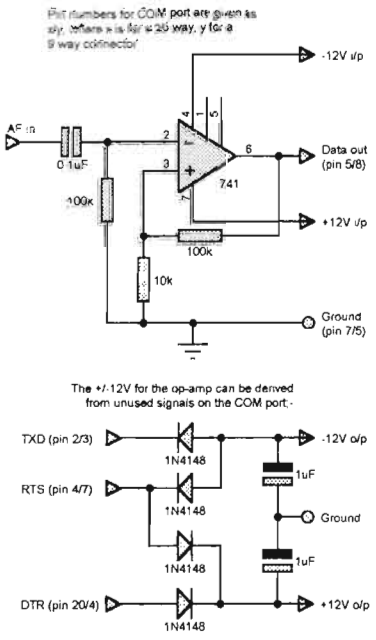
After I gave a mention and details of the 'Airplot' program in this column over the last couple of months, a large number of readers, as well as the trade, have contacted me to express interest. The most often asked question was "Where can I get it from?". Thank you for your letters and faxes! In case other readers missed the information last month, a complete demo version on disk is available from the Ham Radio Today software service, you can also download it via Internet from the ftp site; *ftp.demon.co.uk* in the directory *pub/ibmpc/demos/airplot/*. Flightdeck, the Airband shop in Cheadle (Tel. 0161 499 9350) have told me they are currently interested in retailing the software, I'd imagine they could also usefully supply a 'package' of software, airband receiver etc. Contact them direct for more information.

POCSAG pager decoding

As many scanner users know, more and more signals are now going digital. Recently, personal alphanumeric pagers have taken off in a big way, these have even been used in some instances to 'back up' voice communication or where a degree of security against overhearing is needed. Many listeners will have heard the 'Brrrrrrr...brrppppp' paging signals, for example 138.150, 138.175, and the 153.0-153.5MHz range, which is exactly what these are, high powered paging transmitters sending text messages out to predefined users, anyone from a plumber to undercover squads.

The system used for this is called POCSAG, which stands for 'Post Office Code Standardisation Advisory Group'. This commonly uses a data rate of 512 bits per second of direct FSK (Frequency Shift Keying), with a deviation of 4.5kHz, easily receivable on a scanner. In reply to reader's queries, there's now a very easy, and freely available, way of decoding these messages. You'll just need a simple interface, as shown here, together with appropriate software running on a PC. Peter Bearnet from Pen-y-ffordd, Clwyd, has been in touch to say he's written such a program, 'PD', which is available as shareware (I've arranged with the HRT Editor to have it included on this month's HRT Software disk for the benefit of readers).

Peter says that PD, together with a receiver or scanner, allows off-air decoding of POCSAG paging signals at either 1200 or 512 bits/second. Decoding of both numeric and alphanumeric pager data is supported, as is the hex dumping of



POCSAG Decoder Interface

The AOR AR7030 Short Wave receiver

raw POCSAG codewords. PD runs on an IBM PC or equivalent, anything from an 8086 upwards, and needs just 512k of conventional memory. The shareware version runs for 5 minutes at a time, and in use, it nicely decodes messages by the score. You can select various pager addresses for highlighting and audible indication when received, plus a 'reject' list if required so save cluttering your screen up with unwanted messages.

As POCSAG is transmitted as direct FSK, the best way is to take the data direct from the receiver's discriminator, the disk even giving mod details for this with an MVT7100 scanner. However, the circuit shown here has been fairly successful, which uses audio directly from a receiver's speaker output. Many thanks for the information Peter, which I hope readers will find interesting and useful. If you try your hand at decoding, do let me know how you get on!

New receivers

As well as the new Yupiteru MVT-7200 and Realistic PRO-25 scanners, which are due to be reviewed in this issue, two new 'top of the range' receivers from AOR are also due to hit the market soon.

The first is the AR5000 scanner. Housed in a solid metal cabinet, it offers even more facilities than the AR-3000A, with all mode reception, a 'numeric controlled oscillator' to give tuning rates down to 1Hz, and a number of switchable IF bandwidths in both IF stages. The frequency coverage is 10kHz to 2600MHz with no gaps, together with a very impressive technical specification. I'm looking forward to getting my hands on one to try out!

The other new offering from AOR is their AR7030 HF receiver, this having been designed in the UK as a combined project between AOR and the well-respected designer John Thorpe. The receiver is built around a TCXO frequency standard, and a single loop Direct Digital Synthesizer gives a clean local oscillator signal, tuning in 2.7Hz steps. The IF filters are self-aligned by the receiver's microprocessor, and virtually every aspect of the AR7030 can be controlled via the standard remote port, a multi-function infra-red remote control is also supplied as standard. All modes are fitted, i.e. USB, LSB, CW, AM, Synchronous AM, NFM and Data.

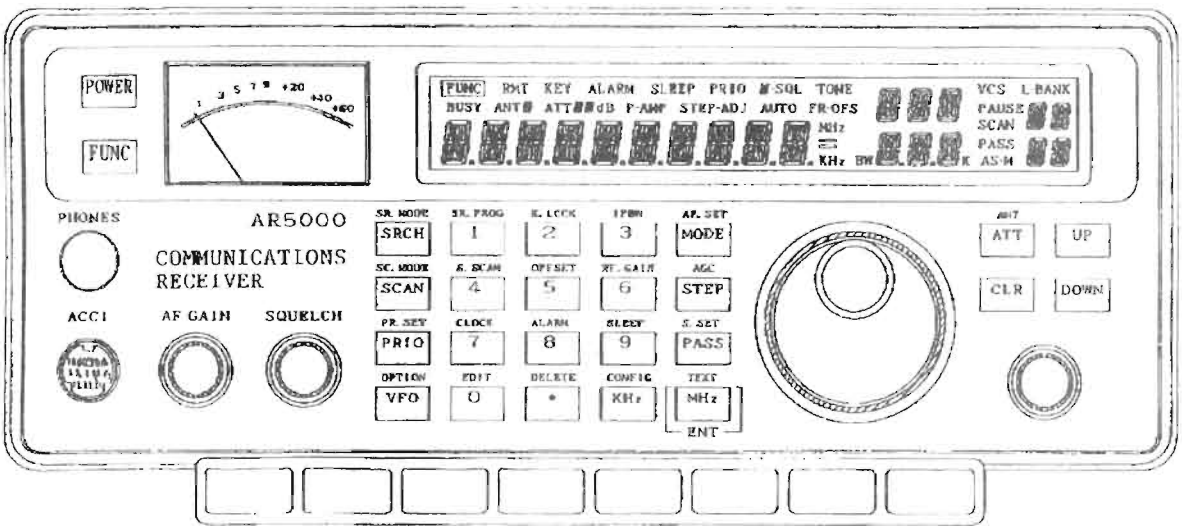
You'll undoubtedly see these reviewed in Ham Radio Today soon, further details can be obtained from AOR who are now at their new manufacturing location; 4E East Mill, Bridgefoot, Belper, Derbyshire, DE56 2UA, Tel: 01733 880788.

Rounding up

Until next month, have a happy Christmas and a pleasant time listening on the bands. If you'd like any specific scanning topics covered in the new year, please drop me a line. See you next month.

Bill Robertson is pleased to hear from readers and 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.



The AOR AR5000 all mode base receiver

'Q' Multiplying Preselector for 80, 40 and 20m

Raymond Haigh describes a simple and inexpensive unit to enhance the front-end selectivity of a receiver and boost signal input

Amateur bands receivers often incorporate fixed and broadly tuned bandpass filters ahead of the product detector or first mixer. These are simpler and less costly than circuits with variable tuning, and the arrangement represents a sensible design compromise for receivers which only have to cover very narrow segments of the HF spectrum.

Performance can, however, be improved by increasing front-end selectivity, especially in the case of direct conversion receivers and superhets of less advanced design. The breakthrough of strong broadcast transmissions, which sometimes afflicts direct conversion receivers, is reduced, as is second-channel interference (the reception of signals spaced at twice the receiver's IF from the tuning point) which affects simple superhets.

The addition of a single, or even a couple, of variably tuned circuits is not likely to yield a very great improvement in selectivity over a two-stage bandpass filter, especially at 7MHz and above, and some other means of peaking front end response has to be adopted if a really worthwhile increase is to be obtained. Selectivity and signal magnification in a tuned circuit are directly proportional to its 'Q' factor (the ratio of its impedance at resonance to the resistive, dielectric and other losses in the inductor and tuning capacitor). The best inductor/capacitor combinations, when connected to the other components in a circuit, will not exhibit a 'Q' factor much in excess of 100. However, by connecting the tuned circuit to an amplifier and feeding back energy in phase with incoming signals, the resistive and other losses can be neutralized and 'Q' factors up to six or seven thousand achieved.

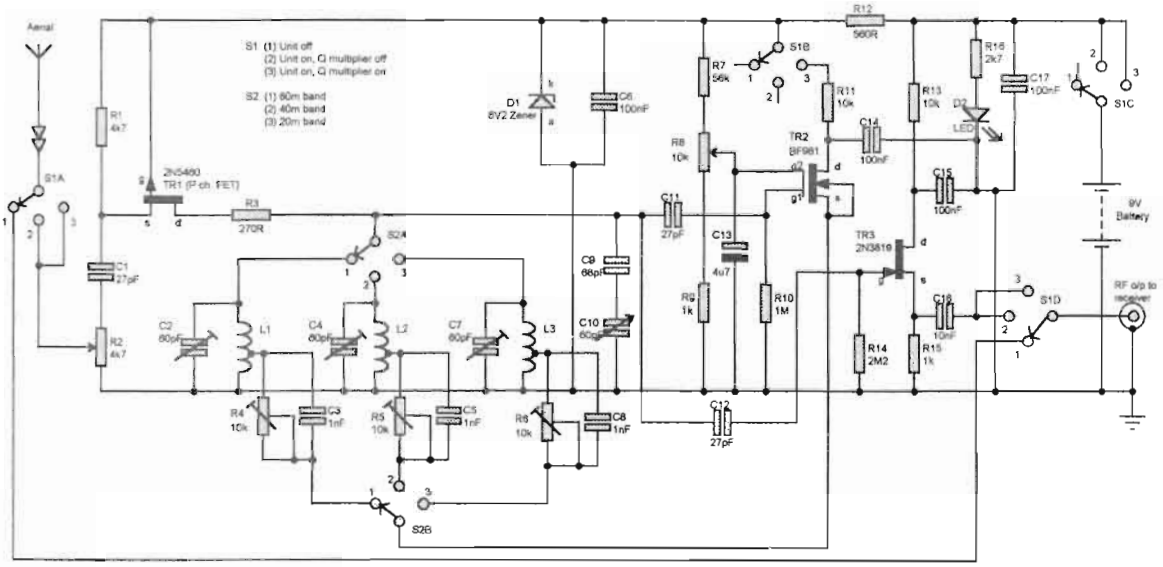


Fig. 1 Preselector circuit

Known as 'Q' multiplication, this technique is used to produce the extremely high levels of selectivity displayed by the unit which is the subject of this article. The 'Q' of its single tuned circuit, and consequently its selectivity, is adjustable over a wide range. When advanced towards its upper limit, preselector tuning can be set to sharply peak individual amateur transmissions. Conventional preselectors without this facility can, at best, only manage to peak up a segment of a particular band, and many can only broadly boost response over an entire band.

The greatly increased magnification which accompanies the enhanced 'Q' results in a dramatic rise in the signal voltage presented to the receiver. Provided care is taken to avoid the cross-modulation, desensitization and blocking problems associated with overload, this can be very welcome when a poor aerial has to be used or the receiver is not particularly sensitive.

The Circuit

The theoretical circuit of the unit is given in Fig.1.

'Q' multiplying positive feedback arrangements are centred around TR2, and TR1 and TR3 act only as impedance matching buffers to isolate the tuned circuit from the aerial and the receiver.

Signals from the aerial are fed, via S1A and potentiometer R2, to the source of TR1, an FET input stage arranged in the common gate configuration. R2 affords a measure of control over signal input in order to avoid overloading the unit, The low value DC blocking capacitor, C1, acts as a simple high-pass filter and inhibits the breakthrough of powerful, lower frequency signals

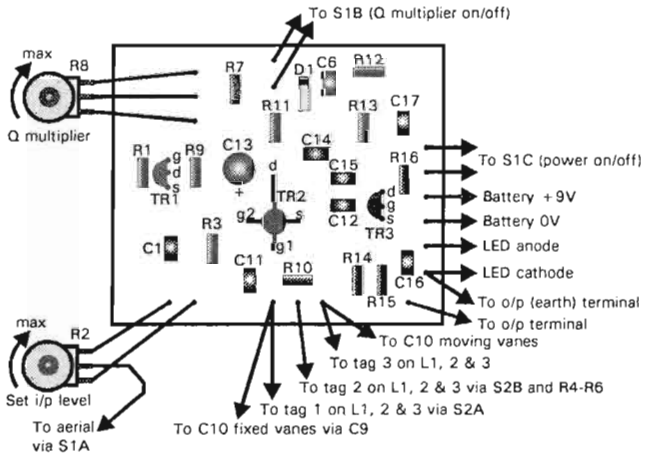


Fig. 2 Q multiplier PCB component layout

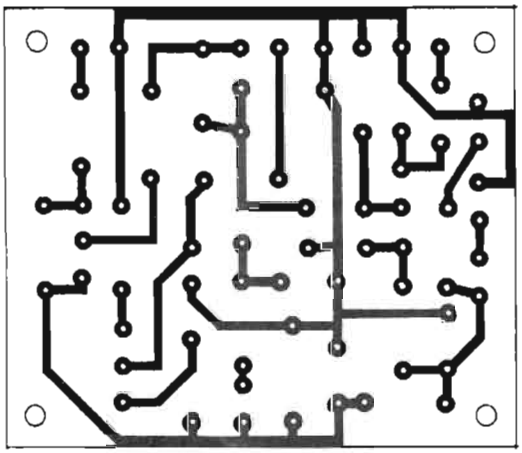


Fig. 3 Q multiplier PCB, track side (shown full size)

when very 'long wire' aerials are used.

The common gate stage has a low input and an extremely high output impedance, just what is required to match the aerial to the high 'Q' tuned circuit. Equally important, it isolates the tuned circuit from the aerial, thereby making the control of its 'Q' smoother, and eliminating suck-out when resonant aerials are used. It also prevents the radiation of energy should the 'Q' control be advanced to the point where the circuit oscillates.

R1 source biases the FET, and parasitic oscillations are prevented by R3. Output is developed across the tuned circuit, which acts as the drain load, and a 'P' channel FET must be used in this position so that its drain can be connected to the negative supply rail. A coupling winding on the coil would have permitted the use of a more common 'N' channel FET, but this would have complicated the band-switching and resulted in some signal loss (even with the drain connected directly to the tuned circuit, gain is about unity at 14MHz).

Tuned circuits for the 80, 40 and 20m bands are formed by L1 and C2, L2 and C4, and L3 and C7, with C10 acting as the variable tuning capacitor. S2A selects the appropriate coil, and C9 restricts the swing of C10 to the minimum necessary to ensure coverage of the 80m band. This makes the tuning rate as slow as possible.

Signals developed across the tuned circuit are coupled, via C11,to gate 1 of the double gate MOSFET, TR2. The positive (in phase) feedback needed to neutralize the losses in the tuned circuit is taken from the source of this device and fed into a tapping on the coil via an adjustable bias resistor, R4, R5 or R6, the appropriate components being selected by S2B. The RF bypass capacitors, C3, C5 and C8, affect the functioning of the circuit (too high a capacitance prevents 'Q' multiplication) and the specified value should be adhered to.

The gain of TR2, and hence the amount of feedback, is controlled by adjusting the voltage on gate 2. Potentiometer R8 performs this function, R7 and R9 set the voltage across it so that the action of the control is smooth and gentle, and C13 eliminates slider noise. Gate 1 of the MOSFET is connected to the negative rail via R10 in order to ensure correct biasing, and R11 and C14 decouple the stage from the supply.

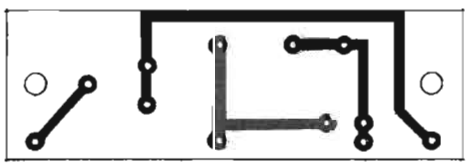
A fresh 9V battery will deliver about 9.5V and this falls to around 6V before it is discarded. With the gain of TR2 being critically dependant on the voltage on its gate 2, such a supply rail variation would make it impossible to optimise the control range of R8. Accordingly, R12 and Zener diode, D1, hold the supply to this stage reasonably constant and enable the swing of the 'Q' multiplier control to be correctly set. C6 acts as an RF bypass and decoupling capacitor.

The magnified signal voltage developed across the coil is connected to the output terminal via the source follower FET buffer, TR3. (Voltage magnification by a tuned circuit at resonance is one of the marvellous paradoxes of physics that make radio possible). The very high input impedance of the source follower stage minimizes damping on the tuned circuit, and its low output impedance affords a reasonable match to the aerial input of most receivers. The low value coupling capacitor, C12, improves the buffering or isolating action of the output stage, the gate is connected to supply negative by R14 to ensure proper biasing, and the device is biased by the source load resistor, R15. Decoupling is effected by R13 and C15, C16 acts as a DC blocking capacitor, and C17 as an RF bypass capacitor across the supply rails.

Equipment of this kind can easily be left switched on accidentally, and LED, D2, guards against this. Series resistor, R16, has been calculated to suit a low current (2mA) type. If a standard LED is fitted, this component should be reduced in value to 680 ohms.

S1A, B, C, and D, switch power on and off, connect the 'Q' multiplier

Fig. 5 Presets PCB, track side (shown full size)



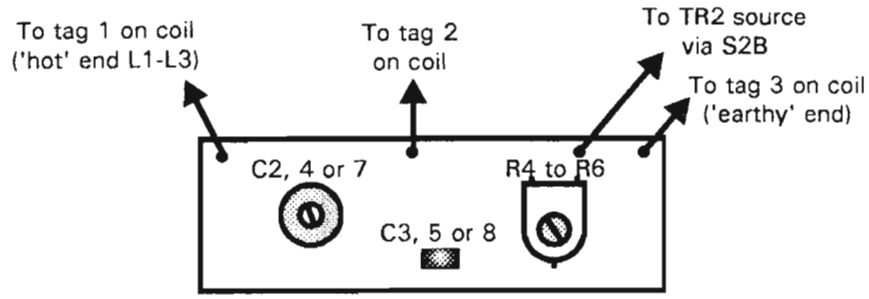


Fig. 4 Presets PCB component layout

stage, TR2, in and out of circuit, and feed the aerial directly to the receiver when the unit is switched off.

With the voltage gain of TR1 about unity and TR3 providing slightly less than unity gain, it will be appreciated that the dramatic increase in signal level is brought about solely by the increased magnification of the tuned circuit which results from its greatly enhanced 'Q'. There is virtually no signal amplification by active devices.

Components

P channel FETs are almost as scarce as hens' teeth, but the device specified for the TR1 position can be obtained from Maplin who also retail the remaining electronic components, with the exception of the BF981 dual gate MOSFET, which can be obtained from Cirkit and other suppliers. 21mm outside diameter plastic overflow pipe used for the coil formers, and is retailed by most DIY outlets.

A 50pF Jackson C804A variable capacitor could be used for C10, but the 140 + 60pF polythene dielectric variable capacitor retailed by Maplin is recommended. With front-end selectivity and signal magnification set towards maximum, air spaced capacitors can display a tendency to microphony. The mechanical damping of the vanes of the less expensive component, by the polythene dielectric, avoids this problem.

An inexpensive Lorlin switch is suitable for S1 and a unit of this type will certainly function in the S2 position. Constructors may, however, wish to consider a more expensive component for the coil switching, and a Maka-switch assembly is suggested in the parts list.

Construction

All of the components, with the exception of the coils, switches, potentiometers, the LED indicator, C9 and C10, are mounted on printed circuit boards. The majority of the components are mounted on a main board, and smaller, individual boards carry the presets for the three switched bands. These smaller boards are mounted on the coil formers.

Fig. 2 shows the component side of the main board, and Fig. 3 the copper track side. The smaller, individual boards are illustrated in Figs. 4 and 5. Vero pins inserted at the lead-out points ease the task of off-board wiring, and the use of pins for the transistor connections facilitates the substitution checking of these devices.

Next month's issue will conclude this project by detailing the construction and testing of this unit, including coil details. In the meantime, any queries regarding this project should be addressed to the author c/o the Ham Radio Today Editor. Ready-made PCBs may also be available from PCB suppliers advertising in Ham Radio Today for readers who may not wish to produce their own. Any reported updates to this project will be detailed, and available for the next 12 months, on the 24hr Ham Radio Today information and fax-back line.

Components list

Resistors;
All 1/4W rating

R1	4k7
R2	4k7 linear potentiometer
R3	270
R4	10k pre-set potentiometer
R5	10k pre-set potentiometer
R6	10k pre-set potentiometer
R7	56k
R8	10k linear potentiometer
R9	1k
R10	1M
R11	10k
R12	560
R13	10k
R14	2M2
R15	1k
R16	2k7

Capacitors;
All 16V working, or higher

C1	27pF ceramic
C2	60pF film dielectric trimmer
C3	1nF polystyrene or ceramic
C4	60pF film dielectric trimmer
C5	1nF polystyrene or ceramic
C6	100nF ceramic
C7	60pF film dielectric trimmer
C8	1nF polystyrene or ceramic
C9	68pF close tolerance ceramic
C10	140 + 60pF miniature film dielectric tuning capacitor
C11	27pF ceramic
C12	27pF ceramic
C13	4µ7 radial lead electrolytic
C14	100nF ceramic
C15	100nF ceramic
C16	10nF ceramic
C17	100nF ceramic

Inductors;

L1, L2, and L3 - see text

Semiconductors;

TR1	2N5460 P channel FET
TR2	BF981 dual gate MOSFET.
TR3	2N3819 N channel FET
D1	6V2 500mW Zener diode
D2	2mA low current LED

Switches;

S1A-D Lorlin four-pole three-way rotary switch
S1A-B Make-switch shaft assembly and one, four-pole, three-way wafer (two poles not used)

Sundry Items;

Materials for PCBs and Vero pins. Plastic 21mm o/d overflow pipe for coil formers. Slow motion drive, control knobs, terminals, battery holder and connector. Hook-up wire and 26 SWG enamelled copper wire. Nuts, bolts and solder tags. Construction and finishing materials for case, or a ready-made case.

See Ham Radio Today classified and display ads for component and PCB suppliers

LETTERS

Letter of the month

Dear HRT,

It was with great dismay and disappointment that I read in both the Editorial and Satellite Rendezvous sections of HRT Oct '95, that from 699 letters sent to RSGB Affiliated Societies from AMSAT-UK, only 29 bothered to reply. I am therefore proud to say that Easington Amateur Radio Society can be counted amongst the 29.

When the letter was discussed at our open meeting there was no hesitation from members that a donation should be made, this is from a club that is neither wealthy nor prolific users of amateur satellites, in fact I am the only one and then only on RS12, so why have 670 not replied?

Did the Pony Express fail to get through, are they low on funds, or, as I suspect, do they suffer from plain and simple apathy. Well to those 670 clubs I say this, no letter OK, no funds OK, but if you just could not be bothered ponder this.

It is not our God-given right to occupy prime allocations in the radio spectrum, it is a privilege much begrudged by government and commerce alike. Make no bones about it, they are looking for any excuse to reduce or remove this allocation and will seize upon any weakness or lack of solidarity in the amateur community to further this end.

Please think again about a donation, not only to help the Phase 3D project, but to show the suits that UK radio amateurs are prepared to fund projects like this, even if not for personal use, then to benefit other radio amateurs and in doing so, amateur radio.

George Ford, G0MHC,

A threat to the RAE

Dear HRT,

Since the privatisation of colleges' funding has been taken over by Central Government via the Further Education Funding Council (FEFC), the number of courses that receive tariff points, i.e. funding, has been drastically reduced and does not include the City and Guilds RAE or NRAE. As a result, the number of colleges and schools providing these courses has dropped and will continue to drop. With the £40 an hour it costs for a classroom and lecturer, with an average class of 15, the economic charge would be £160.

The result will be a drastic reduction in the numbers of new amateurs coming into the hobby, with the result that those who do come in will be trained by volunteers. You only have to ask yourself how willing you would be to give up two hours a week for 30 weeks for free, to realise there will be precious few of these. A slow but progressive erosion of the number of people on the bands and increased pressure from Private Mobile Radio (PMR) for the now deserted bands.

We need to make clear the advantages of the NRAE and RAE to our MPs, the RA and the Minister of Trade, Industry and Education. Have you got a job, not been made redundant, or been promoted because you are a Ham? Is it in the nation's interest to hide military communication between amateur QSOs on 6m and 70cm? If we don't care, why should anyone else?

Glyn Fowler, G7MHT

Equipment reviews

Dear HRT,

I'm writing to HRT to say thanks for an excellent magazine and also to request your assistance in the resolution of a 'wrong' I read elsewhere. In this other review of the Realistic PRO-2035 base station scanner, which managed to include a lot of relatively unimportant detail of questionable use, what it did not mention was the very important fact that the automatic store facility on the PRO-2035 is completely 'non selective' and one can easily find that the same frequency is stored, perhaps 100 times, in a particular bank. OK, we all make mistakes etc. etc., and perhaps the reviewer was referring more to the handbook than the equipment; not an unknown happening in some circles!

Significantly though, the Ham Radio Today review of the PRO-2035, published at about the same

£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 chris@radshack.demon.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

What a mess!

Dear HRT,

I dislike, completely, the silly mishmash cobbled up and disorganised mess, that is the UK's way of becoming a licensed amateur today. Just think, for a minute or two, you probably know of someone living close to where you live. They have no idea what Amateur Radio or even CB Radio for that matter is, yet with the present system we have here, all they have to do is go to the local college, study for, sit and pass the RAE, at the same time learn Morse Code, go to a rally and pass the 12 WPM test, purchase a licence and radio gear and away they go, all over the band. Chaotic or what?

For the most part, amateurs are pretty well honest about their interests in this hobby, and they can see and also remember what it was like for them as the new boy or girl on the block. Why can we not, with hindsight, make a better job of organising the hobby, so that every new amateur starts off slow and easy, gets to know their way around on the air etc. We already have the basic parts for the restructuring, all that is needed is the will and the incentive but most importantly of all, it needs the backing of all licensed amateurs. From the newest Novices, through to 'B' and 'A' class amateurs.

Let's all back the rule that there should be one way and one way only, to reach as far as a class 'A' licence and that is the single step-by-step progress through every stage of Amateur Radio, from Novice 'B' to Novice 'A' to RAE 'B' and then up to class 'A'. Each step up based upon simple written tests and a minimum time on air, with QSL proof of multiple and minimum of contacts made (Novice 'B' and 'A'). Sit and pass the RAE, as soon as you have completed the basic time, contacts and tests (including basic Morse code receiving up to 5 WPM) as a Novice.

Once the amateur has passed the RAE and has obtained the class 'B' licence, the amateur should be allowed to retain the basic uses of the HF bands, the same as for Novice 'A' but at the same time class 'B' operators should have full use of all bands above 28MHz. For ongoing, on air practical training, as per 'self training' in our licence agreement.

Upgrading to class 'A' should also be based upon time on air, full working contacts supported by QSL cards, a short written test on procedures, the relevant questions I am sure, are there ready to be put on paper. The test for upgrading, from Novice 'B' to 'A' and from class 'B' to class 'A' could and should be taken at any and all rallies, where there are three 'A' class licensed amateurs, plus a licensed examiner from the local club who have organised the rally. The price of the test could be set at £5.00 and like they do in the USA, limit each person to five tests at any one rally.

That means that there should be at least twenty different test papers for the examiner to choose from. The three licensed amateurs mentioned earlier, are there simply to mark these papers and give the result to the applicant, within five to ten minutes of taking the test. That gives, if you fail on your first try, a chance to take it again four more times. At the end of the day, away go the successful applicants, pass certificate in hand, now all they have to do is submit their log book (or a copy from their computer log), their QSL cards and the pass certificate to the RSGB.

They will then be able to check QSLs with the relevant log book entry, ascertain that the applicant has spent the minimum or greater time on air, and has a certified pass certificate from an accepted and licensed examiner, and then stamp the application, forward the application and test certificate onto the licensing authority, along with the applicant's fee (cheque or plastic), who will then issue the relevant licence to the applicant.

John Davies-Bolton, G4XPP

time, precisely detailed the problem of 'non selective' storage and gave its readers very adequate warning of this important shortcoming.

What has really 'grabbed my pipes' in this affair is the fact that a courteous and detailed letter to the Editor of the other magazine, pointing out this matter, was not even acknowledged and indeed an equally polite reminder was also ignored. Is this a good example of 'heads in the sand' and does it have anything to do with the rising popularity of ostrich farming?

I currently have a longish term subscription to the other magazine which will not be renewed, while my subscription to Ham Radio Today will certainly be maintained. I am happy to say that Ham Radio Today shows no signs at all of treating its readers like sheep to be tolerated only as long as they bleat at an acceptable frequency. Long may you and Ham Radio Today prosper. It is also very noticeable that a magazine of your stature can offer Free Readers Ads - surely an indication of how it clearly values its readership!

Bill Johnston, SWL

Editorial comment;

Thank you for your kind comments regarding Ham Radio Today. Our equipment reviewer, Chris G4HCL, takes a considerable amount of time and goes to a lot of trouble in testing the review samples thoroughly, to give our readers as much information as possible, the good as well as the 'not so good'. Readers can then compare the results with other similar equipment and make up their own minds. We could also just publish 'manufacturers specifications' or a 'user review' instead of spending time and money in performing real and lengthy technical measurements, but we feel our readers are worth more than that. After all, I wouldn't want to spend a lot of money on equipment to find out later it didn't do want I wanted it to, and neither does anyone else.

From My Notebook

Geoff Arnold G3GSR concludes his series of "Will it do?" with a look at replacement inductors and chokes

The final items I shall deal with under my *'Will it do?'* theme are what the manufacturers' and suppliers' catalogues usually call 'wound components' .

I don't propose to say much about radio-frequency chokes and coils. Like most radio components, they've got drastically smaller over the decades, though not always more electrically efficient. If you are delving into restoration of sets from bygone years, remember that a whole new generation of RF coils came in with the advent of the transistor, in order to cope with the change of circuit impedances from those of valves. Although you can mix one with the other, unless you are an RF buff the results can be unpredictable, to say the least.

Moving on to iron-cored chokes, the sort used for smoothing in HT supplies in valved circuits, these are now very hard to come by, although most old-timers will probably have several lurking in the depths of their 'junk' boxes. A few years ago, I tried to launch a scheme in *Radio Bygones* magazine to put owners and seekers of vintage-style chokes and transformers in touch with one another, but like so many ideas which seem good at the time, it never really got off the ground.

When considering a replacement for a smoothing choke, there are quite a few points to be taken into account. The most obvious of these is the inductance value, but you also have to consider the resistance and the insulation rating of the winding. Replacing a choke with one having a higher resistance will almost certainly mean you will finish up with a lower DC voltage out of the smoothing circuit.

If the unit under repair is one with a particularly high HT voltage, more than about 350V, you may find that the choke has been inserted into the negative HT line rather than being in its more conventional spot in the positive rail. The reason for this is that it reduces the difference in potential between the winding and the iron core, which will usually be firmly bolted to the chassis. The choke is just as effective in the negative rail, but it does mean that you have to use individual smoothing capacitors rather than the multiple type with a common negative connection which I talked about last month. Also, the reservoir capacitor, that's the one connected on the rectifier side of the choke, will need its negative side insulated from chassis.

Although the inductance value may be marked on a choke, the winding resistance and safe working voltage will not. You can measure the resistance, of course, but the safe working voltage of a second-hand choke is something you are going to have to make a guess at. Look at the construction of the choke, and the arrangement and quality of the insulation and the terminal board, and judge whether it has the appearance of being designed to operate safely at high voltages.

At the same time, look to see if there is any corrosion on external metalwork. If this gives the impression that the choke may have been stored for some time in a damp place such as a shed or garage, you will need to leave it for a week or two in a warm dry place such as on top of a domestic boiler or in an airing cupboard, with the aim of dispelling moisture which may have found its way into the innards. Even after that treatment, regard any choke or transformer having signs of corrosion with some suspicion. An insulation test using a Megger or similar instrument will tell you if the insulation between winding and core is intact, but it will not reveal any short-circuits between adjacent turns of the winding, which are likely to cause overheating and winding failure when the component is put into use.

The other parameter which is sometimes but not always marked on the choke is its current carrying capacity. There are two aspects to be considered here, one is dependent on the rating of the wire used in the winding, the other is governed by the maximum DC magnetic flux level which the core will support before it saturates. Once the core of an inductor is saturated, any further change in magnetising force (current through the winding) will produce no change in magnetic flux. In effect, the inductor stops acting as an inductance, and so can do nothing to reduce the ripple on the DC passing through it.

In supplies feeding a load which varies widely in the amount of current which it draws, such as a Class B audio amplifier, you may encounter something called a 'swinging choke'. This is intentionally designed and manufactured in such a way that its inductance varies with the amount of DC current passing, being largest for small currents, and reducing as the current increases. To understand why this is helpful, you should realise that the choke and the load form a potential divider. For DC, the choke has a low resistance, so most of the voltage appears across the load. For AC (ripple) the choke has a high impedance, so only a small amount of the voltage should appear across the load. However, when the load is drawing little current, it has a high impedance, and more of the ripple gets through to the load.

The swinging choke adjusts its inductance (and therefore its impedance) to match the load current drawn, as already explained. All this means that finding a replacement for a defective swinging choke is a well-nigh impossible task. You may have to settle for an ordinary choke and just live with the increased hum at low signal levels. Alternatively, fit a larger reservoir capacitor and replace the valved rectifier with silicon diodes, which will cope with increased surge currents, and get the hum down again that way.

In some vintage radios, the job of HT smoothing choke was taken over by a magnet coil on the loudspeaker. Instead of the normal permanent magnet loudspeaker, such sets were fitted with what was known as a mains-energised speaker. To replace such a loudspeaker, the usual method is to fit a PM speaker of the appropriate size and impedance, plus a separate smoothing choke.

Transformers

Mains transformers for modern, solid-state equipment are usually not too difficult to find replacements for, although some circuit designers have from time to time used custom-built ones with non-

standard secondary voltages. Quite why, I 've never been able to work out, as there is surely a big enough range of standard components available to do the job with some minor adjustments to the rest of the design. Therein lies the answer to the problem of replacing such a transformer - if, for example, the designer opted for a 10V or 10-0-10V rating, then a 9V or 12V one can be substituted with perhaps a small adjustment to the value of a dropping resistor or whatever.

Replacing a transformer in older, valved equipment can be much more of a problem. There will of course be an HT winding, more often than not centre-tapped to give a full-wave rectified supply with a double-diode valve. Then there will be at least one low-voltage winding to supply the valve heaters (typically 6.3V), more often than not with a second winding to drive the rectifier heater. This will be either 5V or another 6.3V.

Depending upon the various secondary windings fitted in the transformer to be replaced, it may be simplest to replace it with two transformers giving between them the combination of voltage outputs required.

Apart from the straightforward voltage and current ratings of the secondary windings, which will usually be marked on the transformer, the insulation ratings can be important, although as for chokes, these are unlikely to be given. Remember that in a valve rectifier, the cathode will be at HT-positive potential. It is for this reason that the rectifier heater is usually powered from its own secondary winding, with one side often strapped to the cathode, to ensure minimum potential between heater and cathode at all times.

Transformers used in high-quality valve circuits, especially audio amplifiers, will sometimes have a centre-tapped winding for the heaters of the amplifier stages, with the aim of reducing mains hum. This winding may be called '6.3V centre-tapped' or alternatively '3.15V-0-3.15V', which comes to the same thing. To replace this with a transformer having only an untapped 6.3V winding, you can provide an artificial centre-tap by connecting a low-value, wirewound potentiometer (typically 50 ohms) across the winding and earthing its wiper. This pot forms what used to be known as a 'hum-dinger' , which can be adjusted for minimum hum on the amplifier output.

Remember that the heater chain of a valved receiver or amplifier can draw a pretty hefty current from a typical 6.3V transformer winding. A rating of 2 or 3A is about the minimum, and in larger equipments you may find anything up to 6 or 8A.

Regulation

With any power supply, the regulation - how well the output voltage stays steady with varying loads - can be very important. Transformers having the same nominal output voltage and current may perform quite differently when loaded, and substituting one of inferior regulation can result in a circuit failing to function properly.

Basically, regulation depends mainly on the efficiency of the magnetic flux linkage between primary and secondary winding, and on the resistance of the secondary. If you look in any catalogue covering mains transformers, you will probably see quite a variety of percentage regulation figures quoted.

Safety and authenticity

When doing any servicing or repairs on radio, electronic or electrical equipment, safety should always be a factor in whatever work that you do, or parts which you fit. Remember, it will not be just your own safety that might be jeopardised by poor workmanship or unsuitable components, but the safety of your family and probably of others as well.

Some equipment which has been approved for used in a domestic situation has a number of safety-critical components. In order to maintain the safety standard approval on the set, any of these must be replaced by parts of the appropriate type and rating. This applies especially to television sets, where safety components are clearly identified on the circuit diagram.

Finally, one other aspect of component replacement, as applied to vintage equipment, is the desire to retain an authentic appearance. Except in very early or home-built equipment, the components will not be in everyday view, but many enthusiasts insist that, when the back of the set comes off, it must look original.

As I have mentioned before, modern components are generally very much smaller than their predecessors, and restorers will for example often remove the defective innards from a capacitor and slide a replacement component inside the original casing, connecting its wires up to the original lead-outs or tags. That way, everything looks authentic, but the set can be restored to its original standard of operation.

In Conclusion

If you have any ideas on topics that I might tackle in future 'Notebooks' , I'd like to hear from you. Your suggestions, please, to Geoff Arnold, either via the Editor by letter, fax or email, or direct to me at 9 Wetherby Close, Broadstone, Dorset BH18 8JB. Alternatively come and have a chat with me on the *Radio Bygones* stand at a radio rally.

QRP corner

Dick Pascoe G0BPS shows the way towards achieving QRPp

Like many authors I keep a copy of every magazine and newspaper that an article of mine was printed in. A browse through the bookshelf brought home to me that it is now just over five years since I started this column.

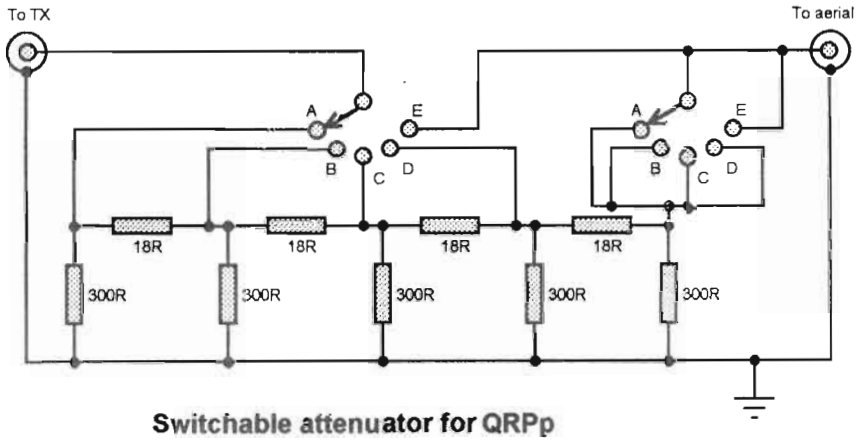
It is with great interest that I have heard that the Radiocommunications Agency appear to have started the ball rolling towards the removal of Morse Code as part of the Amateur Licence 'A'. Comments made recently gave the distinct impression that by far the majority of current 'A' licensees wanted the code kept and that the majority of 'B' licensees wanted it scrapped. Dare I say "What a surprise?"

There has to be a middle line, and although I am very strongly committed to the use of Morse code, I do think that the time has come to vary the RAE to perhaps three levels, not the current two.

The first is the Novice test of course and the second the current RAE, the third perhaps a more difficult version of the RAE with greater emphasis on EMC and the problems associated with the use of high power (and of course how good QRP signals can be!).

There will be less and less activity in the CW sections of the bands, less QRM and a better chance for the QRP operator to get those weak signals out. I can see one brighter light for those who would love to use Morse but just cannot get the hang of it at twelve words a minute. By getting onto the HF bands without this twelve words test they will be able to use the mode at their speed and progress at their own rate.

Of course, it won't take long before this increasingly less-used mode will be pushed into smaller, and smaller sections of the band until we are relegated to perhaps just the bottom 10kHz of the band.



Switchable attenuator for QRPp

Morse code will never vanish, it may fade away a little but when the bands are at their lowest it will be the CW operator getting through when all appears dead to the phone man. What's the betting then, that a few more will turn to this wonderful noise of dots and dashes.

Variable capacitors

The winter rally season will be starting soon and perhaps your chance to get that bargain. For the builders there will be the chance to get those odd components. The one component that we all tend to use in any home-brew equipment is the variable capacitor. These used to be available by the hundred without any problem. They are becoming hard to find. I recommend that if you see one that you even think may be of use, grab it. Useful values are 50pF, 100pF and of course the wide spaced 365pF. These can be single or twin ganged. The wide spaced, high value ones are very valuable for building aerial tuning units.

Tip of the month

During my trip to Ireland back in September, I learnt a lot as well as passing on a little knowledge. One of those both learning and helping on the course was Ray who gave me this tip for stripping enamel wire of its insulating coat. Take a Ball Pein hammer and a block of wood. The thickness is not important, and by using the rounded head and a little force we can make an indentation in the wood of a few millimetres deep.

Next, melt a blob of solder into this indentation and keeping the iron in the bowl, drag the wire through the molten solder. If the insulation is solder proof it will still remain and will have to be stripped off with a knife. If it is not, the solder will melt the coating and you will have clear wire. Most modern enamelled wire has this coating that will melt away.

Another tip given to me about soldering, often we talk about 'gluing joints' or "please pass me the glue" when we refer to solder joints or the reel of solder itself. I

have often done this too. I was told to forget this term as it can cause confusion for the novice builder. A good solder joint is much more like a welded joint than a glued one. OK, the two surfaces do not actually fuse together as a true weld does, but I had to agree that the term 'weld' was much more of an accurate description than the 'glue' one.

Memberships

Time for a reminder about membership dues. Many readers will remember that apart from supporting the G QRP club very strongly, I also help both the American club and the Czech club. The American 'Amateur Radio Club International' has been going for over thirty years and although it has had a few problems recently, strong leadership from the new president Buck N8CQA has brought the club back into line a little. It is now a strong thriving club and the quarterly magazine is getting better. To join this club costs £7 and a subscription of £6 per year thereafter.

The OK QRP Club is also a go-getter type of club and the magazine good reading, written in part Czech, part English. Run by a very good English speaking amateur from Prague, Petr OK1CZ is a strong driving force ably backed up by other active members The subscription for this one is £6 per year too.

As it is difficult to send such low amounts of money through the post to these countries I have been running a system for several years which appears to work very well. You may send your subscription to me at the address at the bottom of the column stating full name, address, callsign, name used on the air and the cheque. Do *not* make cheques payable to me. All cheques should be made payable to the 'G-QRP club'. These amounts are then balanced against the members of our club over there.

QRP vs QRPp

Many of us will have simple transmitters such as the OXO or the ONER, but as is well known these put out a massive 1 to 1.5W. Much too much for the QRPp operator. You can reduce the supply voltage to reduce the output power, but will soon reach the point where the oscillator will cease to function. Much better to keep to the correct supply rating and limit the output power from the transmitter.

The unit shown here uses 2W resistors so the input power should not be more than 1.5W for safety. The values have been calculated for steps of 3dB each, so the power can first be halved, then halved again ad infinitum. A good quality two pole switch should be used. There is no need for a PCB and if made nicely the whole could be mounted in a small box with the resistors soldered directly to the switch. It may be found that the exact value resistors cannot be found, so use a pair to get the value you require. Do *not* be tempted to use wirewound resistors as these have an inductance as well as their resistance. The five positions give the following attenuation; A = 12dB, B= 9dB, C= 6dB, D=3dB and position E is straight through.

That's it for another month. Let me please have some letters of what you are doing. News and views to me via the editor, direct to Seaview House, Crete Road East, Folkestone CT18 7EG, or via GB7RMS, or even Email to Dick@kanga.demon.co.uk 73/72.

VHF/UHF Message

Geoff Brown GJ4ICD looks back on World DX achievements on the 'high bands' during 1995

Starting with the higher bands for a change, there were some spectacular events:

24GHz record from Sam G4DDH

Following on from G3LQR's recent contact with PA0EHG/P on 24GHz for a first contact between the two countries on this band, Sam was able to successfully work ON6UG/P in Belgium on the evening of 4th May 1995, for what he believed to be the first contact between G and ON on this band. The calculated distance is 210km and may be a UK record distance for the band, just exceeding G3LQR's 205km with PA0EHG/P. He operated from home in JO02. Freddy was located at Ronsa in JO10. 10GHz was used for talk-back, where the signal from Freddie's (ON6UG) portable 1W station reached S9+40dB! Even on open waveguide with the transverter laid on the ground, Freddie's signals were S9.

The 24GHz system at G4DDK consisted of a DB6NT based transverter with G4DDK/G3WDG local oscillator chain, power HEMT output amplifier giving 125mW at the aerial, low noise amplifier using a Mitsubishi MGF4915 HEMT, and a system noise figure of about 5dB. The aerial was a 25cm Procomm dish with Procomm feed. The transverter is mounted at masthead and uses a 2m IF. At ON6UG/P the 24GHz system consisted of a DB6NT transverter, 90mW output and a 48cm Procomm dish and feed. This system is tripod mounted. Signal levels started at 419/519 and peaked at 51/52 on SSB. Sam believes the propagation mechanism was super refraction with extension over ground by approximately 50km to Ronsa from the Belgian coast.

On the 11/8/95: Sam Jewell reported on another fantastic opening. Sam worked LA/DB1DI/P on 10368MHz on the second attempt of the evening and on the last evening of their operation from JO37. Reports were 57 on SSB. He had already worked them on 70 and 23cm but was keen to get the new square and prefix on 3cm. Also worked was GM4ISM in IO86 on 3cm. Mark was running just 100mW. "He gave me 59 and I gave him 52. My transmit power was 4.5W at the dish". He rounded off the evening with DC6UW in JO44 ON 3cm, but failed to work OZ2OE on 3cm for the second time. Ole runs a few hundred milliwatts and can usually be detected, but no QSO. More on 10GHz (12/8/95) from Sam G4DDK. Friday night was pretty good on 3cm, he noticed from the cluster that LA8OJ was QRV and found him at 5.9+ on 1296.200MHz. He called and attempted a QSO with him on 3cm. "I think we were both sceptical about the possibility of a QSO". Egil is located in JO28 and is not too well situated for QSO's to this part of the UK. "Nevertheless I transmitted on 10368.105 and he found my signal right away. When he transmitted with his lower power a (few hundred mW) I was able to find and peak his signal at 57, later rising to 59. This was Egil's second only QSO on 3cm., his previous being over 10m within LA to check the gear worked. Our contact was over 849km! I also managed a QSO with OZ2OE in JO45 at last, after many unsuccessful attempts. Signals were weak as always, peaking 52. Later that same evening I worked OZ1UM and OZ1DOQ also on 3cm. This gave me JO65, for my 31st square on 10GHz". Well done to all.

VHF/UHF reports

144MHz ES in Europe; Brian G7LIJ reports that he had 2m ES propagation to IT9 during the morning of the 20th May, working IT9IPQ/9 in JM78SE on 144.300MHz. Brian said that he was audible for 10 minutes prior to hearing a lot of Band II FM broadcast throughout the morning. Also IT9FDR/IG9 was worked from JM56, look on your QRA maps, its a 'once in a lifetime' square!

W7 to KH6 Tropo/Sea Duct

2/7/95: Report from Mike Cherry VE7SKA in CN88, Merle W7YOZ in CN 87 worked Paul KH6HME on SSB RST: 57 at 0615 UTC and still had him in 45 min later.

5/7/95: N6CA reported about one of the longest 2m openings to Southern California in the past 30 years. It was predicted accurately by W5SFW. At 2235z on July 5th, 1995, Phil announced on 50.125MHz that he was going up to 144.200MHz because he expected the band to open.15 minutes later the band opened up and he was S9 at N6CA.The opening lasted over two and a half hours. Stations worked from Southern California were: W5SFW (DM95), WS5R (DM95), N0IXR (DM76), N0IPL (DM76), W2CRS/O (DM78), W5RHR (DM65), N0LL (EM09), WG6K/0 (DM67), KG0HS (DM79), W0ETT, W0MOG, KB0LQZ, and KB5RF. Lots of unusual QSOs were made: WA6TBO in San Diego worked W2CRS in Colo with a 2W handheld whilst standing on his roof, WA6CGR worked his first New Mexico with a triband vertical and 10W, N6XQ and KB6KQ worked several while mobile in motion.

Another report from the USA, this time Doug W2CRS reports:

"For the second time in five days we had an excellent E opening on 144! Around 5.00PM local time I noticed the MUF was above 88MHz and rising. I was hearing commercial FM stations from both the southeast U.S. and California. About 25 minutes later the MUF here had risen to at least 108MHz with strong signals from east and west. I called CQ on 144.200 and worked KJ6FP in DM13, the first of 30 contacts to California over a two hour period. The MUF was above 144 here from about 1725 to 1813 local (2325- 0013 UTC) and then again from about 1902 to 1919 (0102-0119 UTC). Besides CA, I worked XE2EED in DM12, a new grid and my second XE on 144. Other grids worked were DM03, DM13, DM14, and DM04. The strongest stations heard were KJ0FP and WA6TBO, both 30 over 9. WA6TBO was also worked with his 200mW handheld! Other CO stations known to have been in on the opening were W0ETT (DM79), W0MOG (DM78), WG6K (DM67) the only VHFer in that grid and also KS station N0LL about 330 miles east of here".

More 'ES' in the USA on the 9/7/95 from WZ1V:144 MHz Eskip during the

This is the "official" list of DX records for Region 1 on the bands above 50MHz.

Band/ mode	Station A Call	Station A Locator	Station B Call	Station B Locator	Mode	(US)Date YY-MM-DD	Distance (km)
50 MHz							
Sporr-E	JY7SIX	KM71WX	WD4KPO	FM1S	CW	94-06-09	9779
"	ZS6LN	KG46RC	KH6IAA	BK29LA	SSB	79-04-15	19305
TEP	G0JHC	IO83PR	LU8YYO	FF50	SSB/CW	89-08-24	12128
70 MHz							
Tropo	GM3WOJ	IO77WO	G4RFR	IO90AS	SSB	88-09-18	774
Aurora	G3SHX	IO90OX	GM3WOJ/P	IO89KB	CW	82-08-11	904
Sporr-E	GW4ASR/P	IO82JG	5B4CY	KH64MR	?	81-06-07	3465
Meteor	GJ3YHU	IN89XI	GM3WOJ/P	IO89KB	SSB	82-08-12	1083
144 MHz							
Tropo	GW8COX	IO85BS	EA8BWL	IL27GX	?	88-09-09	3223
Aurora	G4VBG	IO94FV	UA3IFI	KO76WT	CW	86-02-07	2324
Sporr-E	EA8XS	IL28GA	HG0HO	KN07RU	SSB	83-07-16	3865
Meteor	GW4CQT	IO81LP	UW6WA	KN97VE	CW	77-08-12	3101
EME	ZS6ALE	KG46RC	KG4YC/KH6	BK29AO	CW	84-07-18	19287
TEP	I4EAT	JN54VG	ZS3B	JG73	CW	79-03-30	7843
432 MHz							
Tropo	EA8XS	IL28GA	GW8VHI	IO81CM	SSB	84-07-05	2786
Aurora	PA0RDY	JO22KJ	RA3LE	KO64AR	CW	86-02-08	1807
Meteor	EI2VAH	IO43XW	SK6AB	JO57XQ	CW	88-08-12	1434
EME	G3SEK	IO91IP	ZL3AAO	RE66GR	CW	89-03-12	18920
1.3 GHz							
Tropo	EA8XS	IL28GA	G6LEU	IO70ME	SSB	85-06-29	2617
EME	PA0SSB	JO11MI	ZL3AAO	RE66GR	CW+SSB	83-06-13	18773
2.3 GHz							
Tropo	EA7BVD/P	IM78JD	EA8XS/P	IL27GW	SSB	84-07-08	1481
EME	OK1KIR	?	W7GBI	?	CW	91-08-03	9336
5.4 GHz							
Tropo	G3LQR	JO0ZQF	SM6HYG	JO58RG	CW	83-07-11	927
5.7 GHz							
Tropo	G3ZEZ	JO01WS	SM6HYG	JO58RG	CW+SSB	83-07-12	982
EME	OK2KIR	JN79DM	VE4MA	EN19LU	CW	95-05-20	7169
10 GHz							
Tropo	I0SNY/EA9	IM75IV	I0YLI/IE9	JM68NR	FM	83-07-08	1660
EME	SS6UUU	JN76	WA7CJO	DM33	CW	94-11-27	9731
24 GHz							
Tropo	DH6FAE/P	JO40PL	HB9MIN/P	JN37OE	SSB	93-07-03	397
47 GHz							
Tropo	HB9MIN/P	JO55	DF7FJ/P	JO55	SSB	94-10-05	184
75 GHz							
Tropo	HB9MIN/P	?	DK4GD/P	?	SSB	95-01-17	80
142 GHz							
Tropo	OZ1UM/P	?	OZ9ZI/P	?	?	94-07-02	11
241 GHz							
Tropo	OZ/DB6NT/P	?	OZ/DF9LN	?	?	93-06-10	3.5

Compiled by John Norris, GM4ANB, the IARU Region VHF/UHF/ Microwave DX Record Co-ordinator

CQWW contest July 9 1545-1630 UTC! He worked WB2QLP (EL96), K2RTH (EL95), KE4NJM (EL94), N4YKM (EL96), W4ZD (EL97), AE4DP (EL96), WA4CHA (EL88), N0KBH (EL88) and KT4AL also in EL88. Most signals were 59.

A major tropo opening developed on the 12/7/95 over the central US, with propagation from Minnesota to Arkansas, Oklahoma and Texas. Several records were made on various bands.

New144MHz World Record

On July 1st 1995, KH6HME and W7FI established a two-way SSB contact on 144.170MHz to establish a new 2m Tropo World Record of 2695.049 statute miles or 4337.262km. Congratulations to KH6HME and W7FI.

More big openings in August. 3/8/95; Another USA 'ES' 144MHz opening! Herb W3IWU reports; "During a ho-hum 6m opening between here (FN20FC) and the 4,5,0 call areas, KD4UPF near Luray, VA spotted W5AL in DM95 into his FM08 grid at 1611z. He immediately switched to 2m and intermittently/weakly heard W5AL between 1615 and 1636z on 144.200MHz and 144.205MHz. Another station in our area worked W5SFW who he never heard". I think propagation from Len was better into the area south of himself.

3/8/95; 144MHz ducting returns. Russ KH6FOO worked K6VI and N6OMW who was 59 in Hawaii at 0529z. N6OMW reported hearing the KH6HME 2m beacon 59+40 at the time of the QSO.

Meanwhile back in Europe, Andy GM4IPK was copying GB3VHF in Kent, which had been audible in Shetland all day (Friday 4th August) at around 539 - 559, so conditions were favourable on the north-south path. He also announced the loss of GB3LER on 144MHz.

Tropo in other parts of Europe were also good, with DK8LV/I6BQI, DL1EJA/OE9DMV (JN47), DL1EJA/ OE5D (JN68), DF7KF/IK5DHM/5 (JN54), and PE1MCD/LA/DL7YS/P in JO37. On the 9th August, Ham radio Today's columnist Dick G0BPS reported a great tropo opening (thought Dick only operated QRP HF!). Dick's pick of the bunch were: six new squares worked; JO28, JO37, JO48, JO58, JO78 and JO79, and stations in LA and SM were worked.

The Perseids meteor shower produced good results for some on 144MHz. Dennis GJ3YHU used his PC sound card for receiving high speed CW, with several contacts being made. Other cluster reported contacts were: CT1FAK/ EA6FB, DK8EL/ ER/LZ1KWT (KN46), PE1OGF/HA3UU, DK8EL/SP5EFO (KO02), PE1OGF/SM7TUG (JO21), and many more I'm sure.

More big tropo events in Europe returned on the 18th to the 20th, even your's truly got in on the action. Both Allan GJ4ZUK and myself were up at the crack of dawn, as our TV link to Jersey was suffering from lots of co-channel interference. Allan followed me in many 432/1296MHz contacts with stations in France at distances around the 850km mark. Stations worked were: F1JGP (JN17), F6CIS/P (IN93, 700km), F6HLV (IN97), F6HTJ/P (JN12, 846km and best DX), F5JGY/P (JN04, 577km), F5AXP (JN03, 680km), F5MZN/P (JN19), F6CRP (IN96), F5EGB/P (JN03), F6TER (JN03), F1DBN/P (JO00), F5VBW (JN03), F1PYR (JN19), F6CBH (JN19), F1CBC (JN09) and F1ANH.

432MHz was also in good shape, and four new squares were worked on 1296MHz, bringing my total up to 79.

Still in Europe and an FAI warning was spotted on the cluster. Jan OH1ZAA reported this on 50MHz, but Allan GJ4ZUK who was operating in the September 144MHz Trophy contest actually worked a few Italian stations on the band. It has been a few years since FAI has been worked from Jersey, the last report was I think in 1985 when I worked a few IT9's or IS0's, one of the two!

70MHz error

In October's Ham Radio Today I stated that Martyn G3UKV near Telford had made contact with a 5B4 on 70MHz. This I'm afraid was not true, and so apologies to Martyn for this error. However Martyn *did* hear the 5B4 beacon three times in 1995, and is trying to set up a contact with 5B4AAI who is active on the VHF bands.

That's all for this month, see next month's *VHF/UHF Message* for Part 2, where I will be dealing with the 50MHz band and including some more QSL info.

I would like to wish all contributors and readers a very Merry Christmas! As always please send your news, views, photos, etc. for inclusion in this column to; Geoff GJ4ICD, TV Shop, Belmont Rd, St. Helier, Jersey JE2 4SA, Tel/fax. 01534 877067, you can also send Email to equinox@itl.net and don't forget to check http://user.itl.net/~equinox for the latest radio information on the Internet.

QSL LISTING

4K6D - Vladimir Scherbakov, 370147 Baku, Mir Djalala 99 KW 95, Azerbaijan.
.....OR PO Box 169, 370000 Baku.
4U6ITU - Via DK5UG, August Gihr, Caroste 2, D-67227 Frankenthal, Germany.
4U/KC0PA - Via VE9RHS, Rudi Saueracker, 2190 Champlain St. Dieppe, N.B. E1C 8J9, New Brunswick, Canada.
5T6E/5T5JC - Via F6FNU, Antoine Baldeck, B.P. 14, F-91291, Arpajon Cedex, France.
5T5BN - Box 1345, Nouakchott, Mauritania.
CN2JA - Via DL2EAD, Andreas Laumer, Wagnerplatz 4, D-40670 Meerbusch, Germany.
CT3/DL5MAE - Wolfgang Schlaffer, Am Rosengarten 3, D-85467 Neuching, Germany.
CO2OJ - *NEW AD* - PO Box 6060, Havana 6, Cuba 10600.
D44BC - Julio Vera-Cruz, PO Box 36, Mindelo, Republic of Cape Verde, West Africa.
EH8BPX - Avelino Martin, Chamiana 15, 38370 La Matanza, Tenerife, I. Canarias, Spain.
EH9RY - Loli Garcia, Bda Constitucion 4 2-B Melilla, Spain.
EH9IE - Juan Fernandez, PO Box 410, 11780 Ceuta, Spain.
ER1LW - Via SP7LZD, Tadeusz Kokoszka, Skrytha Pocztowa 6, 27-600 Sandomierz, Poland.
ER5AL - Via UO5OAL, Toly Shicov, Box 20, 278830 Kagul, Moldova.
HA6ZB - Gyorgy Plosz, Ioszerencset U 6, H-3200 Gyongyos, Hungary.
HA8BE - Bela Nagy, Lenin u 23, H-5720 Sarkad, Hungary.
HA8CE - Istvan Kovacs, K 1 25, H-6621 Deregegyhaz, Hungary.
HB0QQ - Via HB9QQ, Pierre Pasteur, Sunnhaldenstr 28 A, CH-8600 Duebendorf, Switzerland.
HB0/DK0FTG - Via DJ2XS, Matthias Schneider, Radickestr 8, D-21079 Hamburg, Germany.
IK2AEQ/IM0 - Luca Vanni, Via Vetica 18, Castano Primo (MI), I-20020, Italy.
I2ADN - Angelo D'Anna, Via Ortigara 19, I-22070 Casnate, Italy.
IA5S - Via IK5RLP, Claudio Dionori, Via del Maestrale 24, I-58046 Marina di Grosseto, Italy.
JW0BY - Via LA0BY, Stefan Heck, Hildehakken, N-9020 Tromsdalen, Norway.
KP4EFT - Jose Montes, Box 681, Cidles, PR 00638, Puerto Rico.
LZ2FT - Via I8YGZ, Pino Zamboli, Via Trieste 30, I-84015 Nocera Super, Italy.
OJ0/OH8AA - Via OH6LI, Jukka Klemola, Aarontie 5, 31400 Somero, Finland.
OH0/DL5FF - Peter Stapf, Eulengasse 14, D-64807 Dieburg, Germany.
OH0/DJ2PJ - Hans-Dieter Teichmann, Kornblumenstr 7, D-64839 Muenster, Germany.
OH0/SK3SN - Via SM3MXR.
OH0/OH1NSJ - Pasi Alanko, Nasijantie 20 as 2, FIN-28660 Pori, Finland.
OX3HI - Via OZ1HVI, H. Mortensen, Lodsvej 20 Nordby, DK-6720 Fanoe, Denmark.

DATA CONNECTION

Our resident datacomms SysOp goes grey line data DXing on 80m

With the winter evenings now well and truly upon us, I'm looking forward even more to indulging in my favourite HF activity of low band 'grey line' DXing, when I often manage to have SSB chats on 80m with US stations. With this in mind, I was recently interested to see a message from a US station asking whether anyone would like to try using PacTOR or GTOR on 80m, especially trials with very low power. The good news here is that Patricia Gibbons, WA6UBE has been publicising an 80m PacTOR 'calling and working', on 3.633MHz (mark tone). If you have, say, a KAM (as I use for HF data modes), Patricia suggests setting the following commands; mark = 1000, space = 1170, and shift = modem. This way, if you dial your rig's suppressed-carrier freq so it shows 3.634MHz on its display, your mark tone for PacTOR will be on 3.633MHz, i.e. 1kHz lower. There's currently a group of US amateurs on this frequency, including Jack NF7V, Larry KI7GF, Bart WB6HQK and Trish hereself,WA6UBE. Trish and Jack have been leaving their rigs (with personal mailboxes active) on this frequency for several weeks, QSYing when needed to 3.637MHz for longer rag-chews, and they encourage others to also try doing so.

TCP/IP

Many newcomers (as well as many 'old hands) to amateur packet continue to ask about TCP/IP. Basically, it's rather similar to the Internet with FTP (File Transfer Protocol) and so on. Remember, there's a disk available from the Ham Radio Today Software Service with a full 'get you going' pack of software and information (available for £1.00 fully inclusive of the 1.44Mb disk and UK p/p.), just ask for the *NOS* (short for 'Network Operating System') disk, no page corner flash, coupon, or whatever is needed. TCP/IP is an intelligent system which automatically finds, and maintains, the best network route for communication and file transfer, it even sits there and waits when the frequency gets busy rather than giving you a 'disconnect'. It differs from 'normal' packet in that the NOS software running on your PC (an ordinary XT will do although more powerful types are, naturally, faster in operation) controls your TNC, which you first place in KISS mode. This of course means that you need to keep your PC running all the time, in a similar manner to using TNC emulation programs such as BayCom, rather than just using it as a 'terminal' with your TNC otherwise active in PMS and digipeater mode when your computer isn't running. Here, like the Internet, a growing 'network' is created, each station having a unique IP address which you can obtain from your local coordinator. If, in the meantime, you'd like to establish a connection to a TCP/IP station using 'normal' AX25 packet, firstly add a '5' SSID to your callsign (e.g. G4HCL-5), which because NOS allows AX25 protocols to share the network usually also allows a Telnet session.

WinPak 5

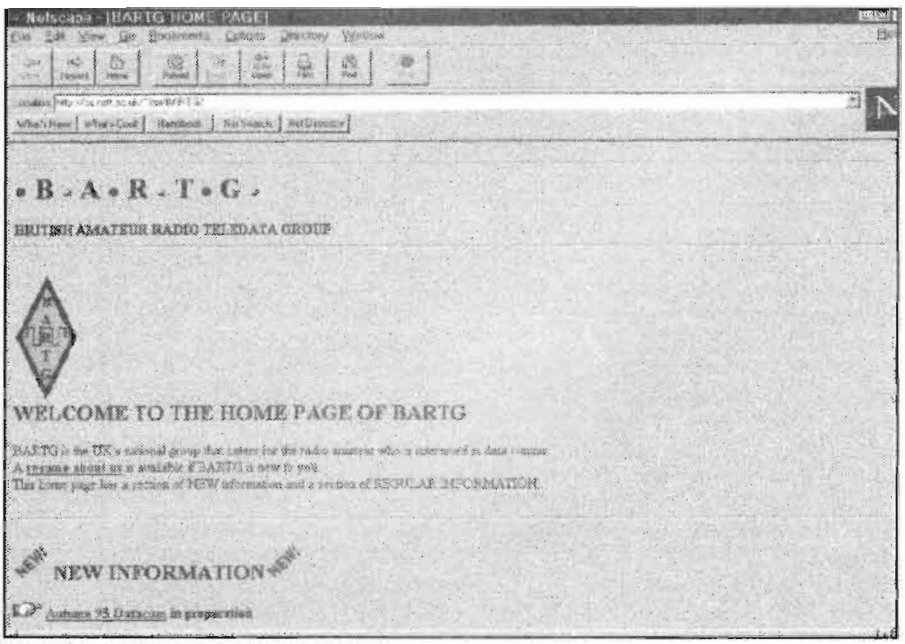
Yes, it's coming! I'm currently testing a 'beta' version of version 5 of WinPak, with the final release no doubt being available by the time you read this. Version 5 has all the nice features of TPK - use of the FBB beacons and compressed download and upload. My local BBS supports the FBB beacons, and I'm currently testing this facility as well for message reception. I hope to report more on this in next month's column. Version 5.00 is distributed as shareware, with resultant full software support, if you'd like a copy it should be available from our software service, see elsewhere in this issue.

BARTG on the Web

A message from Andy G3ZYP, tells me that the British Amateur Teledata Group now have a web site on the Internet. This has been put together by their hard-working Secretary, Ian G4EAN. You'll find it at *http://cs.nott.ac.uk/~ibx/BARTG/* as well as a 'link' to that page (plus many others) being available from the Ham Radio Today web site at *http://www.tcp.co.uk/~slorek/* If you're not on Internet, you can of course still get information on the BARTG via packet from Andy himself with a message to G3ZYP @ GB7MXM .

PacTOR II

Vic G0BVZ from Greater Manchester tells me the recent item

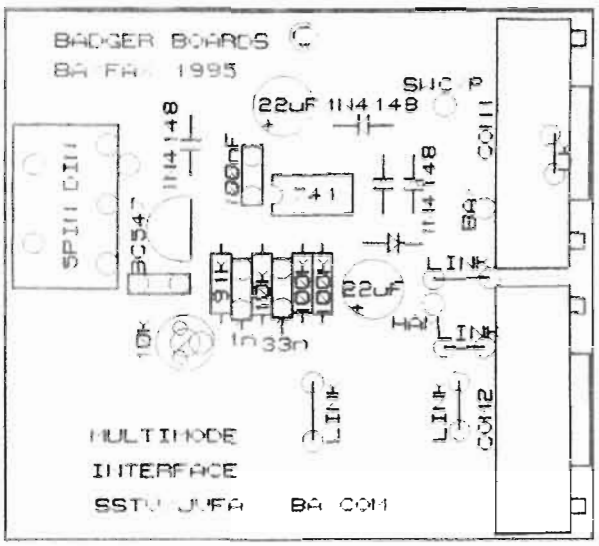


on PacTOR II in this column coincided with a surge of his interest in HF data modes. Due to a packet forwarding problem on his local BBS, which only carried mail from G stations for about a month. He became obsessed by the lack of EU mail , with quite a feeling of 'vulnerability'. He didn't wish to be isolated from EU again. By nature, Vic is a QRPer and so would naturally prefer a mode which is able to cope with weak signal working. Vic asks for more details of the PacTOR-II unit and its performance, also where in the UK he can get one. Well the good news is that I've a test unit coming over direct from the PacTOR team in Germany, which I'll be reporting on through this column.

BayFax

At this year's Leicester Show, Badger Boards launched their new BayFax unit, suitable for use with PCS and compatibles. It comes as a ready assembled but uncased printed circuit board, similar in style to their Hamfax unit which I recently detailed in Ham Radio Today. BayFax however has two

BayFax from Badger Boards



COM ports, the second being for packet radio running with Embaycom software. Supplied with on disk software, the unit links with your transceiver to operate on packet, SSTV, RTTY, CW, FAX etc., indeed all the modes of Badger's 'Hamfax' unit but with added packet radio! You'll need two COM ports available and configured on your PC to run these at the same time, packet running on COM 1 and HamComm on COM 2. Badger Boards have kindly provided me with a sample for review, so I'll be reporting more on this next month. In the meantime, you can obtain further details on the unit, which is priced at just £35 plus £1.50 p/p , direct from Badger Boards in Birmingham (Tel. 0121 384 2473).

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. Likewise if you'd like specific topics covered in this column, just get in touch and I'll try and help out. 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 Rendevous

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

As I write this, German Cosmonaut Thomas Reiter, DF4TR, is on air from MIR as DP0MIR on the ESA EUROMIR 95 mission. He will use Mir's 2m rig during the 135 day flight. The frequencies to be used are 145.800MHz for downlink, and 145.200MHz for uplink as discussed at the IARU session of the AMSAT-UK Colloquium this year.

70cm equipment will be installed during the mission. It is capable of FM voice and 9600 Baud packet modes. The German Mission Control also announced that there will also soon be picture transmissions from MIR by means of a new SSTV mode which will transmit pictures, taken by a still video camera on-board, in AX25 packets. The mode appears to be similar to that used for hypertext images on Internet's World Wide Web with the picture quality improving as time passes. DK8JV, author of the well-known JVFAX program, is in charge of the software of this new system and he will make a suitable program available to all amateurs as soon as it is completed.

QSL info is DP0MIR, and QSLs will be handled via the usual German DARC QSL bureau.

The 70cm gear includes a full blown FM voice repeater called *Safex Two,* components of which are being taken to Mir over the course of several flights. The repeater, actually an FM transponder, was built by DL2MDE. Initially it will be FM only with downlinks at 437.925, 437.950, and 437.975MHz, and an uplinks in the lower part of the 435 MHz space communications subband. Safex will later be improved adding a 23cm to 13cm transponder, capable of broad bandwidth modes including fast scan ATV.

Russian Satellites

Pat, G3IOR, has been trying to get information from the Russians about some of their satellites ... so far without success. This is particularly because of the present state of RS-15 whereby since launch, it has been going downhill. Where at first it held the battery charge and remained operational throughout earlier eclipse periods, it later went off after only a few minutes in darkness; recently it was going off the very second that it entered eclipse, and more recently has been shutting down even when still in sunlight. This points to a possible battery or solar cell problem.

In the course of Pat's investigations it appears that the Russian command is now in financially uncertain times, and they might even completely lose the command facility. The threat also affects RS-10/11 and RS-12/13 as well as RS-15. DB2OS is visiting UA3CR about now, and they will discuss the situation. It may be possible that someone could come up with a rescue package or even that the command might be taken over completely by some other (non Russian) organisation. More information when it's available.

Microsats

LO-19's BBS has been on 435.154MHz for a while because the 435.125MHz CW beacon has been activated. This resulted in a power reduction of the BBS transmission to accommodate the extra power required for the CW beacon. Amsat-LU say that this mode will finish soon. The CW beacon sends eight data channel and one status channel at 12 WPM with a output power near 900mW using abbreviated numerics.

Dove is reported to have its S-band transmitter *off.*

Oscar 10

Oscar 10 is still operational in Mode-B. Despite good signals from the transponder, there are very few stations using it. It's currently available when in view but *please do not* attempt to use it if you hear the beacon or the transponder signals FMing.

Mars global surveyor on 70cm

The Jet Propulsion Laboratory in Pasadena, California will be launching a replacement for the ill-fated "Mars Observer", called the "Mars Global Surveyor", in the latter part of 1996. Among the many experiments carried on the spacecraft, Mars Global Observer will carry a 1.3W continuous carrier beacon transmitter on 437.100MHz. Amateur Radio Operators will briefly have the ability to receive this beacon using their satellite groundstations while the spacecraft heads off to Mars.

Chile satellite

FASat-Alfa, the first national satellite for Chile, was launched on 31st August by a Ukrainian Tsyklon rocket from the Cosmodrome at Plesetsk, it was mounted as a secondary payload on the top of the first Ukrainian satellite SICH-1.

They were successfully placed into orbit and, after four orbits, FASat was scheduled to be separated from the SICH-1 satellite by commands sent from the Mission Control Ground Station outside Moscow.

Following several attempts by the command station to release FASat from SICH-1, telemetry indicated that FASat was still attached to the SICH-1 satellite. Further attempts to separate the two satellites were made without success. FASat was designed and built within a 2-year collaborative satellite technology transfer programme between Surrey Satellite Technology Ltd (SSTL) and the Chilean Air Force (FACH). It is however *not* an amateur radio satellite.

Latest Keplers

Amsat-UK Keplers are put out on packet fortnightly, sent to KEPLER @ GBR. The latest satellite Keplers as supplied by Amsat-UK are also available by fax from the 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 23 from the satellite menu for this month's. You can also get a copy in the post by sending an SAE together with the corner flash from this page to the HRT Editor, marking your envelope 'Keplers' and stating whether you want *all amateur* satellites (one A4 page) or *all* satellites (10-15 A4 pages).

For further information about Amsat-UK contact: AMSAT-UK, c/o Ron Broadbent MBE, G3AAJ, 94 Herongate Rd., London, E12 5EQ. Big SAE gets membership info. SWL's are welcome. All new joiners get the USAT-P tracking program on 5¼in disk. G3RWL can now be reached via internet as g3rwl@amsat.org.