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LETTERS

Letter of the month

Dear HRT,

Congratulations on your firm stance against 'our' licence abusers. I have recently been in discussion with an RA official who stated the view, "The main threat to the Amateur Bands does not come from the PMR camp, nor from the abusers of the airways". Confused? So was I until it was explained to me that it was from the attitude "Not my problem" (i.e., "switch off and they will get fed-up and go away") that the threat arises. It was further emphasised that radio amateurs must take a more positive attitude in the policing of our bands, and to gather evidence for action against the abuser, to actively DF, trace, and identify them, so that the RA can prosecute them and stop their stupidity.

Bob Johnstone, GM1YGV

Editorial comment;
Here speak the words of the people who give us our licences. And now our repeater licences.

Dear HRT,

With reference to the article 50W linear for 6m, by Geoffrey Pike GI0GDP. He makes mention of the fact that as his aerial gain is quite low, he needed a little extra power. It is this point that I wish to take issue with. I concede that he does point out later in the article that a better aerial would be advantageous, however, it is no good having the ability to be heard if you can't hear! I sometimes wonder whether people realise that it is better to upgrade the receive side before the transmit section of their stations? Surely Mr. Pike would be better off building a preamp, assuming that his aerial cannot be changed.

There are many things that could be done before simply being louder. For instance, use a good quality mast-head preamp, use good quality low-loss coax, and remove as many connectors as possible. I appreciate that one wants to be heard, but simply increasing the output of the transmitter is not sufficient, it is only wasting power! I also feel that this linear is just a little too powerful for those people using an aerial with reasonable gain.

Phil Cooper, GU0SUP

Dear HRT,

I refer to the report in Ham Radio Today, September 1993, page 8, 'More RIS Prosecutions'. It seems that Mr. R. G. Hitchcock has suffered an effective £10,000 penalty, not for unlicensed operation but merely for occasioning 'persistent annoyance' to some other amateurs who then bleated to the RA and the RIS, occasioning among other things a DTI 'raid' on Mr. Hitchcock's home. At worst there can only have been some breach of prescribed procedures. Some penalty may have been in order, but that imposed was utterly disproportionate and excessive and in another case reported the operation of an *unlicensed* mailbox cost only £400. The outcome of this proceeding appears to be in a high degree oppressive and I can only attribute it to inexperience of such cases on the part of the judge, coupled with excessive zeal and misrepresentation, if not actual malice, on the part of those pursuing the prosecution. I would like to know what succour was afforded to Mr. Hitchcock by the RSGB? Or, could it be that the body was one of the instruments of his persecution? Whether or not, I feel that in a better world the RSGB would now be pursuing an appeal against the penalty, in honour and in the interests of other members who may fall into such hazard.

Moreover, I am concerned that a possible precedent for abuse has been set. Purely to take an example, occasionally my transmissions might annoy extremely one or two prejudiced and vindictive protagonists of the RA's invidious and totally unjustified (since 1945!) continuation of compulsory Morse. Can I be assured that one of these people could not go to the RA with some whining tale and set the RIS on me to seek assiduously for some fault? And what support could I then expect from the RSGB which seems to include some of them among it's rulers? What are the actual powers of these DTI storm troopers in invading our homes? Is it indeed a safe and sane thing to be an amateur?

Sandy, GM0IRZ

Dear HRT,

I enjoyed your editorial in the October issue of HRT. It's nice to read of some justice being done for a change. I know what it means to have yet another QSO wrecked by an abusive voice or 'squeaky'. It's got to the point now where our local 'box' has to be switched off now after 18.00hrs to try to alleviate the problem. I feel sorry for the people who have taken the time and trouble to provide the facility in the first place. I feel that comments such as those in your editorial serve to highlight and therefore increase the awareness of this problem, and the fact that something is actually getting done about it, and hopefully it will provoke even more action being taken to fight this 'disease'.

Chris Carrington, G0IYZ

Editorial comment;
Within the last few months there does seem to have been a 'flurry' of prosecutions, the details of which you'll have seen reported in HRT over the past few months, and we'll be pleased to carry on doing so as a 'deterrent'. The RA are doing their bit, maybe we should help them.

Dear HRT,

I have read with interest the 'Letter of the Month' Oct 93 and fully support it, except where it states, thus the tale about buying it from a

£10 for the Letter of the Month

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

rally. I wonder how many bring and buy stalls at rallies up and down the country, give a receipt when purchasing a rig or other piece of equipment.

If one purchases from an amateur radio shop, one automatically receives a receipt as proof of purchase, so why not on a bring and buy stall, perhaps this loophole needs plugging?

I am not against these type of stalls, but there is room for improvement i.e., the name and address of the seller should be supplied to a purchaser not just his/her callsign, proof should be supplied that the name and address given are not false. What do other readers think on these lines?
Name and address supplied but not for publication.

Editorial comment;
One idea could be that stall holders ask for proof of ownership, and proof of identification, before agreeing to sell the equipment in the first place. When the equipment is sold, issue a receipt to the purchaser with, as you say, the name and address of the seller on it. It will of course take the stall holders more time and paperwork, but it will help towards the stamping out of people unknowingly buying stolen equipment. What do other readers think?

Dear HRT,

John Bolton (letters, Sept 93) states he bought a radio in September 1991, and 18 months later in April 93 is surprised at how much it has depreciated.

Consider the analogy of the car. In general, expensive cars depreciate proportionally more than cheap ones. You will lose far more on an 18 month old Jaguar/Mercedes than you will on a mini! The same is true for amateur radio equipment. A radio, for which the new price is circa £1500, is at the top end of the price range and so one must expect that the depreciation will be significant. That Mr. Bolton states it has never been used is irrelevant from the dealer's point of view, the dealer doesn't know whether Mr. Bolton is telling the truth or whether he's been 'inside' the rig tweaking all manner of pots/coils etc. I am not calling Mr. Bolton's veracity into question here, merely indicating the things amateurs typically do to commercial radios.

As regards "everything's cheaper in the US", well that is almost true, but; a) the United States represents a potential market of about 250 million or so, Britain does not, and b) we have 17.5% VAT on top of the retail price margin that a UK dealer must make to ensure his livelihood, in Georgia (USA) the equivalent 'State Tax' is a mere 4%. Statuary guarantees in the UK are (usually) 12 months minimum, in the US they are not. I dare say that business premises rates are cheaper in the US, all these costs add up and must be ultimately paid for by the consumer.

If Mr. Bolton objects so strongly to paying the UK prices for commercial equipment he has in essence two choices, go to the US and buy it there (but don't complain if you end up with no warranty) or stop buying commercial equipment and brew his own. Design skills are not essential as there is a wealth of existing designs, indeed I have been know to design equipment myself rather than pay out for commercial equipment.
B. C. Spencer

Editorial Comment;
We all have a choice of where to buy from, that's if we have the money of course.

Dear HRT,

Firstly I'd like to say thanks for the great mag, now for the grumble. Recently I've seen letters in the mag moaning about the price of radios, I can't agree more but why moan about it? I'm unemployed and can't afford a secondhand black box let alone a new one, but I have converted a Pocketfone 70 and a Dymar 2000 at very little cost, thanks to people like Chris Lorek and publications like HRT, so please how about more ex-PMR conversions in the mag?

You could always stick a dual band handheld on the front cover, or would this increase the cover price too much?
Stuart Cutting, G7PEK.

Editorial comment;
We've an absolute pile of ex-PMR projects here, just waiting to go into HRT. We try to fit at least one in every few months, I think I'll have to twist the Group Ed's arm to give us a few more pages – we might be able to have an ex-PMR conversion in every month then! I did try to get a 'cover gift' of a dual-band handheld for sticking on each mag of next month's issue, the only problem was trying to find a sponsor to supply them all!

Dear HRT,

Congratulations on an excellent magazine, my personal interest being the collection and conversion of ex-PMR equipment, your article being the start of a fascinating new part of my hobby. I would like to express my heart-felt thanks to you and your staff. How about an article on PMR accessories, such as chargers, mobile mounts, and many more which seem to be becoming available at this season's rallies.
P. Minchin, G6NHW

Editorial comment;
We're working on it, we're working on it.....

Yaesu FT-2200 Review

Chris Lorek tests Yaesu's new full-function 2m mobile

You may have read about the FT-2200 in our 'Friedrichshafen Show Report' in the Oct 93 issue, as it was at that show where it was revealed for the first time in Europe. We told you there was a full review coming up, so here we go once again with another 'complete' HRT technical review.....

It Gets to the Parts....

The FT-2200 gives a maximum output of 50W on transmit, and that's *high*. In fact, the manual warns that 50W can cause a RF burn to anyone touching the aerial during transmission! But this amount of power should let you get to those distant stations you may otherwise not have been able to. It certainly did when I tested it, as you'll read later. You don't need to run 50W all the time of course, as 'Mid' and 'Low' power modes of 25W and 5W respectively can be switched in for when you don't need such 'ether burning' power!

The set can either cover 144-146MHz, or an 'extended range' of 140-174MHz, and pressing the 'Call' and 'MHz' buttons when switching on can extend this further on receive down to 110MHz, with automatic AM receive capability switched in below 140MHz for civil airband listening in countries where this is allowed.

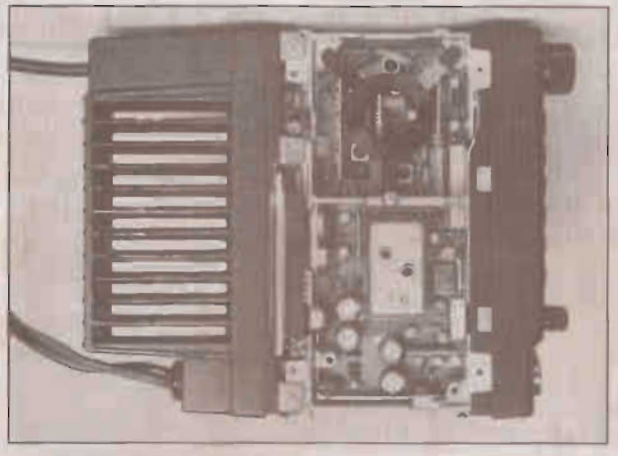
Fully Featured

The FT-2200 has all the 'bells and whistles' of the best, including built-in CTCSS (sub-tone) encode for UK and US repeater access as well as 1750Hz toneburst for pan-European use, a built-in DTMF selective calling and paging, 53 memory channels plus a further 'call' channel, and all the usual scanning modes including two 'frequency scan' ranges with programmable lower and upper frequency limits in four of the memory channels, priority channel monitoring, selectable scan resume modes, the list goes on. In either the 'VFO' or 'programmed frequency scan' modes you can select an automatic repeater shift, which selects a -600kHz transmit shift for you whenever you're in the 145.600-145.850MHz sub-band, thus saving you fumbling with buttons while you're on the move. As an alternative to the set displaying your operating frequency, you can instead select a large 'channel display' on the set's LCD, i.e., CH-15, CH-20 etc. corresponding to the memory channels you've programmed, for possibly easier use on the road where you don't want to be looking at the frequency display and then converting this into S15, S20, or whatever.

Internal options include a CTCSS decoder for 'quiet monitoring', a hands-free boom microphone and PTT switch box, plus mobile headset if required, and even a Digital Voice Storage unit with remote control facilities for the real 'gadget freaks' amongst us. A built-in transmission timer, programmable from 5 minutes to 60 minutes in 5 minute steps, can be switched in to save you accidentally leaving the set in transmit mode for long periods (yes, some of us *have* heard the 'stuck mic PTT' on air!).

DTMF Paging

This uses a common 3-digit DTMF ('touch-tone') system to those on other



transceivers from the major manufacturers for both 'individual' and 'group' paging codes, and the FT-2200 displays the ID of the station calling you when a call is received, a paging bleeper can also be set to sound if you wish. Indeed you can even compose your own 'melody' for this if you like, from the musical tone range given in the manual! Four different paging transmit delays can be programmed to account for repeater access times, 'battery savers' on other rigs, and the like. The set can also be commanded to automatically 'transpond' its ID back to the calling party's page where this is allowed, to let them know you've received their call in case you're away from the set, or just not in a position to reply at that time. A 'trigger pager' mode may also be switched in, where when two Yaesu rigs with this system are in communication after an initial 'page', your set automatically switches to 'code squelch' mode if you reply within three seconds of the code being sent. This saves you having to do an amount of 'button pushing' to manually switch to this mode, which may be difficult if you're on the move.

Alternatively, of you're away from the rig but somewhere nearby and carrying a paging-equipped portable rig, but out of the coverage area of the station calling you due to your portable's limited range, in 'Auto-Page Forwarding' mode you can command the FT-2200 to automatically re-transmit the same paging call to your handportable, again where this is allowed in your licence conditions, to let you know someone's after you. Of course, you could go one further....

Digital Voice Storage

You're away from the car, or indeed away from your shack if you've installed the set at home, but you're expecting a call from your DTMF equipped partner. With the optional DVS unit fitted inside the FT-2200 you can let the set digitally record the voice message for playback when you return! All your partner needs to do is press a few DTMF digits on his rig, then go ahead and leave the message. Where allowed, your rig can even send back a voice acknowledgement over the air, and if you wish (again where allowed) you can even remotely access your rig with a handheld to retrieve your message(s)! You can also manually record, either using your mic or directly from the set's receiver, for transmission by the set. The FT-2200 allows up to 128 seconds of recording, in 1-8 'segments' of multiples of 16 seconds each. I could go on, but take a look at my review of the FT-212 in the May 88 issue of HRT for an idea of the performance and flexibility of this system.

For real remote-control enthusiasts, a CAT (Computer Aided Transceiver) remote control facility is fitted as standard on the set, where you can connect your computer up to the mic plug via an optional interface and control the set's operating frequency, TX/RX switching, high/medium/low power level, and CTCSS facilities. The mic plug also has receive audio output as well as TX audio input and PTT, for connecting a packet TNC or other remote accessories.

On The Air

Well, after reading about all those mind-boggling 'bells and whistles', I thought I'd better try the set out on air to see what its 'radio' performance was like! It comes with a quick-release mobile mounting bracket, making fitment and removal of the transceiver a ten-second affair (mainly plugging and unplugging the DC power and aerial leads) after you've fitted the supplied bracket, useful if you like to remove the set when you're not using it in the car. A hearty length of thick DC power cable is supplied, fused at the 'far' end for connection to your battery. The set itself measures a compact 140mm (W) x 40mm (H) x 160mm (D) which should allow its fitment into cars with even the smallest amount of 'accessory' space. In use, I installed this in my favourite position on top of the dashboard, thus giving minimum eye- travel distance between the rig and the road ahead.

The suppliers of the set also loaned me a very inconspicuous 50cm long 2m/70cm dual band magmount (the magnet itself being only 34mm diameter) to 'try out to see if I liked it', which I used for the mobile tests. This came

The inconspicuous dual band mobile magmount used for on-air mobile tests

with a 90cm length of thin (2mm diameter) coax at the magmount end, allowing it to pass through door seals etc., before it 'expanded' to the usual (5mm diameter) coax for the remainder of its length.

On the road, I found the FT-2200 was very easy to use, and gave ample receive audio from its internal speaker. The 1750Hz toneburst button was sensibly mounted on the supplied fist microphone, and I normally just operated the set in 'memory channel' mode or 'programmed scan range' mode in conjunction with the automatic repeater shift, using the microphone mounted up/down and PTT buttons for channel selection and scan start/stop. I must confess that I used the latter quite often, as with the 'extended coverage', which the review rig had fitted, I quickly filled up a lot of memory channels! Each of these however are fully tuneable, i.e., if I selected a given channel, then pressed the 'MHz' button on the set, I could tune or scan away from these to my heart's content to have a listen above and below the memory channel frequency, retaining any programmed repeater shift etc.

The set's LCD backlight had a useful 'auto-dimmer' facility, where it varied the backlight intensity over four levels, dependant upon the ambient light. As I had the set 'up high', this saved me being dazzled by it at night without the need for more button-pushing, very useful.

One (daytime) journey I made during the review period was to the BARTG Rally one Sunday morning, travelling north on the M3 from its start point up to the M25. Just after passing Winchester in Hampshire, up came the GB2RS news on S21 loud and clear, but the newsreader was in Tring, Hertfordshire! I carried on receiving him at solid copy all the way up the M3, eventually giving him a quick call (he was running 200W) and receiving a 'fully readable' report back from my 50W. We were both surprised at how well we were copying each other. It looks like the FT-2200's 50W combined with the inconspicuous magmount whip (which stayed put throughout my high-speed motorway journeys) was working extremely well!

A test at home using my rooftop aerial system showed very few problems on receive with the many other strong VHF signals present in my location, and the set's high transmit power let me get a good signal to those 'dis-

tant' stations who normally copy my usual 10W noisily (until I switch my Dressler D-200 linear in!). I felt that the set's extended receive coverage would have been quite useful at home, as I live close by an international shipping port (156MHz marine band) and international airport (civil airband). But of course we're not allowed to listen to those things over here, are we? (what a stupid law, are you listening, RA?).

The DTMF facilities worked very well, and I used the CTCSS encoder to good effect on air. One day maybe all VHF rigs may have this fitted, for better UK 2m repeater access for example, rather than it being an 'optional extra'. All in all, I found the set easy to use on air, with a good performance on both transmit and receive.

Laboratory Tests

The accompanying results show the set's receiver to be quite sensitive, matching the transmitter's high power. I found the latter to be slightly low, although within measurement accuracies of the specified 50W. This was well regulated with increase in voltage, as were the mid and low power levels. The receiver gave a good account of itself in terms of strong signal rejection, and the frequency accuracy was very good. The transmitter deviation was accurately set at just below the 5kHz absolute maximum level, and the transmitter harmonics were well suppressed.

Conclusions

I found the FT-2200 to be a very flexible 'all-round' 2m rig, its high transmit power combined with its good receiver performance allowed me to get to places on air that I often found marginal with 'earlier generation' rigs. The facility of the built-in DTMF paging with 'portable page forwarding' could be very useful where this is allowed, and options such as the Digital Voice Storage unit can make the set very versatile indeed!

The FT-2200 currently sells for around £400-£435, and my thanks go to South Midlands Communications Ltd. for the loan of the set and accompanying mobile aerial.

LABORATORY RESULTS:

All measurements taken on 145MHz with 13.2V DC supply, using supplied DC cable, high power TX, otherwise stated.

RECEIVER;

Sensitivity;

Input level required to give 12dB SINAD;

144MHz;	0.137µV pd
145MHz;	0.135µV pd
146MHz;	0.136µV pd

Squelch Sensitivity;

Threshold; <0.06µV pd (<2dB SINAD)
Maximum; 0.21µV pd (21dB SINAD)

S-Meter

Reading	Level	Rel. Level
1	0.46µV pd	-15.3dB
3	0.68µV pd	-12.0dB
5	1.19µV pd	-7.2dB
7	1.96µV pd	-2.8dB
9	2.72µV pd	0db ref.
+	3.51µV pd	+2.2dB
++	4.52µV pd	+4.4dB
+++	5.89µV pd	+6.7dB

Maximum Audio Output;

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

2.77W RMS

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;	36.9dB
-12.5kHz;	36.5dB
+25kHz;	70.2dB
-25kHz;	70.0dB

Image Rejection;

Increase in level of signal at first IF image frequency (- 35.4MHz), over level of on-channel signal, to give identical 12dB SINAD signal;

98.2dB

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;	91.1dB
+1MHz;	96.7dB
+10MHz;	96.1dB

Intermodulation Rejection;

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

25/50kHz spacing;	78.8dB
50/100kHz spacing;	75.0dB

TRANSMITTER

TX Power and Current Consumption;

Freq.	*Power*	*10.8V Supply*	*13.2V Supply*	*15.6V Supply*
144MHz	High	37.0W/7.50A	45.4W/8.25A	45.7W/8.40A
	Mid	21.9W/5.70A	22.0W/5.80A	21.9W/5.95A
	Low	4.67W/3.00A	4.67W/3.00A	4.64W/3.05A
145MHz	High	37.0W/7.35A	45.7W/8.05A	45.9W/8.30A
	Mid	21.9W/5.55A	21.9W/5.75A	22.1W/5.80A
	Low	4.67W/2.90A	4.67W/3.00A	4.67W/3.00A
146MHz	High	36.8W/7.45A	45.4W/8.2A	46.2W/8.25A
	Mid	22.1W/5.55A	22.1W/5.75A	22.1W/5.75A
	Low	4.67W/2.95A	4.67W/3.00A	4.64W/3.00A

Harmonics;

2nd Harmonic;	-76dBc
3rd Harmonic;	-78dBc
4th Harmonic;	<-90dBc
5th Harmonic;	-82dBc
6th Harmonic;	<-90dBc
7th Harmonic;	<-90dBc

Toneburst Deviation;

2.31kHz

Frequency Accuracy;

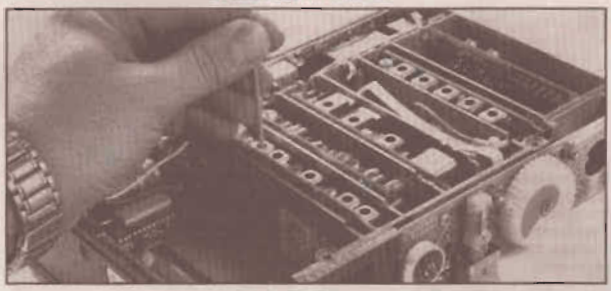
-59Hz

Peak Deviation;

4.94kHz

Problem Page

Our new 'problem page' kicks off this month, with a sample of the many general queries we receive on ex-PMR conversions



Welcome to HRT's new 'problem page', where, each month, we hope to provide answers to readers general queries on amateur radio matters. These can be either technical or non-technical, simple or high-level. In each case we'll ensure that an answer is provided through these pages, either through our own in-house staff (remember, we publish several other radio, electronics, and computer magazines 'in-house' at Argus Specialist Publications with of course plenty of expert knowledge to call upon) or when needed by calling upon other recognised experts in the field.

As this is the 'first month', we're going to start off with our Consultant Technical Editor (the letters after his name are longer than his name itself!) who I've arm-twisted into putting together some of the many general queries we receive on ex-PMR conversions.

Please *do* write in with your questions, on *any* amateur radio related subject. Even if you feel they're too 'simple', we'll try to give you an answer, because if you're having problems with something we're sure others might also be in the same position!

Question;
I'm always being told that I should use a non-metallic adjusting tool to adjust the ferrite cores in my rig with, rather than a jeweller's screwdriver. But many of the cores are too tight and just break my adjuster, what should I do?
Answer;
This is a common problem, as, over a period of time, the lubrication oils that are often applied to the threads of these cores when the sets are made gets 'waxy', and sometimes it even sets hard. One trick here is to heat the core up as much as you can, to hopefully loosen the waxy oil. Try using a fine-tipped soldering iron bit, applying this to the slot in the core, taking care not to damage the coil former. Alternatively, another solution which I read but haven't tried myself, is to use some form of solvent to free the cores, a small drop of turpentine substitute down the core may be one method as long as you take the necessary precautions such as ventilation and ensuring as little as possible gets onto the PCB, then thorough cleaning after use.

Question;
What happens if I find my rig already has a number of broken ferrite cores in the adjusting coils?
Answer;
These often break by someone forcing them with a hard tool, as ferrite is *very* brittle. If you're lucky, it'll just be the slot in the top of the core that's broken, and you may be able to adjust the core from the bottom if you can get to the underside of the PCB, which will often have a hole in line with the core. Otherwise, unsolder the coil former and unscrew the core from the bottom, turn the core over, and resolder the coil former making sure you put it back the same way round – it'll often have a 'notch' on one side of the former base. If, however, the core is cracked throughout most of, or all of, its length, you'll have to try to (carefully) get it out by 'crumbling' it with a suitable metal instrument, then replacing it with a similar core, adding a thin strip or string or whatever along its length if you find the threads are different.

Question;
Can I easily fit a synthesizer as a 'crystal replacement' to my rig to save the cost of buying more crystals for extra channels?
Answer;
You can, but often not very easily, and it may not be very cost effective either! Unless you're skilled in 'rig rebuilding' techniques (i.e., removing the crystal multipliers and injecting at 'final frequency'), you'll normally need two synthesizers because of the different multiplication factors of the crystals originally used. If you'd like to have a go though, then a good starting point would be the Cirkit MC145156 synthesizer development board, which is a 'complete' breadboard with built-in HF VCO. However, a possibly more cost-effective solution would be to use your present rig on the channel it's on at the moment, and spend the money instead on a convertible ex-PMR rig that's already synthesized.

Question;
Where can you buy all this cheap ex-PMR gear? I rarely see any advertised.
Answer;
There are plenty of firms who carry ex-PMR gear, although you'll often find that it's difficult to advertise who's got what in stock because it changes very rapidly! The best thing really is to ring around the ex-PMR dealers who you've seen advertising themselves as a source of such gear in HRT over the last year or so (remember to look in the 'retail network' and 'classified' sections as well), and simply ask what they have in stock!

Question;
I bought a set very cheaply but didn't look at the label before I got it, and I've found it's an AM set. Can I convert it to FM?
Answer;
Yes you can, but it often isn't economic to do so. Spectrum Communications have 'mod kits' to add FM to AM-only HF transceivers, which may be suitable for some models of ex-PMR gear. This may be the easiest way if you don't fancy building your own FM discriminators and FM modulators!

Question;
Where can I get conversion information on this set I've just picked up?
Answer;
Ham Radio Today publishes plenty of PMR conversions onto amateur bands, and we've a lot more 'in the pipeline' waiting to go in. We publish conversions on most of the popular sets, but of course we can't cover *every* single set (like those you only see one or two of for sale). In this case, try sending an SAE to Bob Gant, who runs an 'ex-PMR club' (see HRT 'Helplines' for details), and he may be able to put you in touch with someone who has the information you need.

Long, Medium, and Short Wave Superhet Receiver

Raymond Haigh describes a wide coverage AM/SSB/CW receiver project

Many amateurs are reluctant to attempt the construction of a superhet, despite the fact that even a basic circuit of this kind can outperform simple direct conversion and straight receivers. Alignment, especially when a calibrated signal generator is not available, is usually perceived to be the main problem.

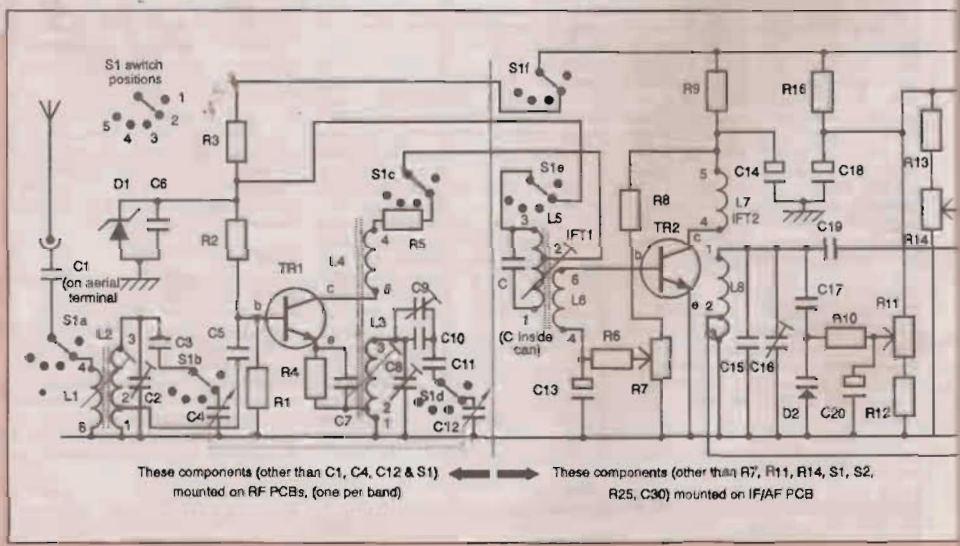
The receiver described here can be aligned without special equipment. Almost any transistor portable will serve as a means of setting up the IF stages, and aligning the short wave front end circuits is no more difficult than adjusting a TRF receiver. Aligning the long and medium wave front-ends is less straightforward, but, with care and patience, even this can be achieved without recourse to a signal generator.

Coverage of the short wave bands is comprehensive, and provision is made for resolving and fine tuning amateur SSB transmissions. These features have been incorporated without making construction difficult or complicated. Indeed, the basic circuit is simpler than the set manufacturing industry's standard design for domestic receivers.

The Circuit

Mixer/Oscillator Stage. The complete circuit of the receiver is given in Fig. 1, where TR1 is arranged as a conventional, self oscillating mixer. Tuned radio frequency transformer, L1/L2, couples the aerial to the base via DC blocking capacitor, C5. TR1 emitter and collector are connected to oscillator coil windings, L3/L4, which are phased to ensure positive feedback. A number of frequencies, including the received signal and an oscillation 470kHz or so higher, combine at the collector and are fed to IFT1 via R5.

Changes in supply voltage cause noticeable drift in simple transistor mixers (the effect of aging batteries will show up clearly on a calibrated dial), and R3 and zener diode, D1, are incorporated to minimise this. The arrangement is inevitably a compromise between long-term stability and current drain through the zener, but its inclusion is worth while if the receiver is to be calibrated. Different values of dropper resistor, R3, and zener voltage, are required to optimise the circuit for medium and short wave coverage. A zener diode is not included in the front end circuit for long waves. Long term drift is less noticeable at these freqencies, and most amateurs are not too concerned about the extreme accuracy of long wave dial markings.



Base bias resistors, R1 and R2, have the same values for all coil ranges, but emitter bias resistor, R4, and its RF bypass capacitor, C7, are reduced in value to optimise the circuit for short wave reception. The inclusion of R5 helps to ensure consistent oscillation over the tuning capacitor swing, its value is the same for all ranges.

Main Tuning System.

The RF and oscillator coils are tuned by ganged, air-spaced variable capacitors, C4 and C12. A swing of 10-300pF provides the necessary coverage on long and medium waves, but results in an excessive overlap on the higher frequency short wave ranges. With the SW1 coil, oscillation ceased when the value of C12 approached 300pF, and oscillation was not sustained at lower values of C12 with the SW2 coil.

The value of the variable capacitors clearly needs to be tailored to ensure reliable oscillation with all five coils, and to avoid excessive overlap on short waves. This is achieved by placing fixed capacitors, C3 and C11, in series with the tuning capacitor gangs to reduce their swing, trimmer capacitors C2 and C8 are included for each range. On long and medium waves, trimmer C9 is wired across the oscillator frequencies to help optimise tracking.

The IF Amplifier Stage

IFT1 tuned winding, L5, is coupled to the base of the IF amplifier, TR7, by L6. This simplified superhet circuit does not incorporate automatic gain control. Instead, IF gain is adjusted manually by R7, a panel control which varies the bias on TR2.

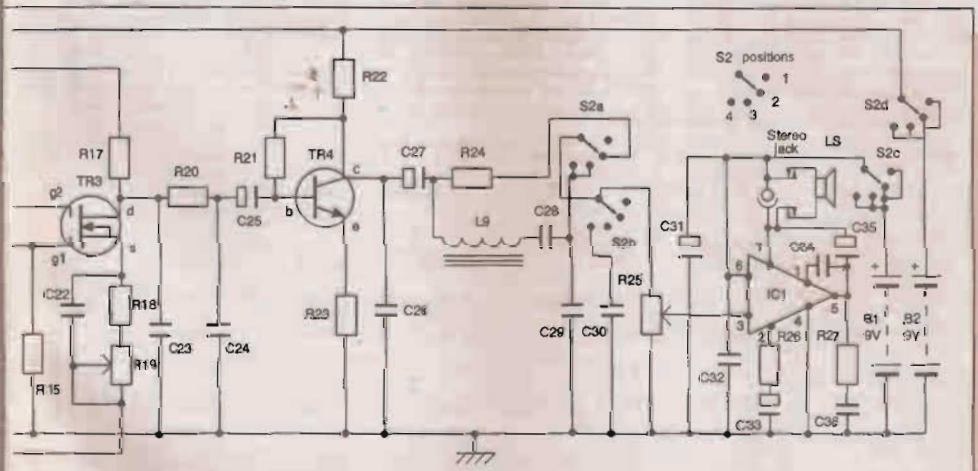
Manual control of RF or IF gain is very desirable when provision is made for connecting long-wire aerials to simple front end circuits, and there has to be some means of adjusting the strength of signals reaching the detector.

The Regenerative Detector

The collector of TR2 is coupled to a regenerative detector by IF transformer, L7/L8. This inductor must have a fairly high 'Q', and the coupling between the windings, and the tapping position, are critical if the detector stage is to work well. The construction of this coil is fully described later.

The application of positive feedback to L8 increases its 'Q' from something less than 200 to a figure approaching 8000 at the onset of oscillation. Sensitivity and selectivity are thereby greatly enhanced, and this makes it possible to reduce the number of IF stages. If feedback is increased to the point where the circuit oscillates, the detector will restore the carrier missing from SSB and CW transmissions and they can be clarified without the need for an additional BFO (beat frequency oscillator) stage.

Regenerative detectors are overloaded by strong signals, and audio quality deteriorates when they are operated close to the onset of oscillation. With this design, the inclusion of IF gain control, R7, resolves the overloading problem, and some reduction in audio quality is not too high a price to pay for obtaining high selectivity and sensitivity when searching for weak signals. R14 controls the positive feedback, applied via a tapping on L8, by varying the gain of MOSFET, TR3. Preset R19, adjusts the source bias to compensate for any spread in the characteristics of TR3 and optimises the performance of the detector.



Overall Circuit Diagram

The IF signal is applied to gate 1 of the MOSFET, via C19, and the audio output is developed across drain load resistor, R17. Residual RF is filtered out by R20, C23 and C24.

The Fine Tuning System

Capacitors C15 and C16 tune L8 to the intermediate frequency, and varicap diode D2 with potentiometer R11 enable the IF frequency to be shifted slightly, thereby affording a means of fine tuning the input signal. Unlike the conventional arrangement of low-value bandspread capacitors across front end tuned circuits, the tuning rate of this system is constant over all bands.

Audio Amplifying and Filtering Stages

Audio from the detector is applied to the base of TR4 via DC blocking capacitor, C25, and the amplified signal is developed across collector load, R22. The slider of the volume, or AF gain, control, R25, is connected to the input pin of IC1, a TBA820M integrated circuit audio power amplifier. This device is capable of supplying about 1.5W into the 3 ohm speaker when connected to a 9V supply. In this application, the ripple rejection capacitor normally connected to pin 8 is unnecessary and component count has been further reduced by connecting one of the speaker leads to the positive side of the 9V supply.

Under no-signal conditions, current demand is very modest, typically 6mA. This rises to peaks of about 100mA when the receiver is operated at loud volume levels. Swings of this kind cause significant voltage fluctuations, especially when the batteries are aging, and the tuner and power amplifier sections of the receiver are accordingly fed from separate battery supplies.

Audio filtering

Clarity of speech under noisy conditions is enhanced if audio reproduction is confined to the band of frequencies between 300 and 3000 Hz, and more complex communications receivers usually incorporate filters to restrict the response in this way.

Even simple forms of processing can help clarify weak signals and render them audible against a noisy background. The audio response of this receiver has been tailored by an appropriate choice of values for coupling, feedback and bypass capacitors, and extra filtering can be switched in.

Coupling capacitors C25, C27 and C35 have been reduced in value in order to limit response to low audio fre-

Components List

Resistors;
1/4 W, 5% carbon film.

R1 (all ranges), R3 (LW).	2k7 (6 off)
R2 (all ranges).	6k8 (5 off)
R3 (MW)	1k2
R3 (SW1-3)	100R (3 off)
R4 (LW and MW), R18.	2k2 (3 off)
R4 (SW1-3)	820 (3 off)
R5 (all ranges), R9, R20.	1k (7 off)
R6, R12.	22k (2 off)
R7	22k lin. pot.
R8	100k
R10, R15	470k (2 off)
R11	100k lin. pot.
R13	47k
R14	10k lin. pot.
R16	220R
R17	12k
R19	10k preset
R21	2M2
R22	10k
R23	680R
R24	27k
R25	4k7 log. pot.
R26	47R
R27	1R

Capacitors;
The values of C3 and C11 quoted in this list assume the use of a 365 + 365pF variable capacitor as tuning gangs of this kind are readily available. See Table 1 for C3 and C11 values to suit alternative tuning capacitors. All capacitors 16V working or greater. All electrolytics axial lead unless otherwise stated.

C1	82pF ceramic.
C2 (MW and LW), C8 and C9 (MW)	2-22pF film dielectric trimmers (4 off)

Table 1. RF/Oscillator stage component values

Band	Long wave	Medium Wave	SW1	SW2	SW3
TR1	BF241	BF241	BC108C	BC108C	BF241
RF Transformer L1/L2	CANIA 350EK (red core) or ferrite loop	RWR 331208 (red core) or ferrite loop	KANK 3333R (violet)	KANK 3334R (yellow)	KANK 3335R (pink)
RF Trimmer C2	2-22pF	2-22pF	2-10pF	2-10pF	2-10pF
Osc. Coil L3/L4	RWR 331208 (red core)	YMR 580046N (blue core)	KANK 3426R (white)	KANK 3337R (green)	KANK 3428R (blue)
Osc. Trimmer C8	5-60pF	2-22pF	2-10pF	2-10pF	2-10pF
Osc. Freq. preset C9	5-60pF	2-22pF	–	–	–
Osc. Frequencies C10	82pF	363pF (330+33pF)	680pF	1000pF	2200pF
TR1 Emitter Bias R4/C7	2k2 10nF	2k2 10nF	820 ohm 4n7	820 ohm 4n7	820 ohm 4n7
Supply Dropper R3	2k7	1k2	100 ohm	100 ohm	100 ohm
Zener Diode D1	–	6V2	8V2	8V2	8V2
Tuning cap. swing reducers C3 and C11 for various tuning capacitor values 300pF	–	–	–	430pF (330+100pF)	330pF
365pF	1800pF	1800pF	1800pF	330pF	270pF
500pF	750pF	750pF	750pF	270pF	220pF

C2, C8 (SW1-3)	2-10pF film dielectric trimmers (6 off)
C8 (LW) and C9 (LW)	5-60pF film dielectric trimmers (2 off)
C3, C11 (LW, MW and SW1)	1800pF 1% polystyrene (6 off)
C3, C11 (SW2)	330pF 1% polystyrene (2 off)
C3, C11 (SW3)	270pF 1% polystyrene (2 off)
C4, C12	365pF + 365pF Type 02 Gang air-spaced variable
C10 (LW)	82pF close tolerance ceramic
C10 (MW)	363pF (330pF 1% polystyrene + 33p close tolerance ceramic)
C10 (SW1)	680pF 1% polystyrene
C10 (SW2)	1000pF 5% polystyrene
C10 (SW3)	2200pF 5% polystyrene
C5 (all bands), C7 (SW1-3), C26	4n7 ceramic (9 off)
C6 (all bands), C22, C32	100nF ceramic (7 off)
C7 (MW and LW)	10nF ceramic (2 off)
C13, C25, C27	1µF electrolytic (3 off)
C14	4µ7 electrolytic
C15	22pF 5% polystyrene
C16	3-90pF film dielectric trimmer
C17, C19	100pF polystyrene (2 off)
C18, C31, C33	100µF electrolytic, radial lead (3 off)
C20	2µ2 electrolytic
C21	10µF electrolytic
C23, C24	1nF ceramic (2 off)
C28	10nF mylar or polyester
C29	22nF mylar or polyester
C30	47nF mylar or polyester
C34	2n2 ceramic
C35	150µF electrolytic
C36	220nF ceramic
Inductors;	
Toko coils:	
L1/L2 (LW)	CAN1A 350EK, or LW ferrite loop
L1/L2 (MW)	RWR 331208, or MW ferrite loop
L1/L2 (SW1)	KANK3333R
L1/L2 (SW2)	KANK3334R
L1/L2 (SW3)	KANK3335R
L3/L4 (LW)	RWR 331208
L3/L4 (MW)	YMRS80046N
L3/L4 (SW1)	KANK3426R
L3/L4 (SW2)	KANK3337R
L3/L4 (SW3)	KANK3428R
L5/L6 (IFT1)	YRCS11098AC
L7/L8 (IFT2)	See text and Fig. 5.
L9	Transistor AF push-pull driver transformer (see text)
Semiconductors;	
TR1 (LW, MW and SW3)	BF241 or BF494 (3 off)
TR1 (SW1 and SW2)	BC108C (2 off)
TR2	BF241 or BF494
TR3	3SK88
TR4	BC169C
IC1	TBA820M
D1 (MW)	6V2 zener
D1 (SW1, 2 and 3)	8V2 zener
D2	BB405B varicap.
Sundries;	
S1 a-f	6 pole, 6 way Maka-switch assembly (one way not used)
S2 a-d	4 pole, 4 way switch

38 SWG enamelled copper wire, length of plastic overflow pipe, stiff card and balsa cement, all for making IFT2 Printed circuit boards, Vero pins and IC holder. Slow motion tuning drive. Hook-up wire. Chassis, dial and case-making materials. Battery holders. Control knobs. Phone socket. Aerial and earth terminals. 3 ohm loudspeaker.

quencies, and C23, C24 and C26 shunt the higher frequencies. The feedback capacitor, C34, on IC1, has been increased in value from 220pF (which gives a flat response to 20kHz) to 2n2 in order to further curtail upper audio response.

Switching in the filter formed by L9 and C28 peaks the audio response at around 1300Hz and improves the clarity of speech, especially when reception conditions are poor. The switched filter capacitor, C30, provides additional top cut. Resistor R24 matches the filter insertion loss, and prevents large output changes when the unit is switched in and out of circuit.

Components

Toko coils and IF transformers are available from Cirkit. The former for IFT2 is a short length of the plastic overflow pipe sold by plumbers' merchants and most DIY stores. The other components are retailed by a number of suppliers. Metal cased BC108 transistors must be used for the SW1 and SW2 front ends, and they must be specimens falling within gain group C. Do not attempt to substitute the plastic cased variant, BC548. Samples tested were not as active as the metal cased originals.

The specified VHF tuning diode is available from Cirkit, but almost any device of this kind should be satisfactory. Small silicon rectifier diodes, such as the IN4001, will also act as variable capacitors when the junction is reverse biased. Several were tried and found to be effective in this circuit.

Filter inductor L9 is the primary of a transistor push-pull audio driver transformer. Items of this kind can be salvaged from old portables, but if difficulty is experienced, the LT44 transformer listed by Maplin and others would be suitable.

Decent air-spaced tuning capacitors can likewise often be salvaged from older valve and transistor radios (the author used a 300pF unit from a valve portable), and a good quality 10-365pF variable is retailed by at least two major component suppliers. If a salvaged component is to be used, remove any built-in trimmers and make sure that the unit is clean and dry, and that the vanes do not short together.

A six pole, six way Maka-switch assembly was used for wave changing. The small size of this component enables RF wiring to be kept short and stray capacitance is minimised. Some form of slow motion drive must be fitted to the variable capacitors or tuning the receiver will be extremely difficult. A 36:1 epicyclic drive was used for the prototype. These are not readily available, but Maplin list miniature 10:1 reduction drives. Two of these in tandem would give a ratio of 100:1 and this would be ideal.

We continue next month with the construction stages.

SCANNERS

From the Editor's Desk

In the last week I've read about a couple of prosecutions regarding the use of scanners for listening into police frequencies. One was at the Kilmarnock Sheriff Court, where the youth involved was fined several hundred pounds and his scanner ordered to be destroyed, the other was in Manchester and involved an unemployed man who was fined £200 plus £30 costs.

I also recently read the following, you can probably guess the occupation of the writer; "We prosecuted a scanner waller on my patch last year when the wally turned up at a shout. Unfortunately for him, he's known to us anyway, so when he failed to give a reasonable excuse for coincidentally turning up his car was searched and two handheld scanners found. *Most* unfortunately for Mr. Scanman, when the officer turned it on he could hear his mates just down the road dealing with the incident. And when, out of curiosity, he twiddled another knob the radio room at Scotland Yard burst forth."

The UK police are well aware of the dangers that scanners pose, but most *Scanners* readers (from our last survey) use theirs for Airband and Marine listening, a hobby in itself. So if you want to carry on with your hobby, be careful that you don't act stupidly by programming police frequencies into your scanner's memories and then acting even more stupidly having done so. Even though you may get away with airband listening (although the law in the UK currently prevents us doing even this), you won't with her Majesty's constabulary! Act sensibly, and hopefully it'll only be the villains who get (rightfully) 'banged up'.

New Products

We've just received a bundle of information about new products from Garex Electronics, here's what we believe Scanners readers would be interested in;

Tuneable Aerial Filter

Most scanners on the market now feature enormous frequency coverage in a very small package, but unfortunately selectivity and strong signal handling characteristics have been sacrificed to save space and cost, which means that unwanted signal breakthrough can be a major problem.

Attaching a microscopic handheld to a home-base aerial is often a good recipe for a disappointed listener. A good remedy is to use a notch filter, which is a high-Q tuned circuit which is plugged in line with the aerial and can be adjusted to attenuate an unwanted signal.

The new Garex product is packaged in a plastic die-cast box (79 x 61 x 41mm) with internal RF shielding and uses a high quality Jackson tuning capacitor for durability and RF efficiency. Input and output connectors are BNC. This filter simply fits in line with the aerial feeder and unwanted signals can be tuned out. Provided the interference is spaced more than 10MHz away, then there is negligible attenuation of the wanted signal. Around 30dB of rejection is achieved. The tuning range is 85-175MHz, which covers the major problem area of band II and also PMR signals such as paging and police, the price is £26.80 inc. post and VAT

Portable Scanner Aerial

A lightweight design using ribbon cable elements so that it rolls up into a small bundle for ease of transport. It gives good VHF/UHF coverage and particularly offers a considerable improvement over the short flexible aerial supplied with handheld scanners. Installation couldn't be easier, just hang it from the nearest tree, curtain rail, or washing line.

This low-cost, unobtrusive product could solve installation problems for flat-dwellers, travellers, holiday-makers, and those with restrictions on permanent aerial installations. It comes ready-for-use fitted with 4m of RG58/U feeder and a BNC plug. Priced at £15.95 inc. post and VAT, we tried a sample here in the Scanners office, just strung up next to the window, and it certainly did work very well (the Tech Ed doesn't want to give it back!).

VHF Airband Preamplifier

There are several wideband receiver preamplifiers already on the market, but problems can arise because strong signals outside the Airband can be amplified to such an extent that the receiver is completely swamped by unwanted signals.

The Garex VHF Airband Preamplifier is designed to cover only the 118-137MHz band, giving at least 16dB gain. Strong out-of-band signals are likely to be attenuated, giving further performance benefits. The product is packaged in a stove-enamelled die-cast box 52x38x31mm with BNC connectors. A DC supply of 9-15V at a few mA is required, making it suitable for operation from a battery or many common mains adaptors. Priced at £28.95 inc post and VAT, we hope to feature a test of this in next month's *Scanners*.

ScanMail

It is true that a communications receiver is better on HF than a handheld with SSB and a wide open front end, and if you connect a decent bit of wire to the latter you may get the stronger SW broadcast stations and bags of noise elsewhere. However, a spot of aerial tuning or preselection can work wonders. At this station, an MVT-7100 was connected directly to the main station aerial. On 80m, nothing but uproar, with or without attenuator. Then through the tuner or matchbox, loud and clear SSB signals. Similar results were obtained on 40m, and 20m where the magnetic loop was also effective, all rather better than hoped for. The MVT-7100 could do with a narrower filter and the frequency indications on this one were off (600Hz high on USB, 2.4kHz low on LSB, should it have been 1500Hz each way?) but it is hardly fair to compare it with an IC-765 and look at everything else it does. It is suggested that anyone disappointed with a set of this kind on HF and who has not tried preselection should do so before spending too much more money. After all, having regard to the PR150/HF150, it seems Lowe is thinking thus, albeit somewhat expensively! Try a tuner kit, or a tuned loop type of aerial. Or perhaps even the front end of an old type radio, with advice, and probably attenuation.

What puzzles an old-timer is, what with the batteries and the display and the speaker and all the logic in that tiny case, where does the radio go? And how to stop it being nicked? Don't have that problem with the HRO.

Alex Dick, 'Sandy' GM0IRZ.

Editorial Comment;

It's certainly true that 'do-everything' receivers are often a compromise, but even the 'better', dedicated HF receivers (like the HF-150 you mention) can sometimes usefully use a preselector to add to the overall rejection of strong signals in other bands. For home constructors, we've the very thing here just waiting to be published in 'Ham Radio Today', a stand-alone tunable HF preselector by Raymond Haigh to accompany the HF multimode receiver project in the current mag.

Why not send us a letter for publication? Send yours to Sheila Lovell, Editor Scanners HRT, Argus Specialist Publications, Argus House, Boundary Way, Hemel Hempstead, Herts, HP2 7ST, or you can fax your letter direct to the Editor's desk on 0703 263429.

Yupiteru MVT-3100 Review

Chris Lorek tests a newcomer from Yupiteru

Over the last few years, Yupiteru have become quite a well-known name in the scanner receiver field, and there's many a scanner hobbyist who'd love to own their 'top of the range' model, the MVT-7100 (reviewed in the April 1993 issue). Others in their range include the airband orientated VT-125 (civil) and VT-225 (civil and military) models, their latest 'niche market' set being the MVT-3100. This is designed primarily for marine, PMR and 900MHz coverage, the frequency coverage being 143.000- 162.025MHz, 347.7125-452.000MHz, and 830.000-960.000MHz. The set uses FM throughout, with pre-programmed 10kHz and 12.5kHz tuning steps.

Features

The MVT-3100 has 100 memory channels arranged into 10 banks of 10 channels each, a further 'priority channel' memory, plus 10 independently programmed search bands. These bands and banks are labelled HAM V, FIRE, MARINE, POLICE U, TAXI, MCA, PERSONAL, BAND 1, BAND 2, and BAND 3 on the set's keypad, undoubtedly conforming to Japanese-used bands (which of course you can program to whatever you wish within the frequency coverage range). The set scans at around 30 memory channels per sec, and around 40 steps per second in 'search' mode.

A very useful facility is that of up to 100 'search pass' channels. Most scanners 'lock up' on a number of channels in 'search' mode, where you're searching across all channels between two programmed frequencies, either due to internally generated signals or external carriers. With the MVT-3100, all you need do if you come across a frequency which you'd like to automatically skip each time, is to press a couple of buttons and that frequency is stored in the set's memory. Each time it subsequently comes to that frequency, it simply passes it, no more button-pushing every few seconds as with many other scanners!

The MVT-3100 is powered either from four AA nicads or an external 12V DC source via an optional power lead (this also charging the nicads), and comes supplied with nicads ready-fitted and a plug-in wall charger, plus carrying aids of a metal belt clip and wrist strap. The set measures 59mm (W) x 147mm (H) x 38mm (D) and weighs 280g.

In Use

I started off by having a listen around the 2m and 70cm amateur bands, as the reception of my semi-local repeaters on these bands normally gives me a 'starting reference' as to how a scanner performs. Surprisingly, this is where I found I needed to look at the instruction book! This was well written (with only a few 'literal Japanese translations') with good instructions on how to use the scanner, although from this I found why I couldn't change the tuning step size from 10kHz (as pre-programmed for both the 2m and 70cm amateur bands) to 12.5kHz. Quite simply, I couldn't, 10kHz steps were 'hard programmed' over the 143-155MHz and 430-440MHz ranges. Ah well!

However, the review period nicely coincided with the start of the Whitbread round-the-world yacht race from my local city of Southampton, and the VHF marine band was literally a hive of busy activity, if you saw the start on TV, you'll have seen the Solent waters described as "worse than the M25 during rush hour"! But this was superb for trying out a scanner with a pre-programmed marine band! The set worked quite well, and I appreciated the 'search pass' facility which allowed me to 'lock out' various channels (such as Niton Radio carrying telephone traffic and other channels carrying routine commercial shipping traffic). The boat's VHF radio was on dual-watch channel 16 and 72 (channel 72 was used for overall yacht coordination that day, and yes, I *do* have a VHF Marine Certificate of Competence to use it!), however the scanner let me have a good 'nosey around' all the other channels from my top pocket, without missing possibly vital traffic on the main radio. The scanner's internal speaker gave very good audio, and the S-meter allowed me to check the relative strengths of received signals, it's a pity all scanners don't have this facility.

Back at home, I found the 'pass' facility again very useful in 'locking out' various other unwanted signals. After some tests, I found the 900MHz range was around 10kHz off frequency on receive, a quick 'tweak'

inside the scanner fixed this though. With the set on a tabletop, I found the LCD was very difficult to read from above, I had to tilt the scanner back to see what was going on. Another minor 'niggle' was that, with the metal belt clip attached making it 'top heavy', the set very easily toppled over with the slightest touch.

Technicalities

The MVT-3100 uses a triple conversion superhet receiver, with intermediate frequencies of 285MHz, 45MHz, and 455kHz. This gives it an excellent 'image rejection' performance, as you'll see from the lab results, unlike some other scanners where you often just have to put up with the unwanted interference or fit an external filter! The results also show the set is reasonably sensitive, and has 'tight' filtering giving very good rejection of adjacent 12.5kHz channel signals.

Conclusions

The MVT-3100 could prove quite useful for listeners interested in the VHF marine band, although the reminder of the set's coverage seems to be, in my opinion at least, rather unusual for UK monitoring use. The 'search pass' facility can be quite useful, for example in the 900MHz range, to 'get rid' of those constant signals you'd rather skip whilst being able to scan across a range of frequencies.

I found the set easy to use, light when carrying around, and certainly up to the quality and performance I've come to expect from Yupiteru sets. The MVT-3100 is currently priced at £199, including nicads and charger, and my thanks go to Nevada Ltd. in Portsmouth for loaning the set for review.

LABORATORY RESULTS:

All tests performed at 145MHz FM, using fully charged internal nicads, unless otherwise stated.

Sensitivity:

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

Freq.	Sensitivity
145MHz	0.21
150MHz	0.22
155MHz	0.23
160MHz	0.20
350MHz	0.16
375MHz	0.18
400MHz	0.16
425MHz	0.18
450MHz	0.22
850MHz	0.18
875MHz	0.24
900MHz	0.36
925MHz	0.35
950MHz	0.39

Squelch Sensitivity:

Level of signal required to raise receiver squelch

Threshold;	0.13µV pd (4dB SINAD)
Maximum;	0.63µV pd (25dB SINAD)

Adjacent Channel Selectivity;

Measured on 145MHz FM 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; 37.5dB
-12.5kHz; 37.7dB
+25kHz: 44.4dB
-25kHz; 47.0dB

Blocking;

Measured on 145MHz FM 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; 62.8dB
+1MHz; 77.4dB
+10MHz; 69.3dB

Intermodulation Rejection;

Measured on 145MHz FM as increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product;

25/50kHz spacing;	61.7dB
50/100kHz spacing;	59.5dB

Image Rejection

Difference in level between unwanted (+/-90MHz) and wanted signal levels, each giving 12dB SINAD on-channel 145MHz FM signals;

145MHz;	>100dB
435MHz;	58.9dB
935MHz;	>100dB

Maximum Audio Output

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

156mW RMS

S-Meter Reading

Indication	*Level*	*Rel. Level*
1	0.27µV pd	0dB ref.
2	0.47µV pd	+4.7dB
3	0.80µV pd	+9.3dB
4	1.77µV pd	+16.2dB
5	4.58µV pd	+24.4dB

Current Consumption

Scanning, no signal;	58mA
Receive, mid volume;	95mA
Receive, max. volume;	119mA

QRP Corner

Dick Pascoe G0BPS discusses the building and use of a dummy load

A nice letter came this month from Gordon Kent, who's built a kit dummy load. He not only wanted to use it at QRP levels but also at QRO, and some of his ideas may be of interest to readers.

Gordon wanted to put the dummy load into a larger container to ensure it would run at much higher than its rated 100W. It is normal in these cases to enclose the dummy load in a can containing dry sand or transmission oil. The heat dissipation of this dummy load would normally be in excess of the required 100W but by immersing it, as Gordon has done, will ensure that it will handle in this case power levels in excess of 1000W, more than double the full legal limit and well above any level required by the QRP man. Very useful for all aspects in the shack.

In Gordon's case, instead of relying on the strength of the wire on the resistors to hold the two PCBs apart, he used plastic rods to hold the whole. The photo show how he has turned down four plastic knitting needles and provided a thread for a small plastic nut on one end, drilled and tapped the other to carry the plastic screws to connect the whole to the lid of the can. In this instance a one gallon metal paint tin has been used with a metal lid. In some cases today paint is now supplied in plastic containers which are not really suitable for our purpose, so a search mission may be required.

The circuit shows a simple Dummy Load which can be used purely as a load (R1-R20 resistors only) to enable the operator to check the output power of the transmitter where a power meter is available. Adding the additional components gives facilities for the measurement of power as well. We have all heard the 'whistler' and the 'tuner-upper' on the bands, and the use of a dummy load can stop these unsocial on-air transmissions. When peaking the output of a transmitter or (shock horror) an amplifier, the dummy load provides the correct impedance that the transmitter requires to operate at maximum efficiency. This applies to all transmitters, whether QRO or QRP! I've been asked on various occasions where the dummy load should be fitted in the station line-up. Figs 1a & 1b shows the best situation where the station equipment may be used to best advantage. In use, the dummy load can be of great use to the amateur, not just for checking the output of a transmitter.

Winter and Christmas

Winter is starting to bite and Christmas is fast approaching. The amateur in the house may already have an idea of the present he/she may require *(a nice FT-1000 please – Tech. Ed)*, and magazines such as HRT can provide the opportunity to get that present. Just leave a copy of the magazine open on the coffee table with the required gift marked! Other gifts in the QRP field may include membership to one of the many clubs devoted to this part of the hobby. These include several mentioned over the past few issues, such as our American cousins the Amateur Radio Club International (ARCI), the Michigan QRP club, the German club DRCI, the Australian VK QRP Club, the Czechoslovakian OK QRP club and of course our own G-QRP Club here in the UK.

If any reader would like information on any of these clubs, drop me an stamped addressed envelope stating which club you are interested in plus one 1st class stamp to cover copying.

The Ten Tec Scout

Word is trickling in from the USA that several US members of the G-QRP club have bought the Scout transceiver from Ten Tec. Readers may remember my comments about this in a previous issue. Word is that this is a very good single band rig, owners are having great fun with it. We are told that the QRP version should be available in the USA before Christmas and hopefully over here not long after that. More news on this rig when I have chance to get my hands on one *(I'll see what can be done, Dick – Ed)*.

That's it for now, news and views to me via HRT Editorial, packet on GB7RMS or to Seaview, Crete Road East. Folkestone. CT18 7EG

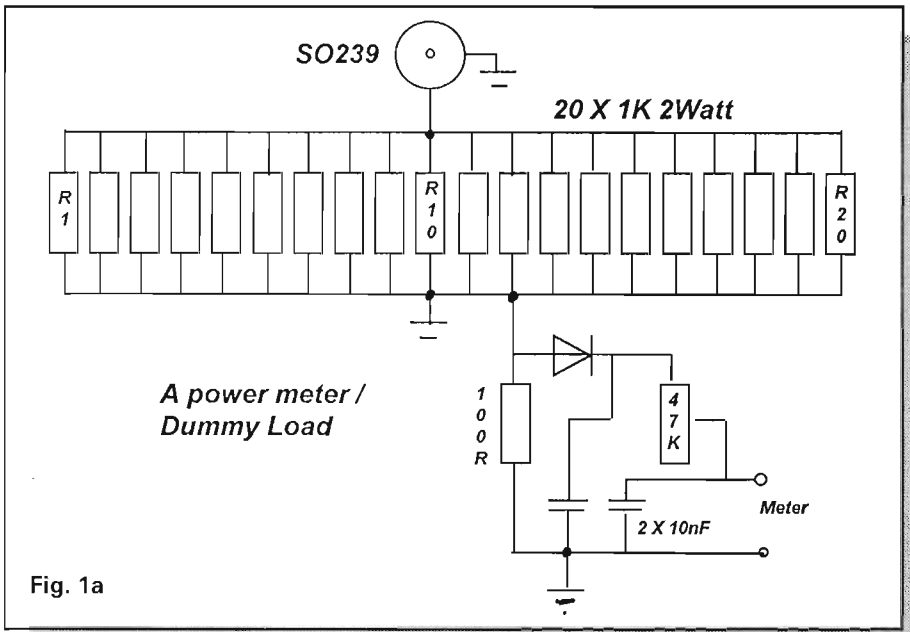


Fig. 1a

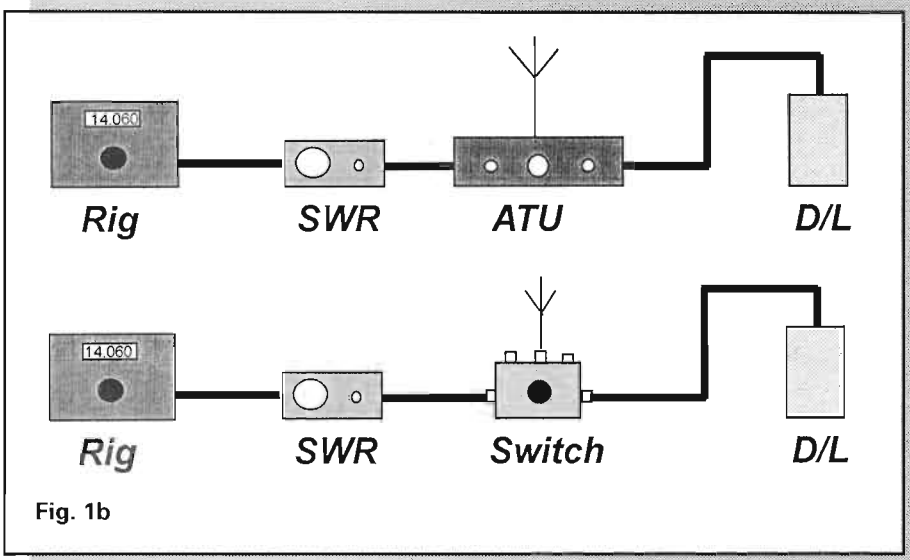
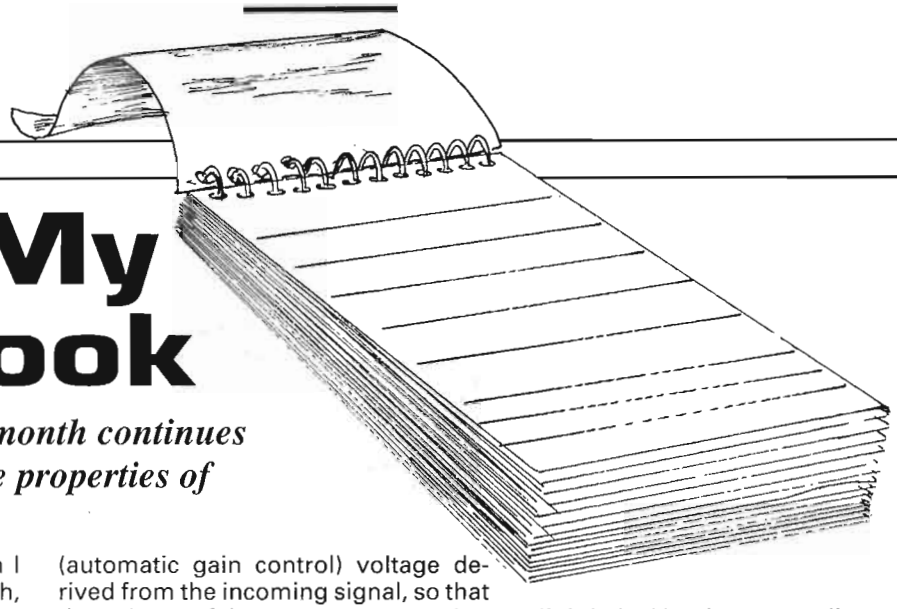


Fig. 1b



From My Notebook

Geoff Arnold G3GSR this month continues his demystification of the properties of valves

The definition which I quoted when I began talking about valves last month, mentions additional electrodes for controlling the flow of electrons from cathode to anode. These additional electrodes are generally in the form of wire mesh structures called grids, placed between the cathode and anode. The electrons can pass through the spaces in these grids, but will be slowed down or speeded up according to the potentials applied to the grids.

The Triode

In the simplest form of valve capable of amplification or oscillation, just one additional electrode is required, producing a three-electrode valve called the triode. The additional electrode generally has a negative bias (with respect to the cathode) applied to it, which slows down or restricts the flow of electrons, reducing the current arriving at the anode. The more negative the grid is made, the more the current is restricted, until eventually a point is reached where the current flow is completely stopped, and the valve is said to be 'cut off'.

A valve can be designed so that just a few volts negative bias on the grid will take it to cut-off. Such a valve is described as a 'short grid-base' type, and will usually be operated with fixed bias and amplification.

Alternatively, it may be designed to have a much longer grid-base, perhaps requiring 30 volts or more to take it to cut-off. The gain of such a valve can then be varied by changing the negative DC bias applied to the grid, either manually or automatically. When used in a receiver RF or IF stage, this second type is often controlled by an AGC (automatic gain control) voltage derived from the incoming signal, so that the volume of the programme coming from the loudspeaker is maintained nearly constant in conditions of fading, etc. The long-grid-base valve is often known as a 'variable-mu' or 'vari-mu' type, 'mu' being the Greek character which is used to stand for amplification.

This first grid is called the 'control grid' (a nice logical name). Because it draws no current from the signal source, but can control a substantial current flowing from the cathode to the anode, a very small signal voltage applied to it can result in a much larger version of the signal appearing across a load resistor in the anode circuit. The valve provides amplification.

In its way, the grid is similar to the base of a bipolar transistor, but with several important differences. First, whereas forward bias (positive for an NPN device) has to be applied to the base to cause current to flow between emitter and collector of the transistor, reverse bias (negative) has to be applied to the grid to restrict current flow between cathode and anode to a safe value. In my experience, this used to be one of the most difficult features of valves to come to terms with, for technicians trained in the semiconductor era, although perhaps in these days of FETs it is less so.

Secondly, unless the grid is driven positive with respect to the cathode, no grid current flows in the valve. The grid circuit impedance is therefore normally very high, and so the valve and its input circuit impose a very small load on the signal source. In operation, this is a very good thing, but as I shall explain later when I talk about valve circuit faults, it will exaggerate the effect of a slightly leaking input coupling capacitor.

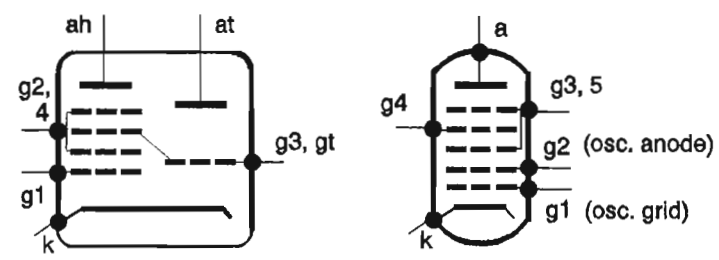
Note that all the above comments apply to a triode valve used in the conventional 'grounded cathode' configuration (equivalent to a transistor operated in 'common emitter' configuration). There are also 'cathode-follower' circuits, (equivalent to 'common-collector' or 'emitter-follower' circuits for the transistor), and 'grounded-grid' circuits (equivalent to 'common-base'). In passing through a valve or transistor stage, a signal will suffer inversion in the first of these three configurations, but not in the last two.

Internal Feedback

The triode valve works well as an amplifier in the audio region, but at higher frequencies the natural capacitances between the electrode structures inside the valve, particularly between anode and grid, become a problem. In conjunction with the external circuit capacitances, they will produce unwanted and unpredictable coupling between the output and input circuits, resulting in instability. There are two ways of dealing with this.

An external capacitance may be connected between the input and output circuits in such a way as to cancel out the effects of this unwanted coupling. This method, called 'neutralising', is still used in valved transmitters, but can require readjustment of the neutralising capacitor at different operating frequencies.

In receivers, and in transmitters which have to operate over a wide range of frequencies, an entirely different approach is usually employed. The time-honoured way of preventing capacitive coupling between two circuits is to place an earthed screen between them, and this is exactly what is done in the tetrode valve (from the Greek tetra = four), where a further grid, known as a 'screen grid', is placed between the control grid and anode. In a multi-grid valve, the grids are numbered for identification, starting from the cathode,



(See last month's 'Notebook' for earlier diagrams)

so that the control grid is called g1, and the screen grid g2.

If the screen grid were connected directly to earth potential, it would reduce the flow of electrons to the anode, substantially reducing the gain of the valve. Instead, it is earthed via a capacitor of a value giving a low reactance for the signal frequencies being processed, but given a positive bias via a resistor connected to a positive supply, so that it has a lower potential than the anode. Therefore, it is earthed for AC but not for DC. The screen grid mesh is made with comparatively large spaces between its wires, so that electrons can pass freely to the anode.

That's clever, you're probably thinking – and so it is. Unfortunately, as with so many clever ideas, there is a snag. In any valve, the electrons rushing towards the anode hit it with such force that so-called 'secondary' electrons are knocked out of the metal. In diodes and triodes, the only electrode having a positive potential is the anode, so the secondary electrons return there. In the tetrode, they have the alternative attraction of the screen grid.

Providing the anode is more positive than the screen grid, most secondary electrons will naturally head back to the anode, but if the valve is amplifying a large signal, the instantaneous voltage on the anode will drop below that on the screen grid for part of each cycle. The proportions of the current from the cathode which reach the screen and anode will change at that time, producing a 'kink' in the valve's anode characteristic which distorts the output signal. This effect generally limits the use of tetrodes to small-signal applications, where there is only a small swing in anode voltage.

The addition of the screen grid does not totally remove capacitive coupling between anode and grid circuits and, especially in VHF amplifiers, neutralising sometimes has to be applied to tetrode stages too.

Give it Five

So, having introduced a second grid to overcome one problem, we've landed ourselves with another – a 'kink' in the characteristic due to secondary emission. How do we solve that one? There are once again two different approaches.

We can introduce yet another grid, between the screen grid and the anode, which is called the 'suppressor grid' and is labelled g3. This is usually connected to the valve cathode, and because of its negative potential with respect to the anode, it slows the flight of the secondary electrons and diverts them back to the anode. The valve with five electrodes – cathode, three grids and an anode – is called a 'pentode'.

The other way of overcoming the secondary emission problem is by something called a 'beam power tube', usually a tetrode but sometimes a pentode. In these the control and screen grids are constructed so that the turns of their meshes are matched and accurately aligned in a straight line on the path from cathode to anode. As a result, the electron flow is formed into 'beams' or 'sheets', which are also prevented from straying off-course sideways by beam-forming plates connected to cathode potential. By choice of suitable voltages on the screen grid and anode, the secondary electrons can then be pushed back towards the anode, removing the 'kink' from the valve's amplifying characteristic.

And Yet More!

That completes this introduction to the basic valve types. However, there are more complex types for special purposes, either having more than three grids, or effectively with more than one valve inside one glass envelope – the multiple valve.

The first sort I shall talk about is the multiple valve. There are double diodes, two diodes in one envelope, commonly used as full-wave rectifiers in power supplies for deriving DC HT from AC mains. There are double (sometimes called twin) triodes, tetrodes and pentodes, which are especially convenient where a push-pull amplifier is required. Usually, these double valves will share a common heater and cathode assembly, but sometimes a separate cathode is provided for each half.

Multiple valves with a mix of different types in one envelope have also been made for special purposes, particularly for use in superhet receivers. At the input of such a receiver, we require a local oscillator and a mixer to convert the incoming RF signal to the intermediate frequency. The local oscillator stage in a valved receiver is usually a triode, and the mixer stage a multi-grid valve of some sort, frequently a hexode (a six-electrode valve having four grids). It is convenient (and cheap) to combine these two valves into one envelope (a combination often termed a 'frequency changer'), usually with a common cathode. There is an internal connection between the grid of the triode and one of the grids in the hexode, which 'injects' the oscillator voltage into the mixer, and hence is called an injection grid.

It's not just the injection grid which has a special function. In the accompanying diagram, g1 is the control grid, where the RF signal from the aerial or RF amplifier is applied; g3 is the injection grid, previously mentioned. The other grids, g2 and g4 are usually strapped together inside the valve, and connected to a decoupled positive potential. As well as behaving like the screen grid in a tetrode, they also screen the injection grid from hexode's control grid and anode, minimising any chance of feedback from there into the triode, which could upset the oscillator stability.

Occasionally, a triode-heptode is used in the frequency-changer stage. The heptode, with seven electrodes, has a suppressor grid, g5, added between g4 and anode.

Another multiple valve is commonly used at the other end of the IF chain, where there is a need for a detector diode, an AGC rectifier diode, and an audio amplifier to step up the voltage coming from the detector to a level capable of driving the audio output stage. These are combined into a double-diode-triode. For more sophisticated receivers, where it is required to 'quiet' the receiver (remove background noise) as it is tuned between stations, a triple-diode triode is sometimes used, the third diode controlling the quieting action.

To round off this section on more complex valves, a few words about a different sort of frequency-changer valve, one in which the oscillator grid and 'anode' are actually in the same electron stream as the mixer. In this case g2 is used as the oscillator 'anode'.

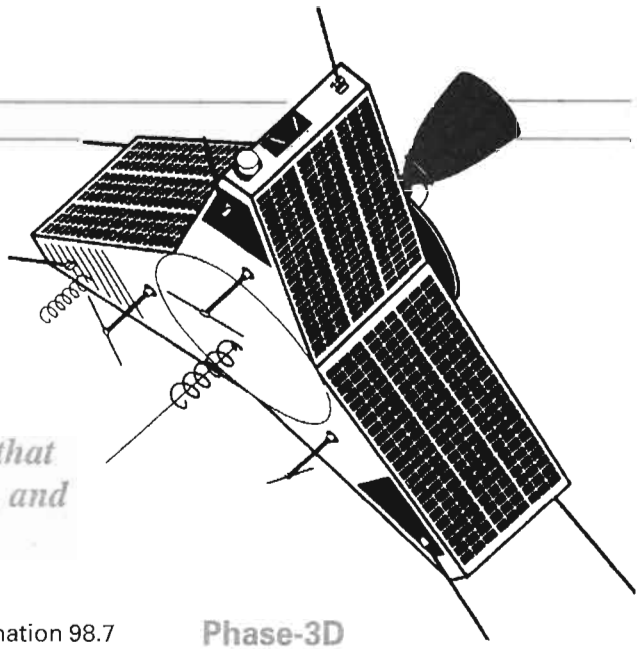
Instead of sitting on the side, effectively in parallel with the hexode, the oscillator here is effectively in series with it. The accompanying diagram shows a heptode, but octodes (eight electrodes) and even nonodes (nine electrodes) are occasionally used.

That just about rounds off the topic of multiple valves, although there have been other types, including one or two rather strange ones. A combined audio output pentode and half-wave rectifier has been used in small mains transportables. Separate cathodes very definitely required here, for the pentode's cathode will be near earth potential, whilst that of the rectifier will be at HT positive!

For something really weird, we must go back to the 1920s and '30s, when what were virtually complete receivers were manufactured within one valve envelope, complete with coupling components. These must surely have been the first integrated circuits!

Next month, I'll be looking at supplies, and biasing arrangements. See you then!

Satellite Rendezvous



Richard Limebear G3RWL of AMSAT-UK hints that Mode S may not be as hard as many people think, and gives an update on Phase-3D

James Miller G3RUH gave a live demonstration of Mode-S reception at this year's Amsat-UK Colloquium, and many folks were persuaded that this mode is not as hard as one would think. James used a 60cm dish and brought strong signals into the lecture hall. The aerial is the cheap-and-easy part of mode-S because, as long as you don't need to transmit with it, the construction tolerances are large.

James says 10W to a 16 turn helix (400W EIRP) is more than adequate for mode-S SSB. A few regular stations use at least 150W to big aerials and are making it almost impossible for newcomers to experiment. Give 'em a chance please?

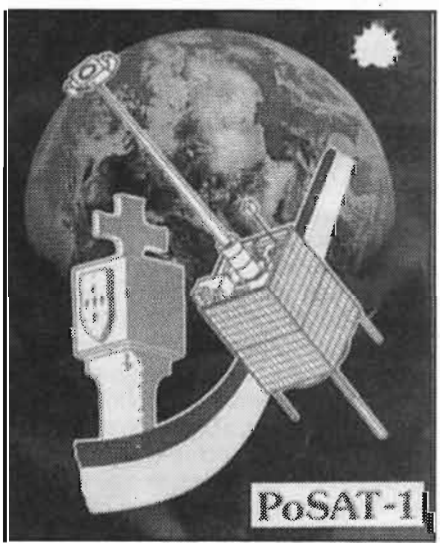
UoSats

Some folks may have noticed that the UoSat-2 (Oscar-11) ASCII news bulletins have re-started. These are prepared by Amsat-UK and usually uploaded on Thursdays. The service is still developing; we are always interested in *your* comments on the service. What would you like to see included? The bulletin is limited to 3000 bytes per week, you can reply to: The UoSat Unit, University of Surrey, Guildford, Surrey GU2 5XH, United Kingdom, or via Oscars 22/23 to G0SYX, or to G3RWL via terrestrial packet radio (@ GB7HSN. #32.GBR.EU) or on Oscars 16/20/22/23.

G0SUL plan to be resuming work now (as you read this) on PacSat software, new features etc. (including separate directories for BBS traffic) can be expected to appear soon. Uploads will be done by means of UI packets enabling software to combine the features of PB and PG. Apparently one of Jeff's limitations is that KISS software does not allow flow-control on the link between the PC and the TNC.

Spot Launch

The launch of the Ariane V-59 flight from Kourou slipped to September 24th. The orbit is 800km and inclination 98.7 degrees; it's expected to be identical to the Spot-2/Microsat (Oscars 14-19) orbit.



Apart from SPOT-3, there are six other payloads;

Stella:	German geodetic satellite (like LAGEOS)
HealthSat:	Commercial satellite based on UoSat bus.
PoSat:	Commercial satellite based on UoSat bus, has amateur component.
Itamsat:	Amateur satellite based on Microsat bus.
KitSat-B:	Amateur satellite based on UoSat bus.
Eyesat-A:	Commercial Microsat (also has amateur component called AMRAD).

The ejection sequence has SPOT-3 separated at T+1036 (1036 seconds after launch); Stella at T+1252; Kitsat, Posat, Healthsat at T+1376; Eyesat, Itamsat just after Kitsat/Posat/Healthsat (typically about one second later). I have no information whether the separation springs have different forces so the satellites will separate and not collide. Suggested OSCAR numbers (in order of ejection and alphabetical order) are: KO-25, PO-26, AO-27, IO-28.

Phase-3D

Following the noted absence of a 2m downlink in recent communications from Amsat-DL, inquiries were instituted by Amsat-UK to find a builder. At the Colloquium it was announced that a 2m transmitter will be designed and built by Mike Dorsett, G6GEJ, an Amsat-UK member with considerable expertise in this field.

Since the spacecraft does not carry transponders, merely separate receivers and transmitters which can be interconnected by a matrix (I understand this permits four independent connections) the existing mode classification (Mode-A, Mode-J etc.) will cease and be replaced by a designation of interconnection according to band: New designations; 145MHz Band V, 435MHz Band U, 1.2GHz Band L, 2.4GHz Band S, 5.6GHz Band C, 10GHz Band X.

So a 435MHz receiver connected to a 145MHz transmitter (old Mode-B) will be called mode UV, and a 1.2GHz receiver connected to a 2.4GHz transmitter will be called mode LS etc. The *first* letter denotes the uplink.

The passband of some of the links will be very wide (up to 500kHz) and it is intended that while half of the link will be for voice/CW usage, the other half of the link (less on 2m) will be for high speed digital use. The lower bands will have 9600 bps but we should expect *very fast* links on the higher bands.

A new uplink *will* be present on C-band, using approximately 5.654GHz. 10GHz downlink power will be 40W pep, and on-board doppler correction is probable.

Rudak-3 will be compatible with Pacsat protocol and will use, at least, 1200 and 9600 bps; other speeds are possible. DAMA protocol may be implemented as a tool to limit uplink collisions (this protocol polls selected groundstations to transmit rather than the open-access method used typically for terrestrial working). The Rudak computer will have the capability to take over control of the spacecraft in

the event of an IHU failure.

Other Satellites

The Finnish spacecraft *HUTSAT* (Helsinki University of Technology) will use uplinks at 23cm and downlinks at 13cm. Part of the satellite will have a linear transponder with 77kHz bandwidth.

Guerwin-1/Techsat (new Israeli satellite): will be compatible with PacSat protocols and be 3-axis stabilised by means of momentum wheels. The orbit is 700km sun-synchronous (inclination not known). The flight will be piggyback on a Russian satellite, which will eject Guerwin after itself being ejected from the launch vehicle. The launch date is currently uncertain, but the spacecraft needs to be in Moscow by November 1994 which suggests a launch around April 1995. The reason it has moved from Ariane to a Russian launch is that the price is less.

The Radio Club Federation of Chile have announced their first MICROSAT, *CEsar-1,* which will be launched in early 1995. The satellite will be a microsat class similar to AO-16, LO-19, WO-18, and DOVE. The orbit will be sun-synchronous and the altitude will be about 900km. The design will include some scientific experiments which will be constructed by students from three local universities, along with some help from the Chilean Air Force.

Software

If you are a Macintosh user and operate satellites or are interested in operating satellites, especially AO16, LO19, WO18, UO22, and KO23, then please get in touch with me. I now have Pacsat protocol software for this machine.

Whilst on the subject of software, the Amsat-UK office has been inundated by requests for an ID number for the SatSked program. Please note that this is **not** given without a donation (of £20) towards the P3D fund (this is on the instructions of the software writer and is not because of an Amsat-UK decision). Amsat-UK is the European coordinator for SatSked.

EME Contacts For OSCAR Satellite Users

The Toronto VHF Society, VE3ONT, will use the 150 ft radio telescope at Algonquin Provincial Park (grid FN05xw) during this year's ARRL International EME Competition.

VE3ONT will be active the full weekend of each contest period, October 9-10 and November 6-7. The schedule of operations is: Nov 6 0340-1700 UTC; VE3ONT TX 432.050MHz, listening range 432.050-432.060MHz, Nov 7 0450-1730 UTC, VE3ONT TX 1296.050MHz, listening range 1296.050-1296.060MHz.

VE3ONT will operate 'split' and asks that stations avoid calling on their our transmit frequency. They will transmit and receive with left-hand circular-polarization on all bands. This means that after reflection from the Moon, signals will be right-hand circular polarized. They will be running the full legal power limit on 144MHz and 432MHz, and 100W on 1296MHz.

As users of a non-amateur aerial, they will not be in competition with other stations; the intention is to provide an initial EME contact for as many stations as possible. Operation will be primarily on CW, although SSB might be employed depending on signal strength and number of stations calling.

Operation will be 'random' format, meaning that VE3ONT will accept no skeds. If conditions are poor, they will use a 30-second sequence in which VE3ONT transmits the first 30 seconds and listens during the second 30 seconds of each minute. Note that this is *not* the usual sequence for EME skeds. VE3ONT will maintain HF liaison on 14.345MHz during daylight hours and on 3.818MHz at night. They anticipate being able to work OSCAR-class stations with 100W of output power on 144 and 432MHz; 25 watts should be sufficient on 1296MHz.

Project Moonray

In almost 6 years we will be entering the 21st century, and Project OSCAR have decided to revive Project *Moonray* as a concept, which might be a stepping-stone for more exotic projects throughout the 21st century. W6OLO had the idea of putting an amateur repeater on the moon in 1965 during the Apollo program when he met Owen Garriott, W5LFL, astronaut in training, scheduled to go to the moon on forthcoming Apollo 18, or 19, or 20. Unfortunately, Congress cut off funding for NASA for any further lunar landings beyond Apollo 17 and the Moonray Project was shelved.

Lunar exploration, Lunar habitats or colonies and numerous Lunar projects have recently re-surfaced. No specific dates or schedules have yet been set, however, it is not too early to plan for Amateur participation in one (or more) future Moon visits as well as for other possible 'out-of-this-world' concepts.

AMSAT-UK News

Amsat-UK announce the new *Guide to Oscar Operating* should now be available. Please note that the price will *not* be the same as in current price lists – there are now more pages and we've gone to A4 size pages instead of the old A5 size; contact Ron G3AAJ for price details, although it should hopefully be under £5.00.

Ron still has two trackbox kits left – contact the office if you're interested.

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

Please note; We often get SAEs through the post. Fine. But they come with no indication of what the sender wants! We supply quite a lot of things in SAEs – if you're sending in for something, pretty please, put a note in saying what you want. Likewise we get notes from e.g., G9XYZ saying he's QTHR, please send ... but he's not in the callbook!

We also get requests with no return postage – sorry but our charitable cause is amateur satellites, not folks who don't include an SAE (including a note of what's required).

KEPLERS

SAT:	OSCAR 10	UoSat 2	AO-13	PACSAT	DO-17	WO-18	LO-19	FO-20
EPOC:	932.38.55014360	93236.07123320	93226.17818333	93237.70244457	93237.26446283	93238.07460067	93238.21200676	93238.02962241
INCL:	27.0250	97.8084	57.8443	98.6187	98.6201	98.6197	98.6202	99.0301
RAAN:	8.9944	259.4596	300.3381	322.1453	321.9454	322.7681	323.0943	80.9627
ECCN:	0.6020869	0.0012302	0.7221606	0.0011515	0.0011722	0.0012189	0.0012592	0.0540206
ARGP:	109.0129	134.5109	321.8002	344.4905	345.4264	343.3172	341.9011	288.4822
MA:	322.7978	225.7104	4.7665	15.5925	14.6579	16.7612	18.1741	65.8314
MM:	2.05880822	14.69044264	2.09725131	14.29847040	14.29983159	14.29962356	14.30053258	12.83220726
DECY:	8E-08	2.07E-06	-1.04E-06	4.4E-07	3.9E-07	3.3E-07	3.7E-07	-9E-08
REVN:	4874	50668	807	18737	18732	18744	18747	16627

SAT:	INFORMTR-1	UO-22	KITSAT-A	ARSENE	RS-10/11	Cosmos 2123	Mir
EPOC:	93238.8032415	93238.23073699	93235.06403375	93220.71127607	93237.34802942	93236.06178531	93238.82774248
INCL:	82.9447	98.4685	66.0812	1.1442	82.9264	82.9216	51.6193
RAAN:	0.5614	313.2013	184.1658	124.5650	187.4927	231.7768	224.6674
ECCN:	0.0035158	0.0008571	0.0000333	0.2935408	0.0012661	0.0027724	0.0004916
ARGP:	182.5409	88.3947	127.5491	146.5525	119.7693	214.7577	27.7563
MA:	177.5557	271.8221	232.5559	234.2699	240.4700	145.1768	332.3780
MM:	13.74523943	14.36846781	12.86279497	1.42202880	13.72322152	13.74025814	15.59356331
DECY:	8.5E-07	7.2E-07	1E-08	-4.9E-07	8.8E-07	2.4E-07	2.745E-05
REVN:	12914	11072	4844	132	30933	12784	43015

Packet Radio Roundup

Chris Lorek G4HCL congratulates yet another packet SysOp 'Amateur of the Year'

Data enthusiasts gathered at the BARTG Rally

This month, I must start by passing my heartiest congratulations to Tim G7OTO on his award of the Radiocommunications Agency 'Young Amateur of the Year' title. Tim, who lives on the Isle of Wight, is a keen packet user and, with the cooperation with the IoW packet group is currently putting together the Island's first packet BBS. Is it any surprise that last year, the winner was also a Packet system SysOp (Martin G7JCJ, who was the SysOp of the GB7DXD DX Cluster), the runner-up was also a 'packet devotee'. This seems to confirm that the 'powers that be' on the award selection panel certainly know what the future of amateur radio relies on. You'll see the photos of Tim's award presentation by the RA in next month's HRT.

New Advert BBS

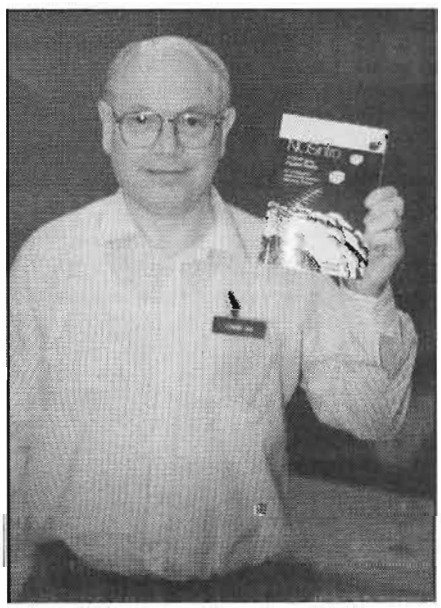
Yes, we know amateurs can't advertise on packet (well, actually you *can,* as long as it's on behalf of a non-profit organisation established for the furtherance of amateur radio, it's a pity that some BBS SysOps either don't read their licence or just delete all such messages regardless). However, for those amateurs who'd like to advertise their individual sales and wants electronically, which of course normally *can't* be done on the packet network, Ricky G0LZX has set up a special telephone line BBS for this very purpose! Ricky incidentally is the SysOp of the RGB nodes and co-SysOp of GB7EVY and GB7LEN.

This landline BBS is available to all amateurs who want to leave adverts for other users, i.e., for sales, wants and swaps, and is operational from 00:00 until 08:00 every morning. There's no charge for placing adverts, only the cost of your phone call, and Ricky says there are also hundreds of files available to download, including GIFs, JPGs and shareware programs. The phone number to access this 'Amateur Advertising BBS' is 051 524 3407, during these hours only. You get further details, or indeed make any suggestions, either to G0LZX @ GB7LEN.#16.GBR.EU or of course via the landline BBS.

BARTG Rally

Once again, this year I was pleased to attend the annual British Amateur Teledata Group rally, held recently at the Sandown Park Exhibition centre. This event caters especially for the needs of data enthusiasts, although as well as 'specialised' exhibitors such as Siskin with packet gear and Timestep Electronics with weather satellite gear, there were plenty of 'general equipment' dealers such as ARE, Icom, Lowe Electronics and the like offering goodies for all (no, I couldn't afford a new rig, although my 12 year old son did come away with a few goodies!).

BARTG Committee Member Ian G3NRW with his book 'NOSintro'.

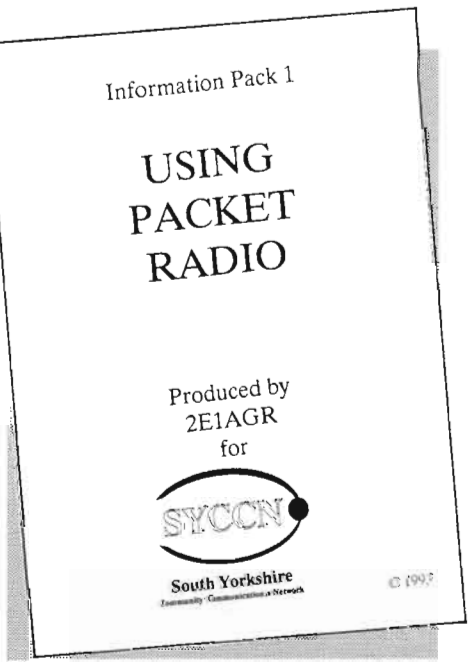


Ian G4EAN of BARTG tells me the group have long sought to promote further data comms within amateur radio, this being a prime aim of both the BARTG committee and as individuals. One particular achievement of a BARTG committee member is that of Ian Wade G3NRW, who's found his book on TCP/IP, *NOSintro* (which you'll have seen reviewed in HRT as soon as it appeared in print), has proved to be a best seller! Indeed I've often seen it advertised in US amateur magazines, so it looks it's certainly 'getting places'.

Novice Packet Guide

From the wordprocessor of 2E1AGR comes the information pack

'Using Packet Radio'. This is a 23 page A4 size booklet, and acts as a comprehensive 'step by step' instruction manual in operating a club's packet radio station. Items covered include switching on, setting 'MYCALL' correctly, connecting to a node, a BBS, and giving a sample list of commands for these. Although essentially simple in nature, the booklet I found was well laid out, which good diagrams to allow the absolute newcomer to a club packet station to operate it successfully without getting into a mess! The pack is based upon the Kantronics KPC-2 with the Kenwood TM-431E and a PC running YAPP software, and is available for £2.50 inc p/p from 2E1AGR, South Yorkshire Community Communications Network, c/o 304-306 Prince of Wales Road, Sheffield S2 1FF, or you can contact 2E1AGR @ GB7SYP.



Using Packet Radio' by 2E1AGR

HamMap Software

I recently received a copy of Version 4.0 of this public domain software, written by DJ6FM. It's a very powerful program (the text being solely in German) with 'pop-up' menus, and gives a graphical map of the countries in Europe together with their packet nodes, BBSs, DX Clusters, and the links between them. You can select each country of group of countries in turn, i.e., the whole of UK, or south UK with north France, etc., 'zoom in' to areas if you wish, 'hunt' for given stations, frequencies, etc., and an 'edit' facility (which previous versions didn't have) lets you manually update it with new BBSs, links etc. to account for the ever-changing system. I found it was quite up to date for German nodes etc., although the UK side was probably based on early published information, hence in need of updating – any volunteers out there? If you'd like a copy, just drop me a formatted 720k PC disk (it'll come as a self-extracting much larger program) plus return stamped mailer or IRC, to Chris Lorek, c/o the HRT Editor at the Editorial address (given towards the rear of the magazine each month).

CTRL-Z, End of Message

That's it for this month, a reminder for BARTG members that the AGM takes place this month, on November 13 at 2.00pm at 'The Green' Wine Bar and Restaurant, The Green, Mere Green Road, Four Oaks, Sutton Coldfield, contact Ian G4EAN @ GB7BAD or Tel. 0602 262360 if you'll be going so that arrangements for refreshments and seating can be made for you.

Please do keep me in touch with details of what your packet group are doing, either via the network or by post c/o the HRT Editor. Until next month, 73 from Chris G4HCL @ GB7XJZ.

VHF/UHF Message

Geoff Brown GJ4ICD gives details of overcoming 6m EMC problems

Last month I promised that we would have a look at some filters to cure TVI problems, this really stemmed from a couple of phone calls requesting help.

Big Problems!

Georges, F8OP telephoned me for help regarding TVI to his neighbour's TV, with just 3W of 50MHz. He had serious problems, with 500W on 144MHz the TV was blitzed. This was a recent problem and not a new TV or new neighbour, so something had changed in the system somewhere. On investigation Georges found that his neighbour had recently installed a new amplified aerial for Canal Plus (above 190MHz) this was combined with a UHF aerial, a nice little package you may well think? Well, it was for the viewer but not for Georges!

In France, TVI filters are very hard to come by and also very expensive, so a quick phone call to AKD revealed that although they could provide a high pass filter (passing Band 4 and Band 5 UHF) they had no filters available that would pass Band 3 (190MHz plus) and Band 4/5. AKD could provide notch filters for 50MHz and 144MHz, and so, it was time to call on Lawrence GJ3RAX and Dennis GJ3YHU for a little design and alignment help. In the meantime another phone call for help came from YO4BZC (a UKSMG member), Dorin also had serious problems with TVI and also around 190MHz (Channel 7/8 Romanian TV).

Lawrence came up with a high pass design and it was quickly made, Dennis GJ3YHU gave it a quick sweep on the work's analyzer and things looked good, see Fig. 1. Losses at 190MHz seemed to be a few dB, but, on Band 3 and the high power the Rumanians use, it shouldn't have caused any problems. The attenuation at 50MHz was good, but we had hoped for more.

It is worth noting that although this filter was designed for problems abroad, it can be used here in the UK as it does give a substantial rejection on both 50MHZ and 144MHz. Of course it acts as a normal high pass filter, but in some areas it may not be suitable due to Band 3 PMR.

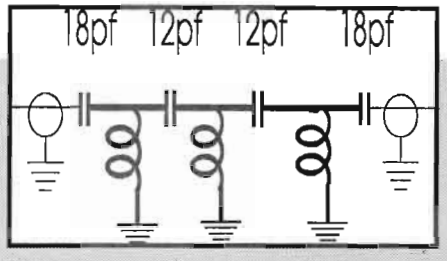


Fig.1

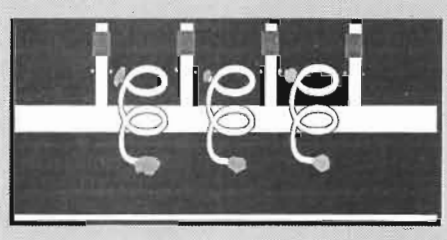


Fig.2

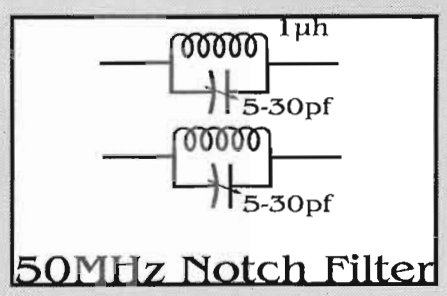


Fig.3

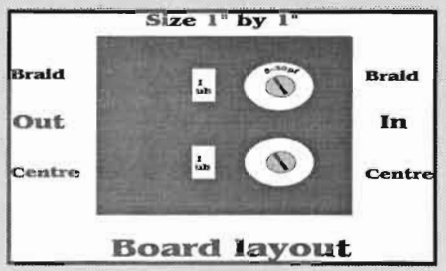


Fig.4

Well, that was one problem cured, but more followed. 50MHz seemed to be getting into everyone's TV in Europe this summer, even when using very low power. So, it was time to try a notch design, this design will cure your 50MHz TVI problems if you have any. As you can see in Fig. 3, only four components are used, two trimmers and two inductors. The circuit is a parallel circuit and is placed in series with the coaxial lead to the TV.

I built this circuit into a 75-300 ohm balun from a portable TV (the bit that fixes the loop aerial to the coaxial socket on the TV), it's very small and you have no 'flying' cables to worry about picking up more unwanted RF.

How to tune it? Well, if you don't have any exotic test gear then here is an easy way to set it up, just tune into a 49.925MHz baby alarm or intercom or your scanner or extended 50MHz transceiver with the filter in line (you'll have to make a couple of plug converter leads for this) and simply 'notch it out'.

Beacon News

News from Tom SP5CCC is that there should be a new beacon on the air very soon on 50MHz, it will be SR5SIX on 50.007MHz and it is located in KO02

FX3UHB/IN78vc has moved its operating frequency, it is now on 432.918MHz and not 432.935MHz.

9M6SMC is now completed, its frequency is 50.013MHz and should be shipped by SMC Ltd. very soon.

GB3IOJ (50.065MHz) is now back on the air after a short illness. *CT0SMI* (IM59sk) is now QRV on 50.100MHz this is an FSK beacon so don't get caught out like I did. Other new 50MHz beacons are; *SV9SIX* (KM25nh) on 50.010MHz *ES6SIX* (KO37mt) on 50.011.5MHz, and *ES0SIX* (KO18po) on 50.037MHz, the latter two being in Estonia.

CU3URA (on 50.014MHz in HM68 was reported into the UK on the 30th August at S9+ around lunch time.

50MHz Reports

A report came in regarding the operation of F5EMT, who during July operated from Corsica as TK/F5EMT. Unfortunately he was operating from JN42 which is forbidden territory in Corsica due to the TV transmitter being sited there, the only legal square according to G4OUT (the RSGB Awards Manager) is JN41.

The Perseids meteor shower produced good results on 50MHz, Neil G0JHC reported working 21 countries during the 11/12th August and claimed

that the best action was around 0130z to 0300z on the 12th. Jon, OY9JD also states this as his best time.

Sporadic 'E' was also still in existence during the month, reports from around the British Isles were as follows; 8/8/93: good opening to OK, OM, SP and EH7; 9/9/93: OM and SP; 14/8/93: lots of SP's into the north of the UK; 15/8/93: SV9ANJ/Crete a new one on the band worked lots of UK stations in the South including G4IGO/Somerset, G4CCZ and G3WOS in Hants, and your's truly for a new one.

On the 20th many SP's were worked around the UK, SP3UCA (JO92) being a new one on the band. The 22nd brought a very widespread event with LA, OY, GM, 9H, SP, OZ, and DL being worked, other shorter openings occurred on the 23rd to Spain and 26th to LA, SM3's, and Poland.

The 25th was the highlight of the month with a TEP plus 'ES' opening to 7Q7 (Malawi) and later to PY (Brazil). Unfortunately it was all spoilt by many Europeans working Spanish stations on 50.110MHz, and so many people missed the DX. *Please* keep 50.110MHz clear of inter-European traffic.

Another long distance 'ES' opening happened on the 29th with OH1NSJ (KP11), SM3BIU (JP73), and LA's on the band in the late afternoon. On the same evening, Italians were S9+, and the band faded at around 2200z which is quite late for the end of August.

The following day (30th) things started very early. At 0600z the band was open in many directions, Polish TV was very strong at 0700z, G3WOS reported working RA3YO (KO73) in the morning. ET3DX (Ethiopia) called me at 0900z as I was in QSO with EH5DY, a quick QSY up the band was made but I lost him, it was later confirmed that he was audible in 9H around that time!

Ela G6HKM added a few new ones during the month, these were: HB9QQ on SSB MS (at 4am!), and SV9ANJ, Ela's total squares on the band is now 456.

144 and 432MHz

The 8th seemed to produce good openings from the UK to EA and France on both 144 and 432MHz.

In a report from 2E1AQS (JO01), Margaret said that she was active on 70cm during VHF NFD, her best DX was PA0PLY (JO22) at 315km, not bad considering the power level! Others worked were: G8YEQ/P (IO80), FF5KD/P (JO00), PA3BPC/P (JO21), together with JO01, JO02, IO90, and IO91 squares, well done Margaret.

G6HKM again burnt the midnight oil, she bagged G4DHF/TF/P on 144MHz for an all-time new country and square. Ela also notes in a QSO with Jim EI3GE that 'ES' was better from EI than Essex this year.

'Down Under' Report

Eric VK5LP sent me a list of the 50MHz countries that have been worked from Australia. Would you believe that 172 countries have been worked from VK, but unfortunately the same situation applies there as it does in the UK, nobody has worked them all!

New Meteosat Schedule

As of July 8th, Meteosat started its new schedule of broadcasts. New slots have been inserted on channel 2 (1694.5MHz) showing fantastic views of Australia, Japan, and the Pacific from the GMS geostationary satellite. These shots are unbelievable to see, as at the time of writing a cyclone hit Japan, for us this was most interesting to follow it's path, for the residents of Japan not so! As we go into the hurricane season I hope to be able to feature some interesting pictures of the Caribbean.

Well that's all for another month, thanks to all who sent in reports, especially the UKSMG. All news, photos etc., please to Geoff Brown, GJ4ICD, TV Shop, Belmont Rd, St. Helier, Jersey. C.I. or phone/fax on 0534 77067 anytime.

QSL Listing

Summer 1993 QSL Update

IK1IXF/IP1 - Mario Alberti, Via Carducci 125, I-19100 La Spezia, Italy
I2ADN - Angelo Anna, Via Ortigara 19, I-22070 Casnate, Italy
LZ1ZX - Dimiter Rahnev, Yavorov 37, 8680 Straldja, Bulgaria
LZ2UU - Jordan Radkov Yankov, Box 196, 7200 Razgrad, Bulgaria
OK1VQ - Miloslav Masek, Rooseveltova 78, CS-41705 Osek, Czech Rep
OM3OM - Julius Cajka, Podhradik 1 Zamok, CS 08001, Presov, Slovak Rep
OM3PC - Rudi Karaba, Gogolova 1882, CS-95501 Topolcany, Slovakia
OM3WMP - Pavol Matyas, Lomnicka 14, CS-94901 Nitra, Slovakia
RU1A - Via KC1WY. 17 Church Street, Woods Hole, MA 02543, USA
SM3NRY - Thomas Gillgren, Engesvegen 5, S-86300 Sundsbruk, Sweden
SP5EFO - Leszek Dunowski, ul Bacha 30 m 908, 02-743 Warszawa, Poland
SP5HEJ - Marek Reszka, ul Willowa 9 M 5, 00-790 Warszawa, Poland
SP7HT - Tadeusz Raczek, Ul Leszczynska 64 m 10, 25-326 Kielce, Poland
SV1AHX - Andreas Hasapakis, Kefalinias 107, GR-11251 Athens, Greece
SV1DH - Costas Fimerelis, 23 Elianou St, GR-11254, Athens, Greece
SV1EN - Nick Gioulbabas, Lefkon Oreon 100, Halandri, GR-15234, Greece
SV1EO - Giorgos Dimopoulos, Patision 300, GR-11141 Athens, Greece
SV5TS - Vasilis Argyris Demokratias 146, GR-85106 Paradisi, Greece
SV5QR - Panos Veletsos, Box 199, GR-85300 Kos Island, Greece
S53ZW - Drago Turin, Cvetlicna 18 A, 62270 Ormoz, Slovenia
S56A - Via YU3EA. Marjan Miletic, Reboljeva 2, 61113 Ljubjana, Slovenia
TF3EJ - Via TF3IRA. IARU, Box 1058, IS-121, Reykjavik, Iceland
TF/LA6HL - Johannes Baardsen, Risabergstien 29, N-4056 Tananger, Norway
T94VO - Via 9A3KK. Drazen, PO Box 673, 41000 Zagreb, Croatia
UB5BW - Via Box 1190, Starokonstantinov, Tenopol, Ukraine
YO7VJ - Emil Nistorescu, Box 107 R-1100 Craiova, Romania
YU1AD - Mirko Voznjak, Kataniceva 16, 11000 Beograd, Yugoslavia
YU1EU - Aleksa Ekmedzic, Cara Dusana 35, 11080 Zemun, Yugoslavia
YU1MW - G.Jovan, Radovana Simica Cige 42 27, YU-11050 Beograd, Yugoslavia
YU2EU - Zlatko Maticic, Box 8, 43280 Garesnica, Croatia
YU7AU - Ljubisa Miletic, Masarikova 2 18, YU-26000 Pancevo, Yugoslavia
ZC4KS - Via G0PWR. K Staley c/o 11 West Lawn, Findern, Derby, DE6 6BB, UK
5R8DP - Via JA1OEM. Shinichi Yoyofuku, Box 9, Sawara, Chiba 287, Japan
5R8DG - Via F6FNU. A. Baldeck, Box 14, F-91291 Arpajon Cedex, France
9A3FT - Renco Kirigin, Balkanska 57, YU - 58000 Split, Croatia
9K2MU - Mortada Marafie, POB 97, Safat, Kuwait 13001