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- **Rexon RL-102 2m portable**
- **Bearcat BC-890 receiver**
- **R-10 'Interceptor'**
- **M-1 handheld frequency counter**



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HRT

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VOLUME II NO.10 NOV 1993

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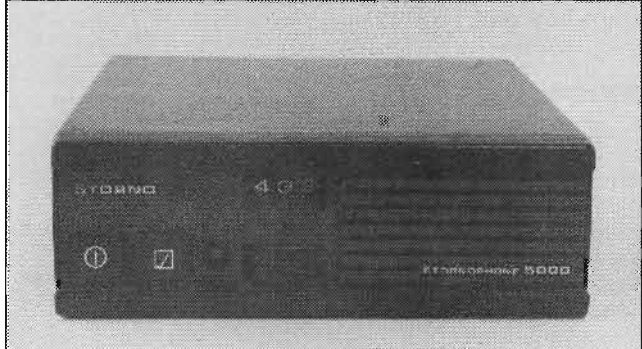
Rexon RL-102 2m handheld reviewed (centre)

2m Handheld for under £30! (right)

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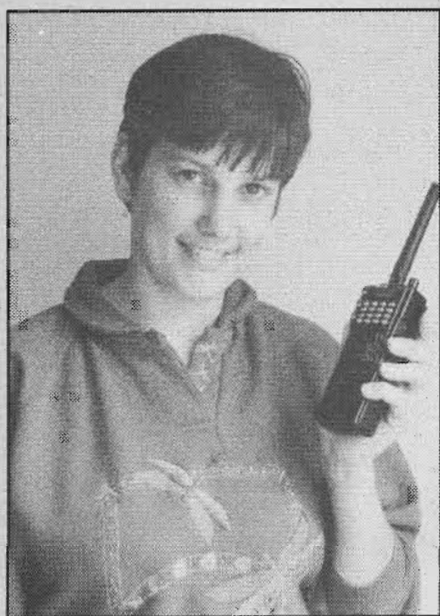
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CQ de G8IYA

Editorial

Amateur radio has been declining, but are we now back on 'the up'?



Many of us know that the amateur radio scene is changing. But did you know that the number of amateurs in the UK has recently been *declining*? Yes, our numbers have been going *down*, rather than up as it's been doing every year for at least the last 15 years, and that's official, straight from the Radio-communication Agency's mouth (or word processor!).

Don't Worry!

But before you bury your head in your hands, don't worry too much! It's only a slight decrease (59,243 on 31 March 1992 compared to 61,443 on 31 March 1993), but these figures include the ranks of novice licensees (935 Class B, 105 Class A on 31 March 1993, 378 Class B and 46 Class A on 31 March 1992). So the number of newcomers to the hobby is going up. After I looked more closely at the paperwork in front of me, I saw that the year-by-year graph of the number of amateur licensees which appears in the recently published RA Annual Report bore a remarkable, almost uncanny, resemblance to the (also recently published) graph of year-by-year UK VAT-registered businesses over the past 13 years provided by the DTI Small Firms Statistics Unit. Each

shows a steady increase up to about 1991, then a 'levelling off' for a year, then a small decrease for a year.

Better Times Ahead

OK, but what does this mean? In recessionary times, often the first thing that 'goes' is non-essentials, like hobbies. Businesses that supply the needs of people also 'tighten their belts', some even close down, hence the recent decrease. But, as I'm told virtually every day, we're now 'coming out of it'. What I've been seeing in the amateur marketplace recently shows that better times *do* seem to be ahead, at least as far as amateurs buying equipment are concerned. Amateurs 'tightening their belts' means that amateur radio dealers have to respond to this, some are.

Times must have been 'interesting' for black box importers recently though, the value of the Japanese yen for example has doubled in the last year. This means, quite simply, that a given Japanese rig costs twice as much to the importer than it did a year ago. Think about it. Maybe this is why other sources are being examined for amateur gear, like the USA, or other Far-East countries besides Japan, and it's no surprise that we've recently been seeing more amateur gear coming in from non-Japanese countries. For example, yesterday I was holding two Far-East made 2m handhelds, one a 'full-feature' set with lots of bells and whistles which sells for £179, another single-channel unit selling for just under £30. Now when could you *ever* buy a new 2m handheld transceiver, of any sort, for *this* price?

Responding to People's Needs

This is one way in which the marketplace is responding to the needs of amateurs. Another is our 'Letter of the Month', where a small dealer has found he's been called to repair more amateur radio gear than before, possibly indicating that amateurs are increasingly interested in 'keeping their gear going that bit longer' rather than 'upgrading' to new equipment. Another is the re-

cent increase in 'group discount' schemes, where some dealers encourage clubs and so on to 'bulk purchase' at lower prices. Yet another is 'stage payments', even where an amateur is building a project or a kit from a supplier who offers this in 'sections' on a pay-as-you-build basis. The RSGB have also responded to the needs of members (and of course prospective members) by introducing an optional 'pay a bit every few months' scheme for their otherwise yearly membership fee.

In our own way, we've also been trying to help, for example in ex-PMR conversions to get youngsters started without breaking the bank. Hopefully, you'll also know that Ham Radio Today has the lowest selling price of all UK amateur radio magazines on the newsagents' shelves, we've also been giving away things such as T-shirts and the like for postal subscribers as an 'added bonus'.

New 'Problem Page' in HRT

Through our reader's survey, you've been kind enough to tell us what you'd like to see in the magazine, and my congratulations go to Mr. Joseph Sadowski in Bishops Stortford who won the offered prize of receiving Ham Radio Today free for a year plus one of our exclusive T-shirts. From the survey, most of you told us the magazine's content was 'about right', however, there were a number of 'good ideas', one of these being a 'problems' column. In response to this, I'll be introducing a 'Problem Page' next month, where reader's questions on technical aspects relating to our hobby will be answered, so start writing in!

We'll try to answer these either ourselves or by seeking help from others, making this a true 'two-way' page! Address your letters to; Problems Page, Editor - Ham Radio Today, ASP, Argus House, Boundary Way, Hemel Hempstead, Herts, HP2 7ST, or you can fax direct to the Editor's desk on 0703 263429. Please note that answers can *only* be given through the 'problems page', we can't answer these over the phone or on a one-to-one basis unless they relate to projects etc. published in the magazine.

Finally, I've just received a copy of a letter from Baroness Denton of Wakefield CBE, who is the Parliamentary Under-Secretary of State for Consumer Affairs and Small Firms. From my past Editorial on EMC and the future for small kit manufacturers, she's been asked to act on the behalf of small amateur radio firms to keep our hobby going. Things are starting to happen.....!

LETTERS

Letter of the month

Dear HRT,

Could John Bolton please explain 1) Why, if he knows so much about the ham radio trade and its profitability, he isn't a dealer (or does he not want to make a fortune!)?

2) Why when a fairly local *very well established dealer* wanted to retire, he couldn't sell his business as a going concern?

3) Why I have decided to close my shop an extra day a week to do repairs and refurbish second hand equipment (why don't I just sell new if it's so easy)?

4) Why several large retailers have closed in the last few years?

5) Who has had supplies dried up 'by the big boys', when 10 years ago the photographic half of our company closed down, and my wife and I wanted to rescue the ham radio business, both SMC and Amateur Electronics fell over each other to help us!!

Does John Bolton expect to get a loaf of bread on a little island off the coast of Scotland at the same price as at a London supermarket? If not why should he expect prices on an island off Europe to compare with prices in the USA? Of course you can buy from the USA and save money *if* you are lucky, but if everyone did this it wouldn't bring prices down, it would simply close the UK amateur trade, and eventually destroy the hobby.

As it is many traders are getting 'fed up to the teeth' of people who aren't happy unless they are complaining. If you don't like the UK radio ham trade, *please* don't patronise it. Buy from abroad, *but*, don't expect to have your import repaired by us.

Harry Leeming, G3LLL Holdings
Amateur Electronics

Dear HRT,

John Bolton's figures are not very accurate, i.e., 1 dollar = 1 pound, it should have read 'the pound sterling

price of amateur radio equipment in the UK is equal to the *list* price of this same equipment in the USA in dollars. For example a Yaesu FT990 in July 1993's QST has a list price of \$2,400, in the UK of £2,400 but Ham Radio Outlet and other companies in the USA advertise it for sale in QST for \$1,940 including post and packing. This price also includes a manufacturers warranty for one year and not 3 months as you imply in your comment.

Assuming that the USA retailer makes a profit of 10 percent, then the price the retailer would pay is 90 percent of \$1,940 or approx \$1,746. Since Japan is no further away from the USA than the UK is, the shipping costs should be very similar and as in the USA should be included in the cost to the retailer of \$1,746. At the moment, when you import amateur radio equipment from the USA you must pay 17.5% VAT and 6.5% duty, a total of 24%. Adding this to the retailer's price gives a sum of \$1,746 plus \$419 or \$2,165 and this when converted to pounds sterling at 1.45 dollars to the pound, equals £1,493 or approximately £1,500. At the present retail price of £2,400 this means that the retailer is potentially making a profit of £900, or in percentage terms 62.5%, and then you wonder why we think that we are being ripped off?

Like John Bolton, when I tried to sell by British bought modern radio equipment, I too was offered a ridiculous price for the said equipment that they were advertising for 85% of new prices. If they would get away from this 30% profit margin that they insist on with second hand equipment and offer hams a reasonable return on their outlay, I am sure most hams would not come away from dealers with such a poor opinion of them. I have been reading your magazine for some years now, it makes a refreshing change from the others, but you should be aware of how the majority of radio hams view the way they are being ripped off. In the example I quoted above you

could actually fly to the USA, pick up a rig, pay 24% VAT and duty and still save money. As for servicing your new rig, at least one company regularly advertises that they can service all of the new equipment sold in the UK, with a guaranteed 1 week turn around. Finally as a professional in the computer industry, I would say that modern radio and computer equipment is so well designed and tested that the chances of failure within the first year of use is very low indeed.

Daniel McLean, GM3SUZ

Dear HRT,

Reference John Bolton's (G4XPP) letter in September issue and the editorial reply.

It is almost like putting ones head in a noose for a large dealer to reply to such a letter which states amateur radio dealers are ripping off the amateur by high prices and profits. Let's look at some of the omitted facts both by John and the editor's comments compared with the USA;

We have much larger shipping costs due to distance and volume of importing equipment from Japan, extra cost 3%. With a smaller market we tend to have less discount than supplies to USA - say 5%. Import duty varies but average 6.5% and this is added to the cost of transport, insurance and shipping. Finally 17.5% VAT. All of this represents at least an extra 32% cost.

Mr. Bolton's statement that the radio supplies of the independent dealers deliberately dried up by the big boys is completely inaccurate and far from the truth.

The profit margins on amateur equipment is in fact so low that few dealers, if any, can survive only selling amateur equipment, which is why many ceased trading and several of the unscrupulous dealers ceased trading deliberately owing the importers tens of thousands of pounds and one has even re-opened 3 times under new names.

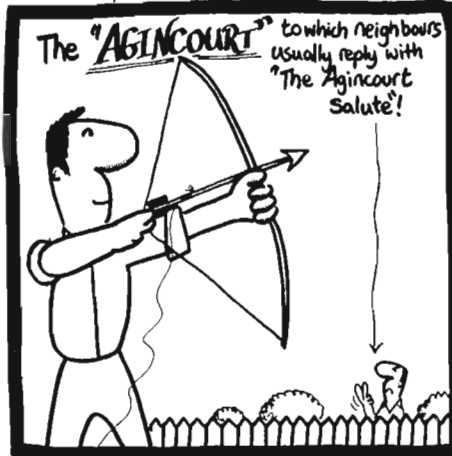
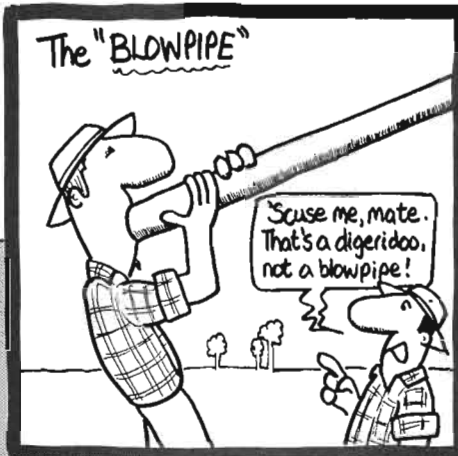
£10 for the Letter of the Month

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.

"TONE" BURST



PRESENTS: How to "Launch" an aerial #1



In truth, as the largest amateur dealer in the UK, for long periods when costs were rising fast we subsidised the amateur sales by our commercial business and I am aware that this is true of at least one of the other major companies.

Unfortunately in this cynical world I am sure I will not be believed by many readers and will probably have initiated a series of rebuffs.

We have traded for over 30 years and have expanded considerably. This has been achieved by very hard work and providing our customers with fair value and service. But one cannot please all the people all the time, but one can try.

Barry Gardner G8MMN South Midlands Communications Ltd

Editorial Comment:

Well, well, from the above letters we've certainly 'rattled the cage' through these pages (good!). Over to you, readers.

Dear HRT,

In Packet Radio Roundup in the August 93 edition of HRT, Chris G4HCL mentions J. & P. Electronics equipment and the fair way they deal with Baycom over software.

I think that this is another British firm who deserve wider recognition, I would recommend them to anyone. Over the years I have bought a number of items of their manufacture and also had software from them, I have found them most helpful when I have had any difficulties, and very prompt when dealing with any orders etc. Only the other week I sent them a piece of equipment which was out of guarantee for repair, it was returned within four days, plus a very helpful phone call to explain to me what I

had done wrong to cause the trouble.

Perhaps you may be able to find room in your magazine to pass on to your readers about this company, by the way I have no connection with them apart from being a very satisfied customer.

D. Johnson, G8AYK.

Dear HRT,

I am writing as a member of the public who was introduced to amateur radio recently by a new radio ham, Mark G7OEZ from Barnsley. After being introduced I was amazed and decided to become a radio ham operator. After asking around I found a gentleman, Ken G8VDP also from Barnsley, who was very helpful and now is teaching me to do the Novice 'B' exam. I would also like to take the time to say that the HRT monthly is a great help to keep the public and learners of ham radio in touch with the world of ham radio, and I will be getting HRT for a long time to come, well done!

P. Moore.

Editorial Comment:

We're always pleased to publicize the help given to newcomers to the hobby, well done lads!

Dear HRT,

Some of your readers may, or may not, be interested in the method I used to support my 50ft wire aerial, allowing me to easily move it thus changing it's angle, and enabling me to take the pole with me should I, as I am hoping to do, move house.

I had previously obtained two (approx) 9ft lengths of water pipe, one of a diameter that it would slide inside the other. I drilled a hole about 2ft 6in from the top of the larger diameter pole to allow the inner one to rest on a bolt, and then intended to fix the base in the ground. However, I

was concerned that with two or three feet of pole in the ground the remaining length would be a little low. I live next door to a garage and noticed a large pile of old car tyres. The owner informed me that he would be happy if I took some away, so I took four.

Placing the tyres on top of each other, I inserted the pole in the centre and filled the remaining area with concrete and rubble. Leaving the concrete to dry for a while, I now have a solid foot with a 2-1/2in by 9ft metal tube sticking out of the top - total cost about £11.

I can, with a bit of effort, move the foot about to my hearts desire, experimenting as I go and safe with the knowledge that nothing short of a small earthquake will case it to fall over. Leaving the top 3in clear of concrete, I packed the top with earth and popped in some hangy type border plants. So it's more than just an aerial support using recycled materials, but a flower pot as well..

Titus Drummond, G0ILT.

Editorial Comment:

Thanks for sharing your idea with our readers Titus, this certainly looks like a useful low cost method.

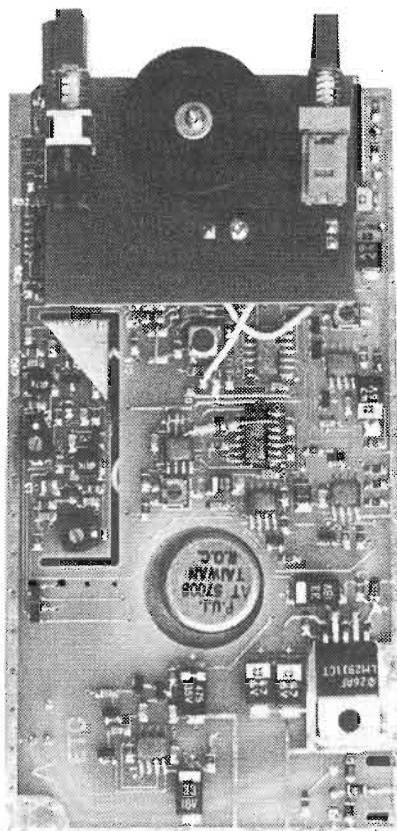
Dear HRT,

I bought a Hitachi LCD screen from the foyer at the Slough radio rally. After many hours probing and head scratching, I managed to get it working on my BBC micro. Pride and pleasure soon turned to dismay as the next day one of my 'little monsters' managed to crack the screen! If the chap who sold me the screen, or anyone who may be willing to sell me their screen could contact me at 242 Southcote Lane, Southcote, Reading, Berks RG3 3BA, I would be eternally grateful.

Paul Martin.

You've just got your packet TNC wired up, but you're not having any luck 'on air' – you probably need to set your transmit audio level up but don't have any gear. The repeater is giving your 2m or 70cm transceiver overdeviation 'pips'. Your 6m DX setup is getting 'wiped out' by an unknown PMR transmitter or something similar, but you can't identify what the signal is and you don't even have a clue what frequency it's on. People tell you that you've a fault with the microphone on your mobile rig, your voice keeps cutting out, but how do you find the fault? That ex-PMR rig you've just got lined up and can't get any QSOs on, is it actually transmitting any audio?

Does this sound familiar? Maybe it does. In comes the test gear. Originally designed and manufactured to meet the needs of a portable test tool for two-way radio communications testing, the R10 'FM Communications Interceptor' should be able to help with all these



look for the 'next signal along', normally finding one within a tiny fraction of a second. Yes, we *did* use the 'skip' button quite a lot with the R10 at maximum sensitivity! But with the squelch level turned up, just very local signals came through, like the HRT Editor using her 70cm handheld in the next office (cheek – Ed!).

Conclusions

The uses of such a unit can really only be limited by your imagination. For constant-carrier interference source investigation for example (the RF-noisy computer down the road?), just let the R10 lock onto the signal, then use the S-meter coupled with the squelch control (which we found actually worked as a wide range RF gain control, the S-meter level changing accordingly) to 'home in'. With the built-in deviation meter, this having a switchable range of 10kHz or 100kHz maximum reading, it can be

Optoelectronics R10 'Interceptor' Review

The Editorial team with a 'user review' of this wideband monitor

things. We know that some business users will also find it handy. Why? Well, read on...

What It Does

To listen to a given signal, you could use a scanner receiver, tapping in the receive frequency and simply listening. Alternatively, if you don't know the exact frequency but the approximate range, you could set the receiver searching across that band, waiting for the signal to come up. The R10 acts as a 'sweep coverage' receiver as well, but with a very wide range of 30-2000MHz. It quickly locks onto any reasonably strong signal, lights the 'lock' LED, shows you the signal strength on a bargraph meter, displays the FM deviation of the signal on another bargraph meter, and lets you hear the modulation on the signal from its built-in speaker! You can set the signal detection level of the unit using the top-mounted 'squelch' control, this in fact varies the detection level over a very wide range (from 25W signals around a quarter of a mile or so away to those virtually 'next door').

Measuring 71mm (W) x 131mm (H)

x 34mm (D) it's easy to carry in your hand, and comes complete with internal nicads (giving 4 hours plus use), a plug-in wall charger, earphone, and a plug-in telescopic whip aerial terminated in a BNC plug, you can of course use any other type of aerial to suit your needs.

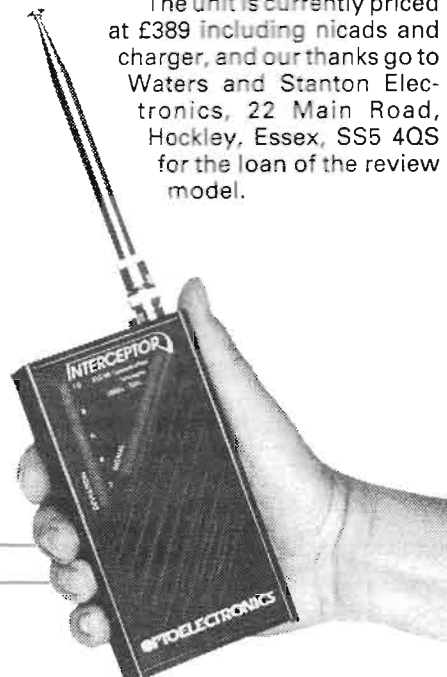
There's a Lot Out There!

There are, of course, many RF signals flying about, and as you can imagine at its maximum sensitivity setting, the R10 would be constantly locking on virtually everything. Coupled to our rooftop 2m/70cm aerial, it certainly did! BBC and IBA local radio (several miles away), the packet station a few hundred metres away, the CB operator down the road, the kids using the cordless phone in the garden, and a lot more besides...you name it, it received it! For US use, the accompanying details even say you shouldn't use it anywhere near cellular phone transmitters, to make sure you don't overhear telephone conversations.

In use, a 'skip' button is fitted to the top panel, and after locking onto a signal, a press of this switches the R10

used for checking your rig, or indeed that of the amateur in the next street or so. Of course it has very, very powerful implications for 'transmitter hunting' purposes, and we wouldn't be surprised if some R10s are 'snapped up' by certain people who'd like to check they weren't being 'bugged' and the like! The R10 Interceptor isn't cheap, but it can be quite a useful accessory to have around.

The unit is currently priced at £389 including nicads and charger, and our thanks go to Waters and Stanton Electronics, 22 Main Road, Hockley, Essex, SS5 4QS for the loan of the review model.



Rexon RL-102 Review

Chris Lorek G4HCL tests a budget 2m handheld that's packed with features

To be launched at this year's Leicester show is the new Rexon RL-102 fully-featured 2m handportable. At an introductory price of £179 this looked 'too good to miss' for the HRT review team, so in we went, managing to obtain a set for review just in time for publication in this pre-show issue!

Features

The set has the capability of all the usual 'bells and whistles' of much higher-priced sets, such as direct key-board entry, expanded frequency range if required (130-175MHz), various scanning modes, normal and pro-

grammable repeater shifts, 'odd-split duplex' between memory channels and so on, together with plug-in options of CTCSS tone squelch and DTMF paging and selective calling.

The set comes supplied with a battery case which houses six AA size cells (nicads or dry batteries), and with this in use the transmitter gives around 2W output power, optional 600mAh 7.2V and 12V nicad packs being available. Either plugging in an external 12V supply via the set's DC socket (which accepts 6-16V), or using the 12V nicad, raises the maximum transmit power to around 5W, and 'Mid' and 'Low' power levels of around 2.5W and 350mW re-



spectively can be selected to conserve battery power. Another 'battery saving' measure is a switchable economizer, this cycling the receiver on/off quickly in the absence of a signal, cutting power consumption to a third.

On the top panel, rotary controls are fitted for channel change and on/off/volume, plus a smaller squelch knob (designed to prevent accidental adjustment). A dual colour LED lights green when the squelch raises, and red to indicate transmit mode, next to this are the usual external mic and speaker jack sockets plus the BNC aerial connector. A very flexible 'rubber duck' helical is supplied, together with a belt clip, wrist strap, and user manual. The set measures 152mm (H) x 63 mm (W) x 34mm (D) and weighs 300g with the battery pack and aerial fitted.

Channels

Together with the facility of direct frequency entry and manual tuning in selectable steps, 20 memory channels plus a quick-access 'call' channel are fitted to allow for frequency storage (the 'call' button doubling as a 1750Hz

toneburst button on transmit). The memory channels are arranged in two banks of ten channels each, with channels 1 and 2 of each bank being capable of 'odd split' use plus various tone frequency storage modes, and standard repeater shifts etc. can be stored in the remainder of the channels.

A number of scanning facilities are built in, for example an 'all band' scan, a 1MHz scan, scan between two preset frequencies (these being stored in memory channels 8 and 9), and scanning of either or both memory channel 'banks'. As well as this, a 'dual watch' scan lets you alternate between two frequencies, or between a preset frequency and scanning your selected memory channels. Either 'pause' or 'busy' scan mode can be selected to suit the operation you prefer.

CTCSS and DTMF

A number of 2m repeaters now have CTCSS (sub-tone) access as an alternative to the usual 1750Hz toneburst access (CTCSS often helps you get in with a 'weaker' signal, i.e., from a handheld). The RL-102 has the

facility via a small plug-in option for sub-tone encode on repeater channels, as well as 'full' tone squelch (encode and decode) for 'quiet' monitoring on simplex or repeater channels. Memory channels 1 and 2 in each bank can store differing sub-tone frequencies along with the operating frequency and any 'odd split', the remainder of the channels storing tone squelch on/off status.

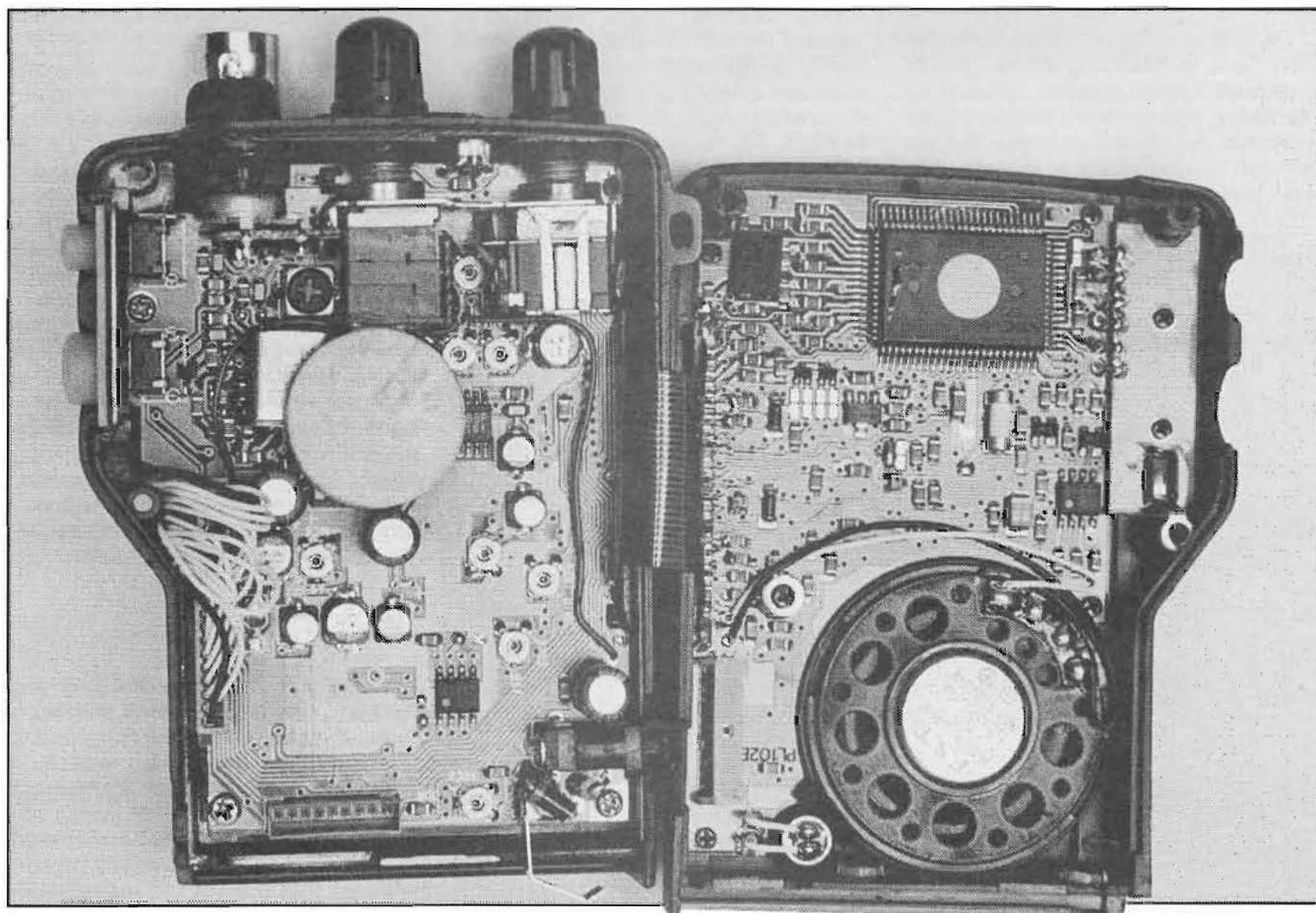
A further plug-in option is a DTMF board, which lets you add 3-digit 'paging' and 'coded squelch' operation to the set. In 'coded squelch' mode, the speaker becomes unmuted only after the correct 3-digit DTMF sequence has been received, your set automatically transmitting this at the beginning of each 'over' (this can also be used in conjunction with CTCSS if you really want). 'Paging' adds an alert tone to the reception of a correctly decoded sequence, together with the 3-digit ID of the person calling you displayed on your set's LCD, you can also program a second ID for 'group call' use between a number of stations (often the same sequence as the 'coded squelch'). Both CTCSS and DTMF units were supplied with the review transceiver, these I found took a just few minutes each to fit inside the set.

On The Air

On switching on at home and tuning to my semi-local (i.e., rather weak) repeaters, getting ready to wave the set around to find a 'good spot', I found I didn't need to. Why? Quite simply, I found the receiver was exceptionally sensitive, so much so that I could comfortably listen away from my living room armchair when I otherwise had to struggle to receive *anything* with my 'usual' 2m handheld!

The other thing I noticed was that I didn't get 'blasted' from my very local 2m packet nodes, these being just a few hundred metres away. 'What's *inside* this rig?' I thought. It was just a pity that the 2W on transmit wasn't quite enough to make it 'back' most of the time, although this showed it wasn't just a 'lift' in band conditions causing this.

After programming up the memory channels I got down to giving the set a thorough testing. Connecting my rooftop aerial brought in very distant signals very well, and although I didn't get troubled with strong signals, my only 'gripe' was that, in scan mode, I couldn't always 'squelch out' the many repeater channels I was now receiving due to the set's good sensitivity! However, reprogramming the memory





'banks' together with use of the 'set' mode of the rig allowed me to 'personalize' the operation roughly to that I like (i.e., local/distant channels, scan pause mode, beep tones on/off, auto power off and the like). Various 'lock' features also let me prevent accidental shifts when preparing to go out and about with the rig. I even found that I could use the battery economizer even with the rig in 'scan' mode (at a slow scan rate than usual) to extend battery life.

Out and about, on receive I found there was outstanding audio quality from such a small speaker, rather than the 'topy' and distorted audio I'd have expected. As I found at home, the set certainly pulled in weak signals very well indeed, and I noticed very few

problems from the many, many strong signals all around me, both in the 2m band and outside of it.

For one-handed portable use, I found it useful to be able to quickly switch between memory channels by a single button press of the keypad (i.e., '1' for channel 1, '6' for channel 6 and so on), and the 'mon' button overrode the squelch (and any programmed CTCSS tone squelch) to let me check the receiver volume and the like. I found the rotary channel knob sometimes 'missed' the odd channel when I turned it which was sometimes a bit annoying, although checking a further sample showed this didn't happen on that one. At night, the backlight illuminated the LCD quite well, but unfortunately none of the set's buttons, and I often needed

to use this as a 'double check' that I'd got to the channel I wanted.

One 'oddy' I found was that memory channels 1 and 2, despite storing additional parameters to the other channels, wouldn't store a 2m repeater shift! But here I simply enabled the 'dual' function on the set to give 'odd split' operation between channels 1 and 2 in each of the two banks, which got over the problem.

During the tests, I used my own 600mAh nicads fitted in the set's battery holder, these quite happily gave me a full day's worth of operation. I often have mixed feelings about manufacturer's 'purpose built' nicad packs, these I find are often far more expensive than the cost of buying individual nicads, and I've often replaced the internal cells in my own nicad packs (after prising them open very carefully!) rather than buy replacement packs at the end of their usual life of a few hundred recharges. Thus the 'cell case' option can be quite useful for those on a budget, although you should be careful not to short the pack terminals in such cases (i.e., with metal keys in the same pocket as a spare cell pack loaded with nicads) as unprotected nicads can develop quite a high current.

Technicalities

Opening the set up shows a very neat and tidy arrangement, with automatically-assembled chip components aplenty. For the price I was quite honestly expecting to see a proverbial hand-wired 'rats nest' of wires and added-on components! The laboratory signal generator measurements showed that the set did indeed have



superb receiver sensitivity, together with good strong signal performance (i.e., rejection of unwanted signals), important in today's crowded spectrum. With the battery economizer in operation, an average of just over 10mA was drawn, which explained the good battery life. On transmit, the set gave a reasonable power output, again without a high current drain.

Conclusions

The RL-102 I feel offers excellent value for the budget-minded amateur, without sacrificing good technical performance, the receiver was particularly very sensitive. The set was quite easy

LABORATORY RESULTS:

All measurements taken using fully charged nicads in supplied holder, high power TX, otherwise stated.

RECEIVER;

Sensitivity;	
Input level required to give 12dB SINAD;	
144MHz;	0.11µV pd
145MHz;	0.11µV pd
146MHz;	0.11µV pd

Squelch Sensitivity;	
Threshold;	0.05µV pd (3dB SINAD)
Maximum;	0.15µV pd (20dB SINAD)

Current Consumption	
Standby, squelch closed; 32.5mA (economizer disabled)	
Receive, mid volume;	99mA
Receive, max volume;	217mA

TRANSMITTER

TX Power and Current Consumption;			
Freq.	Power	7.2V Supply	13.2V Supply
144MHz	High	1.65W/545mA	4.90W/842mA
	Mid	1.65W/545mA	2.43W/590mA
	Low	330mW/279mA	330mW/295mA
145MHz	High	1.62W/545mA	4.93W/840mA
	Mid	1.62W/545mA	2.47W/593mA
	Low	330mW/280mA	330mW/290mA
146MHz	High	1.62W/542mA	4.95W/835mA
	Mid	1.62W/542mA	2.49W/590mA
	Low	340mW/280mA	340mW/292mA

Frequency Accuracy;
-360Hz

to use when out and about, in 'memory channel' mode a single button press was all that was needed to change channels. The set fitted into my hand comfortably, and apart from pressing the 1750Hz repeater access 'call' button (which was a two-handed affair) I found I could comfortably use the set single handed. I believe that a virtually identical 70cm unit may also be available in the future, which I'm sure will be popular with Novice licensees.

My thanks go to South Midlands Communications Ltd., S. M. House, School Close, Chandler's Ford Industrial Estate, Eastleigh, Hants, SO5 3BY, Tel. 0703 255111 for the loan of the review set.

Image Rejection;
Increase in level of signal at first IF image frequency (-43.6MHz), over level of on-channel signal, to give identical 12dB SINAD signal;
76.5dB

Maximum Audio Output;
Measured at 1kHz on the onset of clipping, 8 ohm load;
295mW RMS

S-Meter		
Indication	Sig. Level	Rel. level
1	0.18µV pd	- 20.4dB
3	0.26µV pd	- 17.4dB
5	0.53µV pd	- 11.3dB
7	0.84µV pd	- 7.3dB
9	1.94µV pd	0dB ref.
9+	3.95µV pd	+6.2dB

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;	38.9dB
-12.5kHz;	35.0dB
+25kHz;	68.2dB
-25kHz;	65.6dB

Blocking;	
Increase over 12dB SINAD level of interfering signal modulated with 400Hz at 1.5kHz deviation to cause 6dB degradation in 12dB SINAD on-channel signal;	
+100kHz;	81.6dB
+1MHz;	97.9dB
+10MHz;	99.4dB

Intermodulation Rejection;	
Increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product;	
25/50kHz spacing;	68.3dB
50/100kHz spacing;	65.7dB

Harmonics;	
2nd Harmonic;	-87dBc
3rd Harmonic;	<-90dBc
4th Harmonic;	-78dBc
5th Harmonic;	-75dBc
6th Harmonic;	<-90dBc
7th Harmonic;	-79dBc

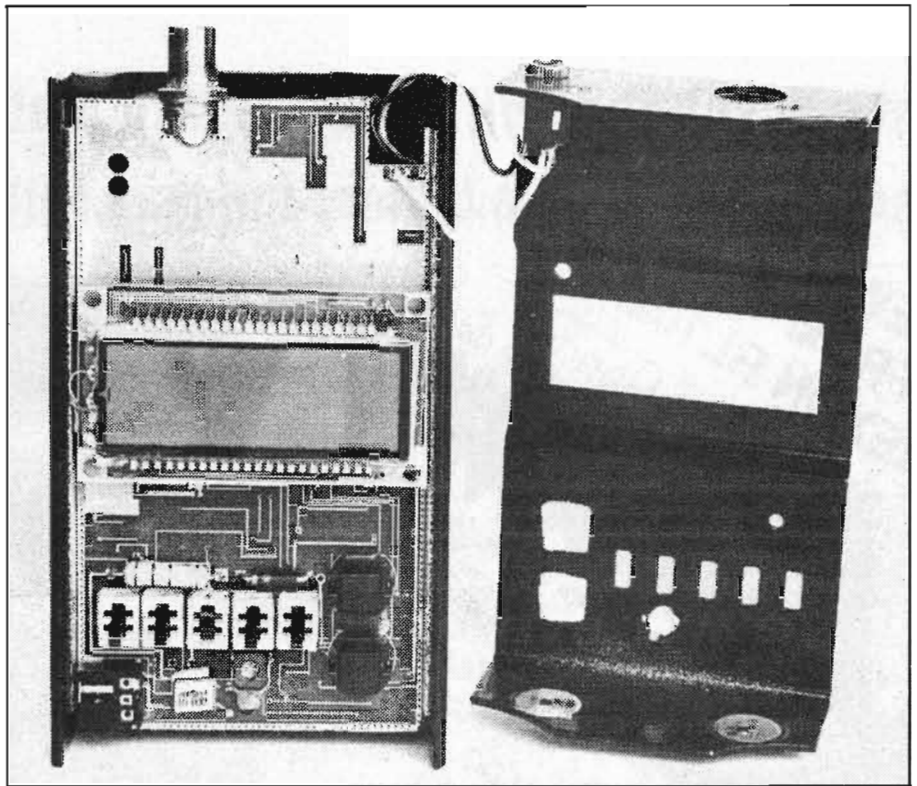
Toneburst Deviation;
3.55kHz

Peak Deviation;
5.42kHz

Around 14 years ago, the HRT Editor, Sheila, built her first frequency counter, a 30MHz unit using 23 ICs on a large PCB. Technology has, of course, advanced somewhat, and in 'real' terms allowing for inflation etc., the components, case etc. of her unit cost just as much as the tiny feature-packed 2.4GHz M1 Handicounter!

Whereas early counters often had just an RF input, the M1 is literally packed with modes, buttons, and digital processing features. Covering the range 10Hz-2.4GHz, it's a pocket sized unit measuring 124mm (H) x 71mm (W) x 34mm (D), powered by its own nicads which give around 5 hours of portable use, a 9V DC input facility also being provided. A 10 digit LCD with a switched backlight shows you the frequency and operation mode, plus a 16 segment LCD bargraph to display the received RF signal level.

Why the latter? Well the M1 has a



Optoelectronics M1 Handicounter Review

The Editorial team with a user review of this handy accessory for your station

very, very high sensitivity (for technically inclined readers, it's $<200\mu\text{V}$ at 150MHz and $<3\text{mV}$ at 800MHz), so in 'physical terms' you just can stand anywhere relatively near a transmitter (even a few hundred metres away) and get a frequency reading with just a small whip aerial plugged into the counter! If you're 'frequency hunting', the M1 has the facility of an 'arm and store' mode, where you can store and recall up to three off-air measured frequencies. Not only that, but a digital communications port lets you couple the M1 up to your fixed or portable computer via an optional TTL/RS-232 level interface, for data logging and the like. In terms of frequency accuracy, basically it's as accurate as what you reference it to, e.g., an off-air frequency reference (an adjustment via the top cover gives a 10ppm adjustment range), and for really accurate measurements a 0.2ppm TCXO is available as a factory-fitted option.

A digital filter mode can be used to stop the LCD showing random figures when it isn't receiving anything, and a 'digital auto capture' holds the last received frequency each time until a new one comes along. We found this worked very well, the 'gate' LED flashed quickly each time it received a new signal, the

LCD then displayed the frequency of this so we could either make a note of it or even place it into one of the 'auto-memories' of the unit.

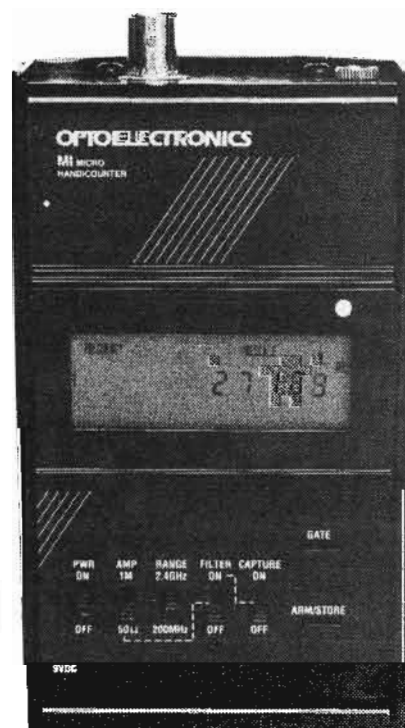
Let's think of a few possibilities - your 2m repeater is getting intermodulation problems from the vast array of other transmitters on the shared radio site. Leave the M1 up there for an hour or two, maybe even coupled to a PC, and hey presto, you can see exactly

what other signals are also present on site! Alternatively, couple the counter to your discone aerial at home, and you'll soon have a nice readout of all locally used frequencies, in whatever band they may be in!

Conclusions

We found the M1 worked very, very well, decoding signals accurately and quickly. The PMR transceiver used by our local milkman often 'wipes out' our TV when he parks up near our home, high pass filters having little effect, yet the M1 quickly gave us the information needed to 'knock up' a short stub filter tuned to the exact frequency to cure this! For 'lab' use, a 1M Ω input impedance can be switch selected in place of the 50ohm input (as used with a plug-in aerial), and the counter plus level indicator thus becomes very useful for test and alignment, especially for modifying ex-PMR radios to the amateur bands! Something like this could also be quite useful for a 'club joint purchase'.

The M1 is priced at £259 including nicads and charger, and our thanks go to Waters and Stanton Electronics, 22 Main Road, Hockley, Essex, SS5 4QS, for the loan of the review model.



Shacklog Program Review

Don Field G3XTT reviews a logging program for your PC

Logging programs are always of interest nowadays, with so many amateurs having computers in the shack. I first saw G3PMR's *Shacklog* over two years ago (see HRT, June 91), my verdict then was that it showed promise but needed some additional features, such as import capability from other logging programs, and a TNC interface to allow access to the packet network whilst in logging mode. I'm delighted to say that Alan has done all of this and more, as I found recently when I had the opportunity to evaluate version 3.22.

So let's start at the beginning. Shacklog now handles all bands through to 23cm, and is written very much with UK logging requirements in mind. By this, I mean that you can record all the information called for in your licence (CQ calls, station close-down, etc). One of the fields is suitable for recording the QTH locator, making the program very useful for VHF operators. Shacklog comes with a comprehensive 90-page manual, and I found installation and configuration to be very straightforward. To use the packet facility (which I find invaluable as I like to be connected to the PacketCluster system when I'm in the shack in order to see what DX is about), your computer must have an EGA, VGA or SVGA monitor, but most PCs nowadays meet this requirement. The only other hardware requirements are a hard disc and at least 512k of RAM. Shacklog also provides a transceiver interface, which currently works with the Yaesu FT757GX, most Kenwood HF radios, and the Icom computer interface (supported by the IC-735 etc. as well as by Ten-Tec's Omni VI) allowing you to QSY the radio from the keyboard. G3PMR is prepared to consider developing interfaces to other transceivers as demand warrants.

I found that Shacklog worked fine with my PK232 TNC, and behaved extremely well under Windows. In fact, I am writing this review using Wordstar as one DOS session under Windows, whilst Shacklog is running happily in another session and sending audio alerts to the PC speaker whenever a DX spot comes in!

Shacklog does everything you would expect of a full-featured logging program, and I cannot do justice here to all its facilities. Entering contact de-

tails is very simple, with much of the information being filled in automatically. Date and time are taken from the computer's internal clock, if you are in 'real-time' mode, while band, mode and power are carried forward from the last contact. Also, and a feature I particularly like, if you have worked the station before and made a note of his name, QTH, or whatever, this information is brought up automatically. Enter 'contest mode' and the program will also keep track of serial numbers for you.

A unique feature of Shacklog is the way it keeps track of countries. Unlike most logging programs which have a separate look-up file for country prefixes, which needs to be kept up-to-date, Shacklog starts with no knowledge about countries whatsoever. This may sound odd, and the first time I saw it I had some doubts. However, it is an approach which seems to work well in practice. As you enter callsigns the program will ask you to type in a country name. The next time it sees a similar prefix it will 'guess' at the country name. This way, over time, Shacklog builds up a comprehensive database of prefixes. My main reservation is that under certain circumstances, for example when importing a log from another program, or in the heat of a contest, you won't be able to check the country name for every QSO at the time, though you can always edit the log afterwards and ensure that every contact is correctly credited.

Why does it matter? Well, of course one of the great benefits of computer logging is to be able to analyze your log afterwards. This is one of the areas in which Shacklog really comes into its own. It has very comprehensive but easy-to-use reporting capabilities, enabling you to do one-off queries of your log or to set up a report format for regular use. For example, I and some friends compete in an annual table to see how many countries we can work on CW on each of the HF bands. We exchange our scores on a weekly basis. In the days of paper logging it would have been very tedious to do this. With computer logging, working out the total each week is a matter of running a standard report, which takes only a matter of seconds.

Shacklog supports import of other Shacklog files as well as from K1EA's

CT contest log, G3WGV's contest log and *Clusterm*, EI5DI's *Super Duper*, WB2DND's and G4TYF's logging programs, and Peysoff's *Radbase*. And, just in case you have been using some other logging program, there is a general purpose ASCII import facility, which will allow you to import data from just about anything. I tried the import facility with an EI5DI Super-Duper file and a G3WGV contest log file, and both worked fine. The G3WGV log was almost 1100 QSOs, and the import took about 6 minutes on my 486 PC.

Once you are familiar with the basic workings of Shacklog, a number of configuration options are available. These range from being able to change screen colours, to setting up label formats for QSL printing. Incidentally, one very neat feature of the label facility is being able to pull up data from the packet screen (particularly useful when it's a QSL manager address from the QSL manager database on the PacketCluster) and place it directly into a label field, so you don't even need to write out the envelope! The QSL card labels can also be printed ready-sorted for sending to the QSL bureau. Having over many years had the experience of sorting several thousands of outgoing QSL cards by hand, especially after one of my DXpedition operations, I can only say that this is a real blessing!

An IOTA (Islands on the Air) database is available as an add-on option. When installed, you can find information about a particular island group at the press of a key. As an avid island chaser I find this facility invaluable.

All in all I can heartily recommend Shacklog. While not as feature-rich as G3WGV's *Turbolog* (see my July 1992 review), Shacklog is less than half the price and, in some ways, is easier for the inexperienced PC owner to configure and use. Support is only a phone call away, and G3PMR has a number of enhancements in the pipeline for future releases, so Shacklog should be able to meet all your logging requirements for years to come.

Shacklog costs £27.50 (cheque/cash only) from Alan Jubb, G3PMR, the add-on (optional) IOTA database is a further £7.00. As always when ordering software, be sure to specify disc size, and remember to mention HRT when inquiring!

To The Far Flung Limits Of These Islands

Jack Hum, G5UM undertakes an investigation of the how and where of repeaters in areas remote from the large conurbations. The first of two articles.

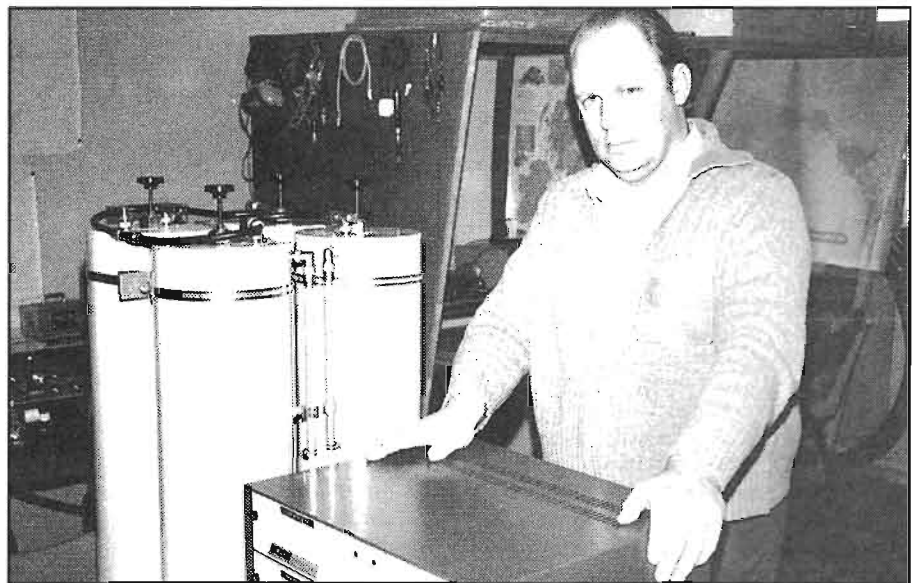
Twenty years ago Britain's first 145MHz repeater took to the air, the brainchild of a number of clever young design engineers at an establishment not many miles from Cambridge. Since then the chain of repeaters which has proliferated in the UK supports the assertion often made by your correspondent that it is the most important collective technical development there has been in recent years. It might be added that packet radio is coming up closely behind.

Not only has the availability of 2m and 70cm repeaters greatly extended the communications range for mobiles: it has done something else, and that is to serve as the prototype for repeater systems in many other countries, not all identical to the British one but borrowing much from it.

There are still many metrowave operators who decry repeaters either through snobbishness ('I wouldn't be heard dead on one') or, with much more validity, provoked by some of the misuse to be heard on them. Because most repeaters serve large conurbations they attract both the average operator and the scum fraternity at the same time, (definition of scum fraternity: those who deliberately jam repeaters or bring them into disrepute by the use of stupid language stemming possibly from synthetic Radio 1 heartiness). No wonder those responsible amateurs who hear what goes on remain unsold on the repeater ethic.

Conurbations produce all sorts and conditions of homo sapiens, they produce all sorts and conditions of radio operator, most good, a few marginal and a rump who discredit amateur radio in general and the repeater systems in particular.

But what is repeater life like outside the big centres of population? As the repeater maps and lists in The RSGB Callbook reveal, there are places of



sumably even sparser of that professional electronic expertise without which repeater design and commissioning would be difficult indeed. Your G5UM has for a long time been curious about how these repeaters came to life, what problems they faced during their period of gestation and how much 'trade' they enjoy once they are up and running. I wrote to half a dozen repeater keepers and received some surprising answers. Collectively, these answers amounted to virtually a conspectus, almost a textbook in miniature, on how to go about planning and commissioning a repeater system, and about properly using it too. First then to the far north....

GB3LU: where Norway is local

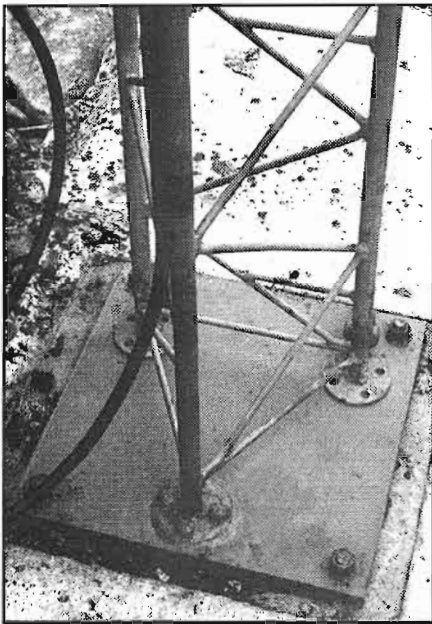
To many people, and particularly the more elderly who may have done war service there, the Shetland Islands evoke the vision of a region where the

Logic designer Jim Butler, GM3ZMA with the GB3LU repeater unit, based on ex-PMR equipment modified for use on channel 3 in the 145MHz band. On the left is the Waycom duplexer.

all the time. Aerial structures in such an environment need special strengthening and protection. Here in the words of Repeater Keeper Arthur Tait GM4LBE, is how the team went to work to ensure that their GB3LU repeater at Lerwick, would continue to provide a service whatever the weather might throw at it;

"There was an occasion in January when the Shetland Islands had the worst storm in living memory. A gust of 196mph was recorded and steady wind speeds reached 125mph. The repeater installation was still standing afterwards!"

Arthur goes on to say that although no special protection was needed on account of the weather because the site hut is waterproof and substantial, special attention was paid to the aerial



Members of the Repeater Group of the Shetland Radio Club in a joint co-operative operation made a stout engineering job of the base of the lattice mast at GB3LU, engineered to stand the worst that the northern winds could hurl at it.

liberally coated with 'Sylglas', which in Arthur's words "...is the finest WX protector since sliced bread!" It is used by local communication firms for the radio equipment on North Sea and Atlantic fishing boats.

As for the contents of the site hut, there are two complete repeater units plus a Wacom duplexer obtained from America. The Shetland Repeater Group will tell you that it is greatly indebted to Jim Butler, GM3ZMA who was responsible for the logic circuitry. The RF side of the installation is based on ex-PMR equipment modified for use in the 145MHz band on channel 3. The reliability of GB3LU has been excellent during its eight years of life. Having a complete spare repeater unit available ensures that reliability may be maintained besides being very comforting! As for the personnel behind the enterprise, the Shetland Repeater Group is in essence the entire membership of

the Lerwick Radio Club, GM3ZET, everything is done on a very friendly and informal basis.

But what about unfriendly characters like those who infest repeaters in large urban areas? Arthur Tait reports that in a remote region like Shetland there is no such problem and certainly no abuse. He adds; "the use of GB3LU is more by fixed stations than by mobiles, ideal for times of power cuts in the remote islands, and of course invaluable for general ragchews".

Visiting amateurs use GB3LU frequently during the summer months, including many from Scandinavia. Apropos which, it is worth adding that under 'lift' conditions operators come up on 'LU from most of the Scandinavian countries as well as GM and sometimes even G, not forgetting OY land, the next northabout group of islands between Shetland and Iceland. The Arctic Circle at 650 miles is about the same airline distance as London, way down south. With Bergen little more than 170 miles to the east over a sea path, signals from LA land are almost local.

GB3OC: The story of 'Oscar Charlie', Orkney-Caithness

At 150 miles from GB3LU lies GB3OC just outside Kirkwall, the capital town of the Orkney Islands. The concept of a metrewave repeater to serve both Orkney and Caithness was much discussed during 1980 by GM4FZH in Caithness, GM8LMA, at that time working in Orkney, and GM4RZJ,

A panorama of the Shetland topography showing the GB3LU building on the left and the Hustler co-linear at the summit of the 6.5m lattice mast. The big mast next to it belongs to professional communications services.



who lived in Orkney but was working in Caithness. They thought a repeater on 145MHz would serve a very useful purpose and would help Orkney and Caithness amateurs to communicate readily with one another. Thus the Orkney-Caithness Repeater Group was born. In the words of Bill Wright, who has been repeater-keeper since the outset, "Initially, it had no members as such but it did have notepaper, and I was the nominal chairman and filing cabinet!" As the group burgeoned in the succeeding months it was faced with the problem of holding committee meetings with members either side of the turbulent Pentland Firth. Answer; have the meetings using a conference-type phone.

After much letter writing and gavering by higher authority, GB3OC went on the air on 17th February 1984, rather more than two years after the proposal and the decision by almost all the Orkney amateurs that a repeater would be a good thing. The event was signalled by a whimsical press release;

'Birth notice; on Wideford Hill near Kirkwall, Orkney, at 4pm on Friday 17th February 1984, to Orkney-Caithness Repeater Group, their first offspring, GB3OC. This result of a liaison between two groups of radio amateurs, separated by what is probably the worst piece of sea in the UK, was conceived in 1981, although the formal application to conceive was not lodged until June 1982. The gestation period was beset with alarms that the outcome would be a still birth. The proud parents' thanks are due to all who helped at the ante natal stage, including JayCee Electronics and Heller Electronics and to the many amateurs and professionals who gave of their time and substance, whose names have been forgotten in the passage of time, but whose contributions will certainly not'.

It was agreed in this 'gestation period' that Caithness, with the benefit of Thurso Technical College (where GM4FZH with a PhD was head of electronics there), plus further backing from the scientists at nearby Dounreay UKAEA site, would provide the equipment, while Orkney would organise the site and keep an ear on the repeater when it was up and running. By a stroke of luck for the group, the North of Scotland Hydro Electric Board were moving out of one of their bunkers on Wideford Hill and were quite happy that the 'OC Group should take it over. They even left the heliax and mast for GB3OC. Soon the donated Jaybeam ground plane aerial was in position, well spaced from the metal 'corset' on the mast to give a cardioid polar diagram with the null to the north. To quote Bill Wright, GM3IBU once again; "For reasons of

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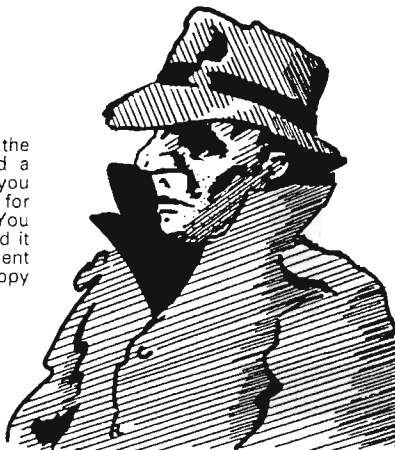
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expertise it was specified that the repeater design should not be esoteric, should be reliable, simple to service with an Avo and a damp finger".

Design of the repeater

A Uniden 2030 was donated by JayCee Electronics together with the appropriate crystals. There are separate boards for transmit and receive fitted into separate die-cast boxes. The output stage was derated to 5W and became the driver for an outboard PA donated by Heller Electronics, delivering some 11W to the aerial. The logic is a GB3US board, there is no time-out, LED indication for DC on, squelch lifted and PTT on. The receiver section has been given a pre-amplifier, and the complete installation is in a 19 inch rack panel. Single aerial working is used with a total of six cavities built into the lower half of the five foot rack. Weather protection measures paid special attention to coaxial joints, a natural thing to do in any communication installations in a far north environment.

As a matter of history it should be reported that the first exchange through 'OC was made on 17th February 1984, between Anne GM6WPA, and Kim GM4LNN, two of the three YL operators

And reliability?

Remarkably good, reports GM3IBU, in spite of two especial hazards. One of them of course, is the inhospitable weather. One winter GB3OC was off-air because of snow, a problem cured by fitting a standby battery on the set/reset gate so that if the mains power goes off the unit remains alive, whether the power cut be milliseconds or 20 minutes. The second hazard is that GB3OC is at the end of a long line provided by the hydro-electric board to connect the terrain into the national grid. This power comes by overhead line across Sutherland and Caithness and produces momentary dimmings and blips. A fairly short blip would unset the set/reset latch in the logic. Now thanks to that spare battery, normal service is maintained.

How much 'custom'?

As might be guessed, GB3OC is used a great deal by tourists during the summer season. Throughout the year its good coverage of both Caithness and Orkney ensures it a steady clientele on both sides of Pentland Firth, a useful link between the islands and the mainland, with activity not only from the

coast centres of population, Wick and Thurso (populations 6,000, 7,000, and 8,000 respectively).

A comment by Repeater Keeper GM3IBU regrets that high power stations using beam aerials over 100 miles away attempt to capture the repeater and are full of complaint that "...OC does not do this or that". Bill echos a comment frequently made here; "Many of the newer users of the repeater tend to forget that the concept was to provide an improvement for the mobile or portable operator, or for those badly sited".

A couple of months after GB3OC went on the air a formal Constitution was prepared. Its wording provides a balance between two separate amateur populations on both sides of the Firth and restricts the numbers of the Committee to be drawn from one side or the other, an admirable example of 'combined operations'. The committee meetings as described above are by conference telephone!

Finally, finally, GB3OC changes its callsign once a week, it becomes GB2RS each Sunday morning. For the next half hour channel RS becomes a broadcast station, another extremely useful service to all within its capture area. In the next part of my article, the stories of the

Storno 5000 conversion to 2m

*Mike Rowe G8JVE converts the synthesized
CQM5114S VHF ex-PMR transceiver to a useful 12
channel 2m rig*



The Storno CQM5114S is a synthesised high band transceiver with a power output of 25W, and in its basic form as received is a 6 channel 12.5kHz unit. The modification described in this article will enable the amateur to convert this to a very useful 12 channel transceiver, the choice of channels being programmed into a diode matrix board

with a binary adder providing the necessary 600kHz offset for repeater use.

The conversion is very straight forward requiring only two crystals to be changed, the test equipment required being a DC voltmeter with diode probe, frequency counter, oscilloscope, and signal generator (or a local transmission source).

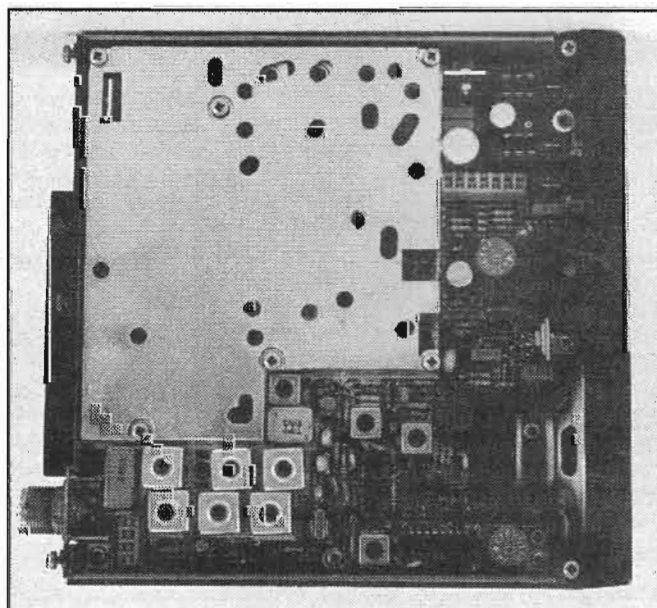
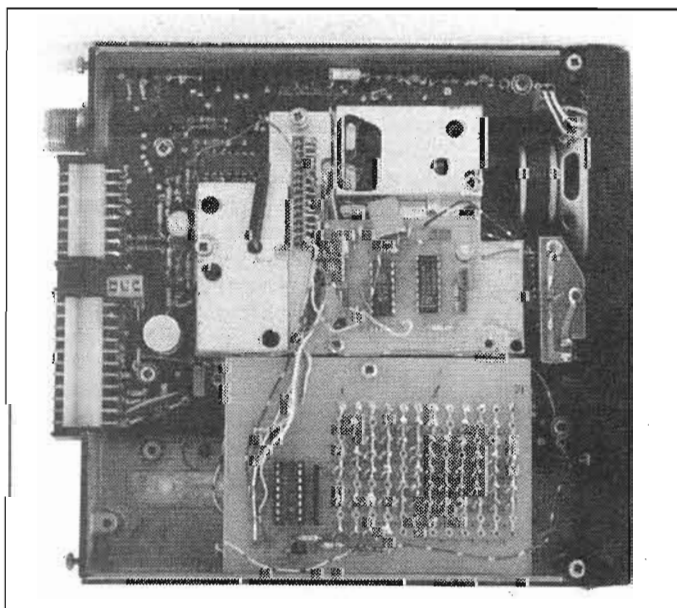
The Synthesizer

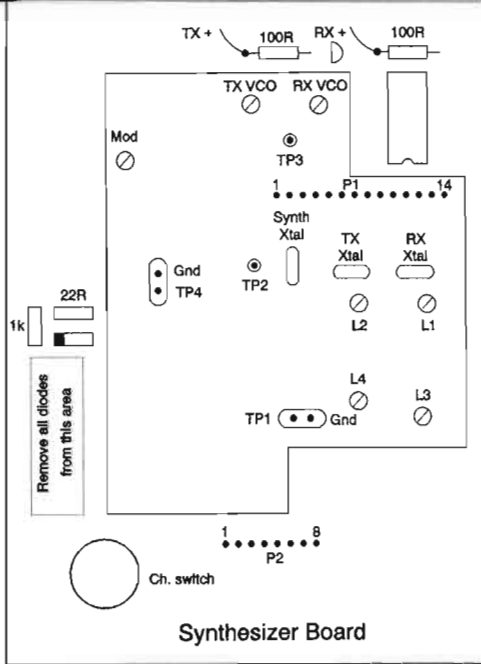
In the set's synthesizer, the TX and RX crystals are arranged so that an input to the programmable divider of 0000000 will give an output frequency from the transceiver of 144MHz. The 'N' divider is programmable between 256 and 511 giving a total of 255 channels each spaced at 12.5kHz. The output from the synthesizer is at signal frequency on transmit, and signal frequency minus 10.7MHz on receive.

On transmit, the output is amplified by three stages of tuned amplifiers before being passed to the broadband PA, which on my prototype produced nearly 40W (turned down to 25W in deference to the life of the transistor!). On receive, the oscillator injection is fed via an amplifier to the mixer, with an RF amplifier with band pass tuned circuits preceding it. As the units have just been taken out of service, the IF stages will be on alignment and should not be touched.

Synthesizer modification

The following crystals are required; one 43.36666MHz series resonant, and one 46.93333MHz series resonant. On the synthesizer board, remove the small

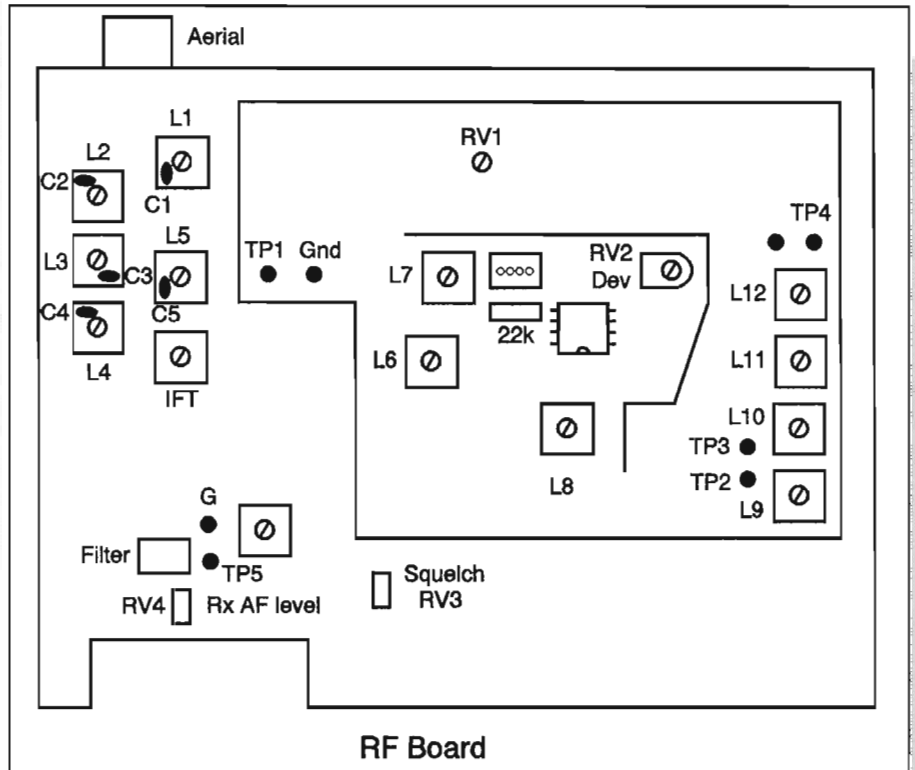




L shaped PCB containing the original PROM, and connect a dummy load to the aerial socket. Replace the TX crystal with your 46.9333MHz crystal and the RX crystal with your 43.3666MHz crystal. Connect the diode probe to test point TP1 and tune L1 and L3 for maximum reading on receive. Operate the PTT switch (the red TX LED will not light as the PLL is unlocked) and adjust L2 and L4 for maximum reading. Remove the diode probe and connect a high impedance DC meter to TP3. Adjust the RX VCO trimmer to give a reading of approximately 2V. Operate the PTT and adjust the TX VCO trimmer to give a similar reading. The red TX LED should now glow, but there will be no power indicated on the load. Remove the DC meter and connect an oscilloscope to TP2 and re-adjust L3 and L4 for maximum amplitude. Connect a frequency counter to TP4 and adjust L1 to give a reading of 133.300MHz on receive and L2 to give 144.000MHz on transmit.

Receive alignment

Carefully remove the RF board from the chassis and remove the screening cans from L1, L2, L3, L4, and L5. Locate and remove C1, C2, C3, C4, and C5 and replace with 12pF, 10pF, 12pF, 15pF, and 8.2pF respectively. The crystal filter is a 12.5kHz type and may be replaced with a 25kHz type if required to reduce clipping on heavily modulated signals. Replace the RF board. Connect the diode probe to TP1 and tune L6 and L7 for maximum reading. Connect a signal generator set to 144.00MHz (or use a local transmission) and connect the diode probe to TP5. Adjust L1, L2, and L4 in that order for maximum reading on the meter, reducing the RF input as each coil peaks. *Do not re-adjust L4.* Finally, adjust L3 and L5 for best signal to noise. The RX AF level control should not need adjusting, the squelch preset should be adjusted in the usual manner.



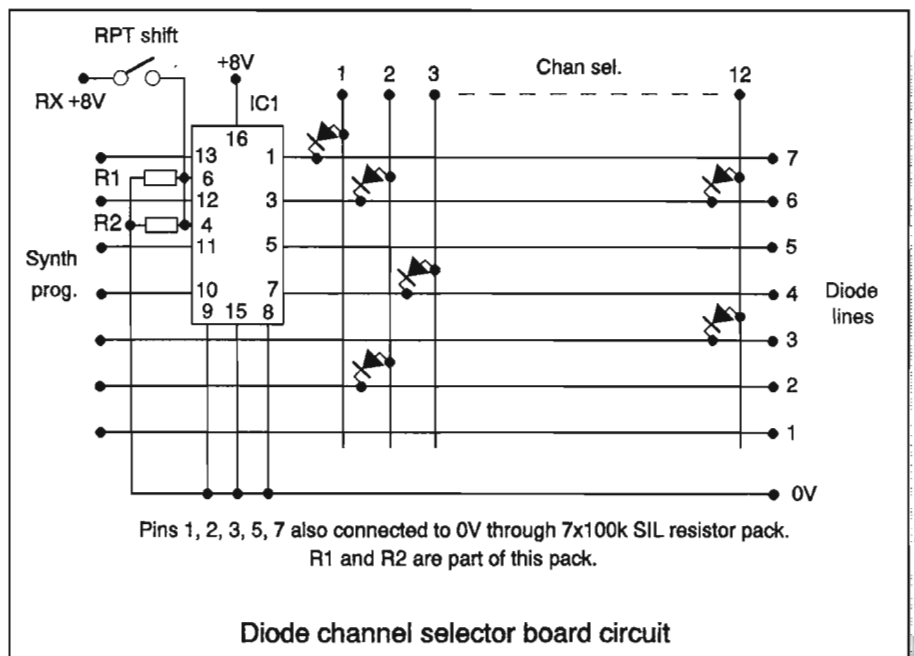
Transmitter Alignment

Connect a power meter to the aerial socket and a DC voltmeter to TP2, key the transmitter and tune L8 for maximum. Move the DC meter to TP3 and adjust L9, and L10 for maximum. Connect the diode probe to TP4 and adjust L11 and L12 for maximum reading, power should now be seen on the power meter. The PA is broadband and needs no adjustment, just set RV1 for an output of 25W. There are two deviation controls on the set, I found the best way to set deviation was by using the control on the synthesizer board. On my set, I found mic gain to be lacking, and increasing the value of the 22k resistor shown on the layout improved this.

Multi-channel Modification

This is achieved by a diode matrix board which is easily programmed to the user's requirements. The board is double sided and etching patterns for both sides are given. Repeater shift (+600kHz on receive) is achieved using a 4008 binary adder IC. With S1 closed, a logic level '1' is applied to the 16 and 32 lines adding 48 to the divide ratio of the programmable divider within the PLL IC. This arrangement also allows 'listen on input' when operating through a repeater, for normal simplex operation S1 is open and the 4008 is inoperative.

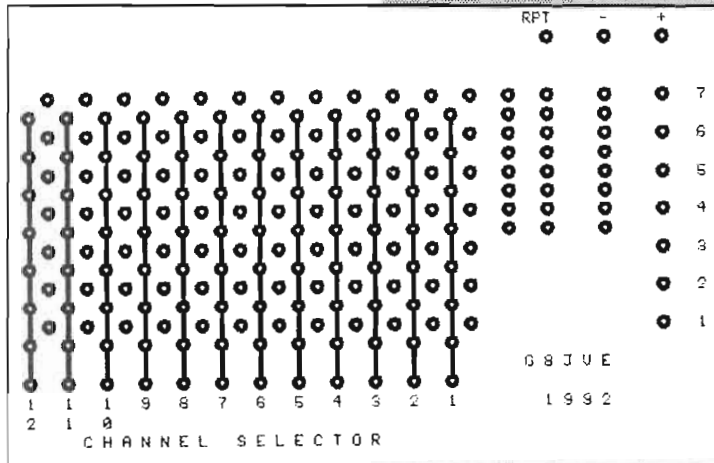
Carefully remove the synthesizer board from the chassis and remove all the diodes in the area shown on the



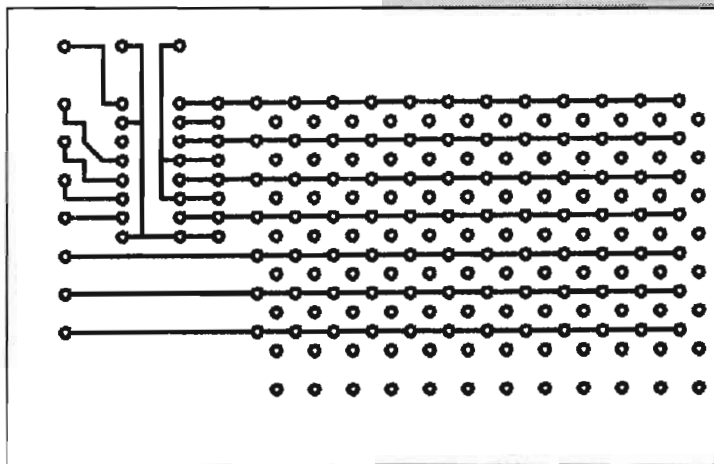
layout. Using ribbon cable, connect to each pole and the common of the channel switch. Carefully remove the stop pins on the switch body. The synthesizer board may now be refitted. Wire the channel selector switch to the diode matrix board, position 1 to line 1 on the board and so on to position 12 and line 12. Remove the 14 way socket from the original PROM board and using an insulating pad underneath, refit the 14 way pin connector P1 on the synthe-

For repeater operation, program the transmit frequency, the +600kHz shift is taken care of by the binary adder. A toneburst generator for repeater access may be fitted, a suitable unit is to be found in the August 1992 issue of HRT, reference to the synthesizer board layout gives a suitable TX+ connection point.

My thanks go to GWM Radio Ltd. in Worthing for the loan of the transceiver used in the preparation of this article.



PCB pattern - topside (full size)



PCB pattern - underside (full size)

sizer board. Using the socket allows the matrix board to be unplugged if the screen needs to be removed at any future time. Wire this up to the output line pins on the matrix board as shown in the table.

Link pin 1 on P1 to pin 7 on P2. Link +ve on the matrix board to pin 7 on P2. Link -ve on the matrix board to pin 8 on P2. Connect 'R' on the matrix board via a front panel mounted switch S1 to RX+ on the synthesizer board. When the diode board has been programmed check that the VCO steering line voltage on TP3 is approximately 4V on S20.

Parts required

- 1 8.2pF min plate ceramic cap
- 1 10pF min plate ceramic cap
- 2 12pF min plate ceramic cap
- 1 15pF min plate ceramic cap
- 1 4008 IC
- 1 7x100k SIL resistor pack
- 1 SPST sub-min toggle switch
- 1N4148 diodes for matrix
- 43.3666MHz Series resonant crystal (Style K +/- 10ppm @ 25C)
- 46.9333MHz Series resonant crystal (as above)

Synthesizer Matrix Links

Matrix	Synth P1
1	3
2	4
3	5
4	6
5	7
6	8
7	9

Programming the diode matrix

Frequency	Line						
	1	2	3	4	5	6	7
144.500			*		*		
.525	*		*		*		
.550		*	*		*		
.575	*	*	*		*		
.600				*	*		
.625	*			*	*		
.650		*		*	*		
.675	*	*		*	*		
.700			*	*	*		
.725	*		*	*	*		
.750		*	*	*	*		
.775	*	*	*	*	*		
.800							*
.825	*						*
.850		*					*
.875	*	*					*
.900			*				*
.925	*		*				*
.950		*	*				*
.975	*	*	*				*
145.000			*		*		*
.025	*		*		*		*
.050		*	*		*		*
.075	*	*	*		*		*
.100			*	*	*		*
.125	*		*	*	*		*
.150		*	*	*	*		*
.175	*	*	*	*	*		*
.200				*	*		*
.225	*			*	*		*
.250		*		*	*		*
.275	*	*		*	*		*
.300			*	*	*		*
.325	*	*	*	*	*		*
.350		*	*	*	*		*
.375	*	*	*	*	*		*
.400			*	*	*		*
.425	*		*	*	*		*
.450		*	*	*	*		*
.475	*	*	*	*	*		*
.500			*	*	*		*
.525	*	*	*	*	*		*
.550		*	*	*	*		*
.575	*	*	*	*	*		*
.600							*
.625	*						*
.650		*					*
.675	*	*					*
.700			*				*
.725	*	*	*				*
.750		*	*				*
.775	*	*	*				*
.800			*	*			*
.825	*		*	*			*
.850		*	*	*			*
.875	*	*	*	*			*
.900			*	*			*
.925	*	*	*	*			*
.950		*	*	*			*
.975	*	*	*	*			*

SCANNERS

INTERNATIONAL

ScanNews

**Bill Robertson details
a new nationwide
scanning club**

Bob Gant, G0LXP, has for some time been running an 'ex-PMR' helpline club, aimed at putting people interested in this equipment in touch with each other. This has been very successful, and he's hoping to get a monthly newsletter put together to send to for club members. Bob tells us that he's been asked to start a 'Scanners' club, again for users to exchange ideas and information. Bob uses a PRO-32 scanner himself alongside his ex-PMR equipment and finds this very useful.

He asks that interested readers write to him, enclosing a stamped self-addressed envelope for the reply (remember, that means *stamped!*), and he'll be pleased to 'get the ball rolling'. You'll be able to help Bob by giving him an outline of the equipment you have, any modifications you've successfully done, and of course any other details you have such as circuits etc. that you'd think may be of use to others. Printing (or even typing, as opposed to hand writing which may be difficult to read) would of course help him to accurately collate the information. So, if you have information to offer, or need help or information on some aspect, you can write to: Bob Gant, 25 Worcester Avenue, Garstang, Preston, Lancs., PR3 1FJ.

The Editor tells me that *Scanners* will be pleased to publicize news of the growth of this scanning club though its pages, let's see how it gets on!

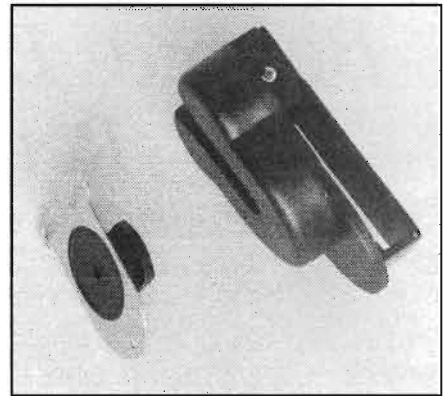
New Products

Bearcat BC-2500XLT

As well as the new BC-890XLT (reviewed this month) comes the new BC-2500XLT handheld scanner. This one's certainly a 'full-feature' model, covering 25-550MHz and 760-1300MHz and automatically switching between AM and FM depending upon the sub-band selected (AM for civil and military airband plus 25-29MHz, FM otherwise). 400 memory channels arranged into 20 banks are fitted, and an 'automatic store' facility is even available to help fill these for you with locally active frequencies. 10 priority channels can be used to keep track of activity on those 'important' frequencies, and 'Turbo Scan' mode lets you hunt around at up to 100 channels per second. For manual tuning a click-step rotary 'VFO' knob can be used, and a rechargeable battery back gives you several hours of listening between recharges. The BC-2500XLT is currently priced at £365, and is available from Nevada, 189 London Road, Portsmouth, PO2 9AE, Tel. 0705 662145. Watch out for a review in these pages soon!

'Quik Clip'

This type of quick release belt clip has been used for some time by security forces around the world for their handheld trans-



ceivers, and to meet the demands of radio amateurs they're now available for this market also. Designed for both professional and amateur handheld transceivers and scanners, one half fits in place of the usual belt clip, the other half being a solid belt-fitting 'housing' with a locking tab to prevent it ever slipping off. In use, your handheld is slotted into the belt fixing horizontally, then rotated to its normal vertical position for carrying around, where it stays. To remove the handheld, simply turn it horizontal again and lift off - simple! The Editorial team recently put a sample through its paces and found it very useful indeed, it certainly isn't surprising the same type has been used by police and security guards etc. for a number of years. The 'Quik Clip' is priced at £14.95 (plus £2 p/p by mail), and is available from South Midlands Communications Ltd., S.M. House, School Close, Chandler's Ford Industrial Estate, Eastleigh, Hants, SO5 3BY, Tel. 0703 255111

From the Editor's Desk

A few months ago, I heard about the growth of the use of sensitive handheld frequency

counters in the USA as an accompaniment to portable scanners. Quite simply, these let users see which frequency the radio transmitter they were near to was using, so they can tap the frequency into their scanner for future listening. I thought at the time 'When will these start appearing over here?'. Well they have, now. In this month's *Ham Radio Today* magazine 'review special' you'll see the first UK review of the Optoelectronics 'M1 micro Handicounter', complete with internal rechargeable batteries for portable use. It can

pick up and display the frequency of any reasonably strong (i.e., local) signal, it even has a 'store' facility to memorize received frequencies. Another product from the Optoelectronics stable is the 'R1 Interceptor', which again automatically locks onto any strong local signal, but instead of displaying the frequency it lets you listen to the modulation! Wouldn't it be superb if the two were combined in a single box. Then no doubt someone, somewhere, will want to ban them.....



Bearcat BC-890XLT Review

Chris Lorek tests the very latest scanner from Bearcat

two frequency limits, in either 5kHz (VHF only), 12.5kHz, or 25kHz steps to find new active frequencies. Memory channels can of course be locked in or out of scan mode, and a programmable two second delay is switchable on a channel-by-channel basis to save you missing replies. Bearcat's 'Turbo Scan' claims a switching rate of up to 100 channels per second, or (if you like the slow life) you can switch to the 'normal' mode of around 16-20 channels per second. When scanning through each memory bank, the BC-890 automatically scans in frequency order rather than channel order, to speed things up.

Automatic Store

On getting a new scanner, many users normally have to go through the motions of entering lots of frequencies in manually, either from pre-prepared lists of frequencies or (sometimes more usefully) from active frequencies found in 'search mode'. Here's where the BC-890's 'Automatic Store' comes in useful. Decide which frequency range you want, which memory bank or banks you want to fill, and set the BC-890 off – it automatically

Just after I saw a news release of the Bearcat BC-890 in an American publication, I went on holiday for a couple of weeks, yet amongst the inevitable 'pile' of post on my return was a nice glossy leaflet on the BC-890 from the UK distributor! A very prompt phone call followed, and I was pleased to take delivery the very next day of the receiver 'in the flesh'.

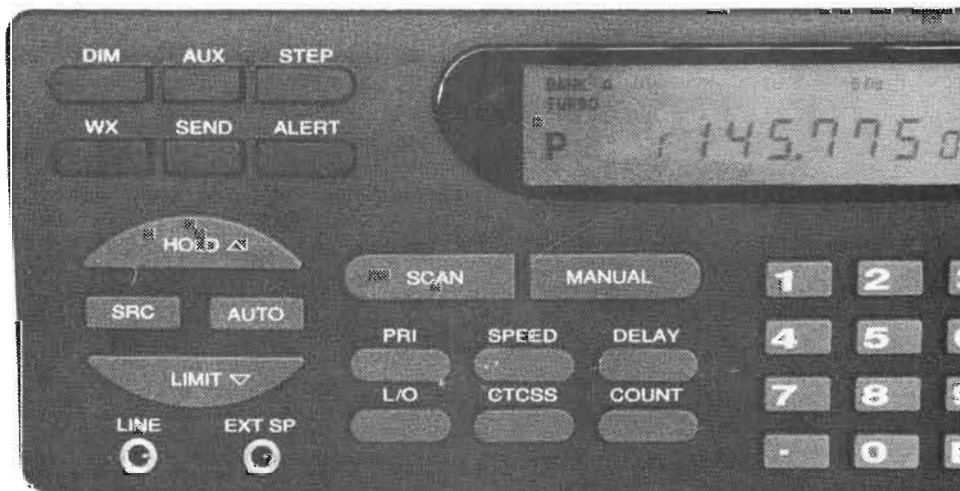
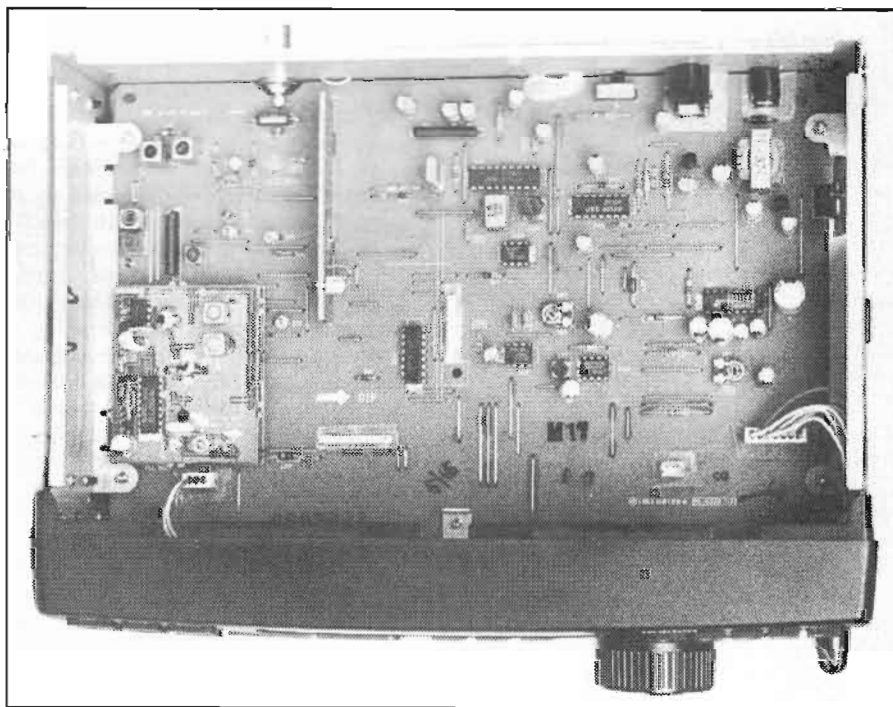
Features

The BC-890 gives coverage of 29-54MHz, 108-512MHz and 806-956MHz (minus the US cellular band segments as usual, these not being used in the UK), and operates on FM apart from the 108-136.975MHz civil airband and 225-400MHz military airband segments where it switches to receive AM automatically. 200 memory channels arranged into 10 banks of 20 channels each let you store frequencies for scanning, segregated according to your various interests or whatever.

Measuring 267mm (W) x 189.5mm (D) x 85mm (H) the set is obviously primarily designed for tabletop use, although its 12V DC input (a plug-in AC wall adapter being supplied for home use) also lets you use it out and about from your vehicle's battery for 'outdoor' operating stints.

Tuning

As well as the 'usual' keypad which let's you enter the frequency directly, the BC-890 adds a large 'soft click-step' tuning knob to the front panel which lets you tune around manually in various frequency steps, as well as tuning through your stored memory channels, just like some desktop shortwave receivers. The usual 'scan' and 'search' modes let you either scan your programmed channels (on a bank-by-bank basis, selecting any number and choice of banks in or out of the scan), or between any



stores all channels where the squelch raises into the memory channels for you – up to 200 channels worth!

Not only that, but when you subsequently set the receiver off scanning and leave it to its own devices, a 'count' mode lets you see how active each channel's been by showing how many times the squelch has raised on each channel. The supplied user manual also mentions an optional CTCSS (sub-audible tone) board which may be internally fitted, the set may then be programmed to only halt when a desired CTCSS tone accompanies the signal. CTCSS is used by many communication services together with radio amateurs, and this option on a scanner can be quite handy for 'specialist' use.

Some up-market base scanners have a tape record 'remote' facility, where when the set finds a signal when it's merrily scanning through the channels, your tape recorder can be controlled to start recording each time the receiver squelch raises. All well and good, but some channels aren't all that interesting, are they? The BC-890 has the answer by letting you program this on a channel-by-channel basis, i.e., only recording the channels you want but letting you listen to whatever it otherwise finds!

The possibilities of these 'up market' features can of course be very useful, and I'm pleased that Bearcat have incorporated what I'm sure users have been asking for.

On The Air

The set comes with a plug-in telescopic aerial to get you started, which I found worked reasonably, however as soon as I coupled the set to my rooftop VHF/UHF aerial it pulled in a very good amount of signals. Indeed I used the 'Auto Store' to good effect, for example to automatically program the frequencies in everyday local use in the VHF marine band – as I live a few miles away from an international shipping port. Unfortunately, these filled up rather quicker than I thought they would, with several distorted signals which I found to be unwanted 'image reception' signals from the AM civil aircraft band – I also live just a few miles from an international airport. Ah well, you can't win them all!

I found rejection of adjacent channel signals 25kHz away very good, less so with 12.5kHz spaced signals. However when I tried the BC-890 for VHF weather satellite reception I found I could use this 'wider bandwidth' to receive very good signals without the usual distortion I find with 'tighter' receivers, thus receiving good pictures on the BC-890 without the need to 'go inside with the soldering iron'.

I found that a number of other handy operating modes were fitted, such as the facility to transfer channels between banks. I was also pleased to be able to tune to a memory channel with the main knob, press the button alongside this to transfer to 'frequency' mode, then simply manually tune away from that frequency again using the knob – very handy!

For US use the set has a 'weather search' mode where it scans across pre-programmed weather channels (not used in Europe). Here, the set includes a rather spectacular (and loud!) 'siren' that can be set to go off at full blast when the set receives a 'severe weather alert tone' – you can get the BC-890 to demonstrate this which certainly impresses visitors to your listening station!

Conclusions

The BC-890 is packed with many quite useful operating features, it was a pleasure to operate, and the 'automatic store' proved very useful, saving much 'button pushing' as would

otherwise be needed.

The lab results show the set is reasonably sensitive, quite so above 800MHz, although the image rejection is rather poor – UHF giving no discrimination at all, although this limitation is typical of many scanners which don't use a very high first IF.

All in all, an easy-to-operate and quite impressive-looking base scanner which comes with a number of very useful operating features. Currently selling at £299, it also comes without a sky-high price tag!

My thanks go to Nevada Communications, 189 London Road, Portsmouth, PO2 9AE, Tel. 0705 662145, for the loan of the review receiver.

LABORATORY RESULTS:

All tests performed at 145MHz, FM, unless otherwise stated.

Sensitivity;	
<i>Input signal level in μV pd required to give 12dB SINAD;</i>	
<i>Freq.</i>	<i>Sensitivity</i>
29MHz	0.32
40MHz	0.43
54MHz	0.30
108MHz	0.45 (AM)
120MHz	0.64 (AM)
130MHz	0.79 (AM)
138MHz	0.34
145MHz	0.34
160MHz	0.33
174MHz	0.42
216MHz	0.45
224MHz	0.57
225MHz	0.85 (AM)
250MHz	0.70 (AM)
300MHz	0.45 (AM)
350MHz	0.65 (AM)
399MHz	0.62 (AM)
400MHz	0.42
435MHz	0.55
450MHz	0.44
500MHz	0.43
512MHz	0.41
806MHz	0.19
850MHz	0.22
900MHz	0.25
935MHz	0.27
956MHz	0.29

Adjacent Channel Selectivity;	
<i>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;</i>	
+12.5kHz;	5.2dB
-12.5kHz;	4.3dB
+25kHz;	56.3dB
-25kHz;	56.5dB

Squelch Sensitivity;	
<i>Level of signal required to raise receiver squelch</i>	
<i>Threshold;</i>	0.34 μ V pd (12dB SINAD)
<i>Maximum;</i>	0.52 μ V pd (21dB SINAD)

Blocking;	
<i>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;</i>	
+100kHz;	68.3dB
+1MHz;	79.3dB
+10MHz;	86.3dB

Intermodulation Rejection;	
<i>Measured on 145MHz FM as increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product;</i>	
25/50kHz spacing;	59.2dB
50/100kHz spacing;	63.8dB

Image Rejection	
<i>Difference in level between unwanted (-21.6MHz) and wanted signal levels, each giving 12dB SINAD on-channel 145MHz FM signals;</i>	
145MHz;	13.2dB
435MHz;	-0.2dB
935MHz;	5.5dB

Maximum Audio Output	
<i>Measured at speaker/earphone socket, 1kHz audio at the onset of clipping (10% distortion), 8 ohm resistive load;</i>	
2.42W RMS	

Packet Radio

—Roundup—



Chris Lorek G4HCL with information from the network including the new Isle of Wight packet node system

If you're reading this issue 'hot off the press', then the SysOp 16 packet meeting take place in just a few days time, on the 3rd October at The Old Schoolhouse Hotel, Severn Stoke, Worcestershire. If you're intending to visit, ensure you've let Steve G4FPV @ GB7TCM know to allow seating arrangements etc. to be made (he'd also appreciate a message from stations who are unable to attend).

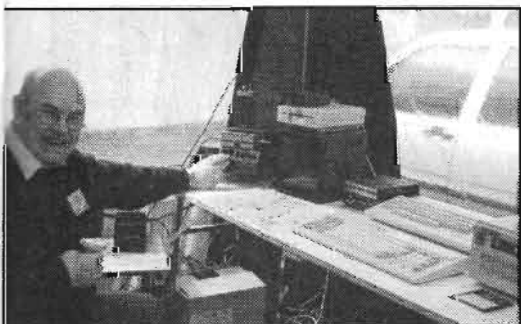
These meetings act as a 'discussion forum' for packet SysOps around the country, where anyone is welcome to give the meeting a presentation on items that they think will be of interest to the delegates, items to be discussed at this one include; a re-examination of the decision made not to allow linking on 2m (G8PZT), BBS forwarding of one message per callsign at a time (G4DYA), limits on the BBS forwarding of multi-part bulletins (G4WRW), and correct BBS to Node route quality settings (G4WRW).

Network Trunk Links

There are a number of individual packet SysOps as well as groups who have experience of high-speed network linking, with duplex links typically operating on 23cm, and now they've also been 'getting together' in an attempt to share their knowledge for the good of the network that we use.

Typical of this are the Gloucester Repeater Group and Fourpack, who over the last year and a half have been installing 23cm full duplex links. Steve

GB7SIG SysOp Stan G3DSS mans a SUNPAC demonstration station



G4FPV @ GB7TCM mentions they now have four up and running, all using Pye L313 type base station radio equipment. Steve recently put out a bulletin giving details of useful mods to these, including details to get them working using a single aerial rather than separate one for which they were originally designed. If you missed this information and/or need a 'hard copy' then just drop me an SAE.

News of a source of L313 gear comes from G8EPR @ GB7PZT, who suggests you go along to your local MEB-Gas board Telecommunications Engineering Department, who are reportedly updating their equipment and thus scrapping the L313 gear! He adds that most gas and electric board telecoms offices have radio amateurs amongst their staff, mentioning that this 'source' worked for the Fourpack group so it could be for you.

New Isle of Wight packet system

A number of groups are actively expanding their 23cm links, and as I write this, the Isle of Wight packet group (after quite a delay due entirely to the required 'site clearance' needed by the site owners) have now placed their multi-port packet system into operation. This is now on air from the enviable site of the TV transmitter mast at Chillerton Down on the island (which covers much of the central south coast), operating on 70.325MHz (GB7IW-4, user access/DX Cluster user link), 144.675MHz (GB7IW-2, user access), and 1299.000MHz (GB7IW-1, link to GB7XJZ BBS and GB7SMC DX Cluster). They're still waiting for site clearance for their GB7IW-7 432.675MHz port, which will be placed in operation as soon as the paperwork's received. The system currently runs TNC-200 TNCs with TheNet 2.08, and a change to a four-port RLC-100 card in a PC running BPQ node software is currently being considered. The group welcomes comments, and especially any donations towards the upkeep and running costs,

you can get details from their Chairman Bob G0ISB @ GB7XJZ.

6m Packet?

Do you run 6m packet? I've been running a node port on 50.650MHz for some time now, and the activity on this is certainly less than what anyone would call 'congested'. Indeed, in the last year it's been used by no more than 5 stations (over a radius of around 20 miles), so with the talk of congestion on 2m, 70cm, and even 4m in many areas, why not try these 'greener pastures'? Novice licensees should find this quite useful, and ex-PMR gear convertible for 6m is readily available (e.g. E band Westminsterers, see the May 89 issue of HRT for conversion details) which doesn't tie up the 70cm FM rig from its use for local QSOs. My comment on this was prompted by a bulletin from Dave 2E1AIB, who's been receiving 6m packet from his location in Hollinswood, Telford, and asks if any local amateur has information on what's on there, and whether it would be worth him getting set up for packet on 6m. You can contact Dave with a message to 2E1AIB @ GB7MAX.#28.GBR.EU

CTRL-Z, End of Message

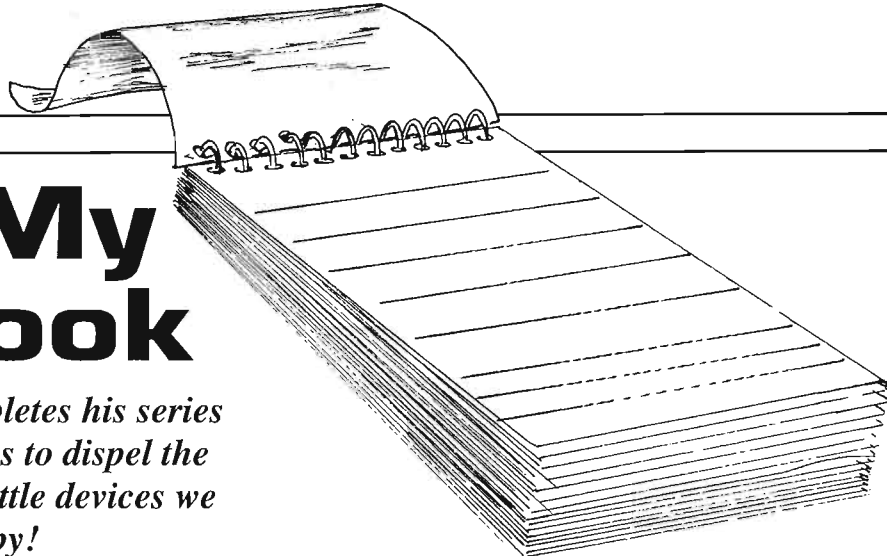
The SUNPAC group (see the Sept 93 issue) tell me they've had tremendous interest shown at their rally stands, and for the autumn they're now planning a 'Meet the SysOps' get-together for users, contact John G8OQN @ GB7HJP if you'd like information.

Richard G0RSN @ GB7BNM asks 'How do I use a DX Cluster?' - the simple answer to this question, which many newcomers to the mode ask, is simply to type a '?' when logging in - all will then be revealed. Most DX Cluster SysOps also have user manuals available for a nominal fee, just leave them a message on the cluster.

That's it for now, until next month it's 73 from Chris G4HCL @ GB7XJZ, or by post c/o the HRT Editor at the magazine head office address.

From My Notebook

Geoff Arnold G3GSR completes his series on fixings, and commences to dispel the mysteries of those glass-bottle devices we use in our hobby!



Quick Fit and Release

Another requirement for equipment panel and unit fixings in military and professional applications is that they should be quick and easy to remove and replace in servicing. It's not a good idea to have to spend several minutes undoing and retightening a series of conventional screws in pouring rain or other adverse situations! For this purpose, several quick-access fasteners have been developed, usually based on a 'bayonet-fixing' principle, where a quarter-turn to the left disengages the fastener, and a quarter-turn to the right re-engages it.

A variation on this idea, and in fact one of the first to be invented, was the 'Dzus' fastener. With this, a quarter-turn either left or right would disengage the fastening (a great help for people who don't know their left from their right!), but to re-engage it you simply had to push the fastener home with at the most a slight twist, whereupon it would refix itself.

With either of these types, the loose part of the fastener is usually retained in the panel or unit which is removed, so that it will not fall out and be lost.

Lightweight Fixings

I've already mentioned how modern developments in materials have allowed new fixings and fasteners to be produced. The enormous improvements in modern adhesives have also been important. Here, I'm thinking not only of the epoxy-resins (Araldite, etc.) and cyano-acrylates (Super-glues), but also of things like 'Sticky Fixers' and even double-sided adhesive tape, which are perfectly adequate for securing things like small printed circuit boards. Make sure that you've got adequate clearance between the back of the pcb and any metal surface on which it is mounted, of course.

Save Your Legs

One aspect of fixings and fastenings which I've not mentioned is

the need to secure objects to walls, either indoors or out of doors. For the radio enthusiast, these would include things like putting up benches and shelves, or aerial brackets.

Over the years, I've tried all sorts of different fixings, from the old-fashioned fibre Rawlplugs and the now-forbidden asbestos putty, through all the various fancy shapes and designs of plastic wall-plugs. Providing you can get a reasonably true hole, and clean the drilling dust out of it (use a vacuum cleaner or drag the dust out using the head of a scrap screw), most of the modern plugs seem to do a good job.

For outside fixings, where you may need to secure fairly hefty galvanised steel aerial brackets to walls, something more hefty than wall-plugs and woodscrews is necessary, and Rawlbolts are the usual solution. When you're drilling the necessary 12 or 14mm diameter holes into bricks, whilst perched at the top of a ladder, a hammer-drill does the job with a lot less effort than a conventional electric drill. Although it's tempting to drill the holes for the bolts into the mortar between courses of bricks, rather than the bricks themselves – don't! It may be softer, but when you tighten up the Rawlbolts you will be expanding them in the holes, levering the bricks apart and weakening the structure of the wall.

Another tip when erecting aerials, born from bitter experience, is always to do a 'dry run' first at ground level. This will enable you to check: (a) that the nuts actually fit the bolts they're supposed to, and that the bolts are long enough to pass through whatever they are going to secure; (b) that the 'U'-bolts are large enough to go round the mast-section or aerial they're securing, and also match the wall brackets in spacing and diameter of holes; (c) that the threaded portion of any bolts having partly-unthreaded shanks is long enough for the associated nuts to have reach their 'tight' position before they run into the end of the thread.

Whilst you are doing this 'dry run', make a note on the aerial assembly

instructions of the type and size of spanner needed for each and every bolt and nut used in the installation. If no such instruction sheet is provided, make up a sketch of your own, and file it afterwards with your radio equipment manuals. At some time in the future, when you have to go aloft to make some adjustment or repair to your aerial, you will know which spanners to take with you up the ladder, which can save an awful lot of climbing up and down. Yes, I know, you can use an adjustable spanner, but it's usually a lot quicker, easier and safer to be using a properly fitting ring-spanner or box-spanner when you're in the situation of having just one free hand to hang on with. (You have secured the ladder and used a safety-harness, haven't you?).

Valve Revival?

The transistor has been with us for some 45 years now. In that time, as a discrete device and as one of perhaps hundreds on a chip of silicon, it has revolutionised the way of life in many parts of the world. Despite the transistor's several advantages – smaller size, less power required, less heat to get rid of – over its predecessor the valve, valves now seem to be enjoying a revival of popularity in some quarters.

Hi-fi buffs have rediscovered the valve (some of them had never actually mislaid it!), and radio enthusiasts are having their imagination fired by valved circuits, either renovating and using old sets, or – shock, horror – building new ones!

Now I'm not suggesting that anyone in their right mind would attempt to construct a valved replica of a modern receiver, with its digital read-outs, scanning facilities, dozens of memories and so on, but when it comes down to the basic task of reception, simple valved circuits can do a very creditable job indeed. Enthusiasts who have built a design published recently in the vintage wireless magazine *Radio By-gones*, using just three currently-available valves, have favourably

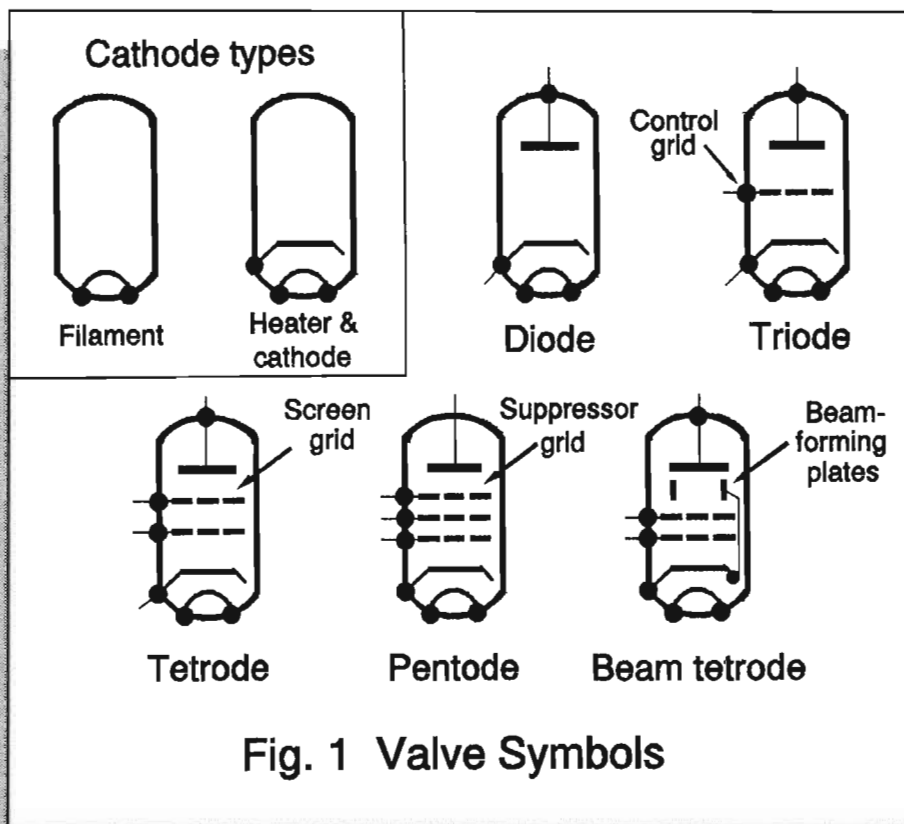


Fig. 1 Valve Symbols

compared its signal-getting performance with several state-of-the-art black boxes!

For old hands like myself, who were raised in the valve era and had to make the transition to solid-state circuits later on, getting back into valves requires at most a quick browse through the traditional text-books to refresh the memory. Those who have become involved in radio in the last thirty years, either as a hobby or a profession, are quite likely never to have been taught anything but solid-state electronics. To them, the jargon and practice of valves are a closed book.

So, I thought I'd try to give a brief introduction to valves for those who fall into the second category – describing what a valve does, the parts that make it up, the terms you will encounter, the supplies required for its operation. I plan to follow that up with a run-down of common faults and fault-finding in valved circuits. Throughout, I'll highlight some of the points where practice differs from solid-state circuits.

Electrons

The definition for a valve (or thermionic valve, to give its full title) given in *Chambers 20th Century Dictionary* is 'a vacuum tube containing a heated cathode from which electrons are emitted, an anode for collecting

some or all of those electrons and, generally, additional electrodes for controlling their flow to the anode.' Personally, I think that sums up the device brilliantly!

The heated cathode or source of electrons can be one of two types, which also divides valves into two categories, 'directly-heated' and 'indirectly-heated'. In the first type the heating element and the emitter of electrons are combined, being a length of fine metal wire called a filament, having an oxide coating which emits electrons readily. The second type separates the heating and electron-emitting functions into a heater and a closely-surrounding, oxide-coated cathode.

The directly-heated type requires far less electrical power to heat it to a temperature where electrons will be given off, and is therefore ideally suited to battery-powered equipment. The 2-volt filament was commonly used when radio receivers in the home were powered from a single rechargeable lead-acid accumulator plus dry batteries for the rest of the supplies. As smaller 'portable' receivers came into fashion, the 1.4-volt filament, designed to be powered from a single 1.5V battery, meant that sets could be lighter and more deserving of the name, and also got rid of the nasty corrosive sulphuric acid in the battery.

Directly-heated valves were also used in early mains-powered receiv-

ers, often running with 4 or 6 volts on the filaments. The method remained in vogue for rectifier valves, and also for transmitting power valves, which use a different filament construction and material. However, there are a number of snags to this, particularly if the filament supply is AC, where getting rid of mains hum can be quite a problem. More of that later.

Indirectly-heated valves have the advantage that the heater and its supply (often derived from the AC mains) is electrically separate and well-insulated from the cathode. This means that AC mains hum problems are minimised, and also that different bias or signal potentials can be applied to the cathodes of several valves within a set which are all fed from a common heater supply.

One-way Street

Electrons carry a negative electrical charge, and the electrons emitted from the cathode will be attracted towards any positively-biased electrode placed within the vacuum tube. In the simple two-electrode valve, that positively-biased electrode is called the anode. The flow of electrons from cathode to anode constitute an electric current, which will then be carried around the external circuit (including the power supply) connected to the valve.

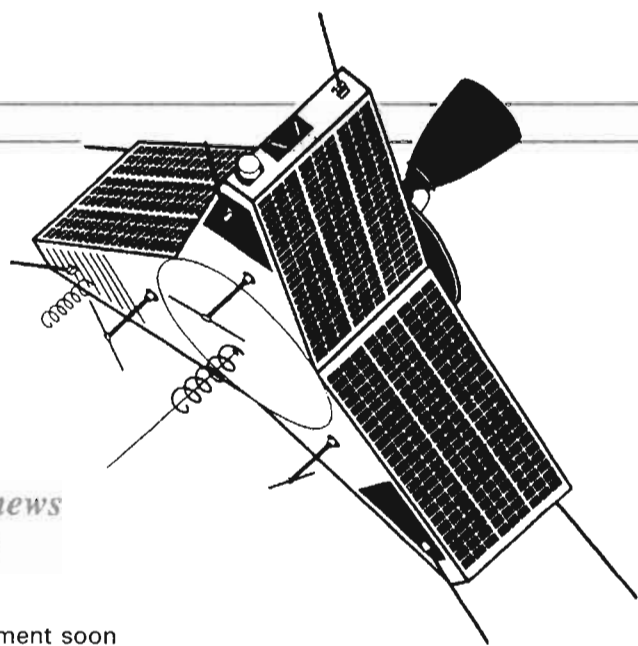
If the anode were to be at the same potential as the cathode, or negative with respect to it, the electrons from the cathode would not be attracted to it, and no current would flow through the valve. This simplest valve, with just two electrodes, cathode and anode, is called the diode. In referring to the number of electrodes in a valve, the cathode is always counted as one, regardless of whether it is a directly-heated filament or an indirectly-heated heater-plus-cathode assembly.

This valve diode is equivalent to the modern semiconductor diode, and in similar fashion, this 'one-way flow' feature is frequently used to perform rectification, signal detection, etc. Compared to its more modern counterpart, the valve diode has a higher internal forward resistance, and so a higher forward voltage drop, a factor which has to be allowed for when fitting semiconductor diodes as a replacement for valve diodes in power supplies. The valve diode also has a much higher reverse resistance, being essentially an open circuit between anode and cathode when reverse-biased.

So, we've got our diode, which is very useful if somewhat limited in its application to radio and electronics, but what comes next?

To be continued

Satellite Rendezvous



Richard Limebear G3RWL with his AMSAT-UK news report from this year's successful Colloquium

Amsat-UK's eighth annual Colloquium was held between Thursday 29th July and Sunday 1st August 1993, hosted by the University of Surrey. It was attended by 138 delegates from all six continents. Although the numbers were about the same as last year, there were more visitors from overseas this year and marginally less from the UK. The University of Surrey staff once again looked after us well despite a number of prominent members of staff being abroad (in Kourou preparing for the SPOT-3 launch opportunity).

G3RUH gave a live demonstration of Mode-S 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. The expensive part is the price of 2.4GHz to 144MHz dish-mounted converters (which will survive when you accidentally key the 2m TX). I'm building and saving.

We also had a lecture by a non-amateur about radio astronomy. Fascinating and we hope to him back next year (his shack took me back to the 'old' days and his 6m dish just got me green with envy).

News

Webersat; Mondays will be 'spectrometer day' starting soon. Surrey have (as yet) no plans to use links in L-band and S-band. 38.4 kbit downlinks (with 9600 uplink) are very likely - there was no technical info on the modulation type; whether QPSK (fits the bandwidth of amateur receivers) or FSK (separate RX technique needed). FSK seems probable.

RS-14/Oscar-21; will continue the digital voice and FM repeater operations. Tests have been conducted with 9600 bps data and more digital operation at this speed is expected (but the Amsat-DL guys are very busy with P3D).

Amsat-DL expect to experiment soon with Fax and SSTV images. The parent GEOS payload is switched off now, and Russian fees have been paid for, to keep AO-21 operational until at least December 1994.

Arsene; 2m operations are thought to be very unlikely. Enough nitrogen remains for one attitude correction activity per year for five years.

UoSats; GOSUL will be resuming work on PacSat-protocol operations at about the time of the SPOT-3 launch and new features etc. (including separate directories for BBS traffic) can be expected to appear shortly afterwards. 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.

Amsat-UK; the Annual General meeting was held and the committee (BoD) was re-elected with the exception of G1DGL who had other commitments and the addition of Douglas Loughmiller G0SYX (KO5I).

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. A communique will be issued shortly by the various international Amsat groups.

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, 1.2GHz Band L, 5.6GHz Band C, 435MHz Band U, 2.4GHz Band S, 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. Onboard doppler correction is probable.

Rudak-3 will be compatible with Pacsat protocol and 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.

Pictures from the Japanese SCOPE experiment will be digitised and downlinked via Rudak. SCOPE has three cameras; two are earth-pointing and the third is for celestial imaging.

Onboard power generation will make 800W available from the spacecraft's 28V supply.

Stabilisation will be achieved initially by magnetorquing (until the final orbit is achieved, while the spacecraft is spinning) and subsequently by momentum wheels (the spin will be stopped once final orbit is achieved).

This year we received a paper by WD4FAB about the mechanical side of P3D construction. The 'metalwork' tends to be taken for granted by most amateurs, who either forget or do not realise that the 'nuts and bolts' side of the spacecraft is both as complex and as time-consuming as the electronics.

Did you realise that, once P3D reaches its final orbit and becomes 3-axis stabilised, thermal control is needed because one side of the satellite cooks while the other side freezes? Heat pipes will be used to move heat around.

We accept that the propulsion system will put the spacecraft into its final orbit. Did you realise that the dynamics, tankage, etc were so complex? Fuel for the motors makes up 46% of the launch weight; someone has to make and mount the gas tank! (these are being made in Russia).

I was impressed by the amount of detailed mechanical work involved and encouraged that the work is in such capable hands. Its usually the makers of the electronics who get the prestige and the mechanical guys get nothing. Thanks fellas, I appreciate your work.

The Future

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 (Israeli); will be compatible with PacSat protocols and be 3-axis stabilised by means of momentum wheels, with a 700km sun-synchronous orbit (inclination not known). The flight will piggyback on a Russian satellite which will eject *Guerwin* after itself being ejected from the launch vehicle. The launch date is 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!

New Satellites on SPOT-3 launch (some of this information was sent out a couple of weeks ago);

Ariane V-59 flight from Kourou, launch has slipped to mid-September. Orbit is 800km and inclination 98.7 degrees; expected to be identical to Spot-2/microsat (oscar 14-19) orbit. Latest

known launch date is 21st Sept.

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): KO-25, PO-26, AO-27, IO-28. *Payload information*; *Stella* is a geodetic satellite.

KITSAT-B; Digital store and forward communication experiment plus CCD earth imaging system and a DSP experiment. Standard PacSat protocols.

Uplink; 145.87/145.98MHz
Downlink; 435.175/436.50MHz 2/2.2/5W output power
Speed; 9600bps

Power; solar cell (GaAs) Nicad battery(14V/6A)

Computer; primary 80c186, secondary Z80, 12MByte RAMDISK

POSAT;

Uplink; 145.925/975 MHz
Downlink; 435.250/275 MHz (250 primary)

Speed; 9600bps with 38.4kbps capability which is *very probable* (understood to use PacSat protocols).

This comes from the Portuguese organisation LNETI with the purpose of giving experience in spacecraft construction/operations to Portuguese nationals. The spacecraft carries both amateur and commercial components;

the extent of amateur radio operations is not known. Additionally POSAT carries two cameras (1km and 200m resolution); DSP, cosmic ray, and star sensor experiments; and will navigate autonomously using an onboard GPS receiver.

Healthsat will use commercial frequencies to continue to support voluntary workers associated with VITA, SatelLife etc. Its purpose is to be a test platform for minimal ground-stations and it will operate at 9.6 and 38.4 Kbps.

AMRAD; not planned for 'routine' services. Has modem capability for 1200 and 9600 bps but is said to *not* be PacSat software compatible. FM talkthrough mode too. Commercial payload has priority.

Uplink; 145.850 MHz
Downlink; 436.800 MHz
Speed; 300 - 9600bps
Power; solar cell (GaAs) Nicad battery(14V/6A)

Computer; Primary 80c186, Secondary Z80, 12MByte RAMDISK

Itamsat; Digital store and forward communication experiment.

Uplink; 145.875/900/925/950MHz
Downlink; 435.867/822 MHz
Speed; 1200/4800 bps (experimental 9600) PacSat protocols.
Call sign; IY2SAT

The secondary downlink on 435.822MHz will be for experimental speeds/modes while the primary downlink will be 1200/4800 bps. The uplink associated with experiments will be 145.925MHz and 145.950MHz will also be used for 9600 bps.

LoS

As usual, information on AMSAT-UK is available by sending a large SAE to; AMSAT-UK, c/o Ron Broadbent, G3AAJ, 94 Herongate Rd, London, E12 5EQ. Big SAE gets membership info, SWL's are welcome. Until next month, 73 from Richard G3RWL @ GB7HSN & Oscars 16/19/20/22/23/25/26/28 (when will I sleep?).

KEPLERS								
SAT:	OSCAR 10	UoSAT 2	AO-13	PACSAT	DO-17	WO-18	LO-19	FO-20
EPOC:	93200.18785409	93198.60902225	93202.33713546	93200.26347958	93200.39185796	93200.77960521	93200.77943508	93201.62045726
INCL:	27.0768	97.8099	57.8903	98.6210	98.6215	98.6216	98.6215	99.0326
RAAN:	15.1878	223.6595	304.6158	285.0949	285.3710	285.8500	286.0309	51.4678
ECCN:	0.6022626	0.0010545	0.7223772	0.0012487	0.0012509	0.0012084	0.0012252	0.0541409
ARGP:	98.7005	263.2244	320.1229	88.0964	87.3715	86.6248	84.8513	10.9621
MA:	329.8696	96.7762	4.9105	272.1649	272.8894	273.6431	275.4181	350.2744
MM:	2.05880809	14.69026926	2.09727230	14.29841825	14.29978118	14.29957691	14.30048277	12.83220462
DECY:	2.7E-07	2.53E-06	-2.69E-06	4.7E-07	5.8E-07	6.1E-07	7.8E-07	-8E-08
REVN:	4795	50118	757	18202	18204	18211	18212	16160
SAT:	INFORMTR-1 AO21	UO-22	KITSAT-A	ARSENE	RS-10/11	RS-12/13	Mir	
EPOC:	93202.62536230	93200.69628709	93199.53163862	93171.50001791	93199.50757804	93194.70011642	93203.89589115	
INCL:	82.9405	98.4714	66.0764	1.1154	82.9227	82.9221	51.6204	
RAAN:	27.3398	276.2830	258.5539	126.6985	215.4592	262.4530	40.1947	
ECCN:	0.0034082	0.0007013	0.0003204	0.2945839	0.0010367	0.0029590	0.0004278	
ARGP:	286.8119	195.8075	181.1709	142.5535	225.8425	334.4617	237.2527	
MA:	72.9281	164.2889	178.9304	241.8895	134.1868	25.5075	122.8051	
MM:	13.74521997	14.36839639	12.86279356	1.4220091	13.72320353	13.74023985	15.58896369	
DECY:	8.5E-07	7.3E-07	1E-08	-4.9R-07	8.8E-07	1.1E-07	5.6174E-04	
REVN:	12417	10533	4387	62	30414	12216	42470	

VHF/UHF Message

Geoff Brown GJ4ICD asks 'To QSL or not to QSL on VHF?'

This month we take a short look on getting those valuable VHF/UHF QSLs. To send direct or via the bureau? Sending and receiving QSLs is part of our hobby, giving and receiving should be part of life, but it does not always work that way!

Many amateurs require QSL cards for awards, or to confirm achievement of what is sometimes thought to be the 'impossible' on the higher bands.

But there are many problems in getting those valuable cards. Firstly you should ask the station you work if indeed he does send QSL cards, and if the station is rare DX does he QSL direct, via the bureau, or does he have a QSL manager? Many times the latter is not asked, and the result is that no card is ever received.

For instance, 50MHz has become very popular in Europe, and, there have been some very rare expeditions and operations like ZA1A, UC2AA, 9K2ZR, YL/ES9C, 4J1FS, T94VO and others, but unless you use their QSL managers you are unlikely to get a QSL card.

When sending a QSL to a manager, always include an IRC (International Reply Coupon, obtainable from your local post office) or better still a dollar bill, as some countries do not use IRCs (like Africa). This is of course is for the return direct postage, as nobody can afford to send out thousands of QSLs direct.

Also don't forget this one, UK stamps are of no value in other countries. Even in GD, GU, or GJ they are worthless, and if used will encounter a very large surcharge when your post-man calls!

Just recently I received a request from Paul G4CCZ to see if I could help him in obtaining a TA5ZA QSL card for 50MHz. Paul had sent two QSLs direct to the manager of TA5ZA, but never received a reply. I sent Paul's QSL card, a dollar bill and an SAE, and within seven days the card was received, so puzzle that one out. However, I personally sent a station in the Caribbean area at least five direct QSLs with dollars inside and never received anything at all, some you win, some you lose, but it pays to ask the station you work if he does send out cards.

The VHF/UHF Records

Do you remember a short time ago

CZECH REPUBLIC				
OK 1 FFD				
QSO WITH	DATE	UTC	MHz	RS/T 2WAY
GJ4ICD	5.2.1993	19.15	1296	559 CW
TX: 1W !!			QSB	
ANT: Loop YAG-1			RX: MGF 1402	
PSE QSL VIA CRC PO BOX 69				
113 27 PRAHA 1				
VY 731 <i>Karel</i>				
ADR: VÁCLAV JAROS				
Nemocniční 33				
352 01 AŠ				
LOC: JO60CF				

Streams of Mail for 70MHz

More mail has been arriving regarding a 70MHz dedicated TX/RX, well I will repeat the good news. Lawrence GJ3RAX will be working on this very shortly, and has promised me the first prototype. So look out 4m and start saving your pennies! Lawrence has also stated that the radio will be for CW and SSB modes only.

Reports and News

July started off a little quiet regarding propagation on all bands, maybe it was the flares that seemed to suppress 'ES' propagation, and little tropo was reported.

Sporadic 'E' started to build in its usual fashion from around the 7th July, when widespread openings on 50MHz were reported to SV, SP, OK, OM and other eastern block countries. Around the 11th (another 28 day cycle?) things were really hot with 66 to 75MHz FM radio stations coming into the UK at S9+, the same day OD5SK and his beacon OD5SIX were heard all over the UK on 6m.

Ela G6HKM reports a good bit of new DX on 50MHz, she managed to work T70A for a new one plus DL, ES, F, I, IT9, LA, OE, OH, OZ, S5, SV, YU, 9A3, and 9H on the 8th.

On the 16th HV4NAC (Vatican City)

I requested any information on 23cm distances from the UK? Well, Pat GW3KJW wrote back with the answer to my question, Pat is the official VHF/UHF/SHF record keeper for the RSGB (along with John Morris GM4ANB), and he advises me of the following;

"The current 23cm distance record is held by G6LEU and EA8XS, this took place on the 29th June 1985 and is a distance of 2621km" (wow!). But also look at this, EA8 has worked G, then GD and then GM to establish the UK record on 144MHz, but EA8 has also worked Iceland for a new IARU Region 1 record on 144MHz! Anybody active on 432MHz in Iceland?

GW6ZMN gets himself into the record books for his QSO on 23cm with OZ1LKA as at present there is no other GW claimant. By the way, thank you all for the response regarding GW6ZMN, 'GW' is a separate Country and not G or GM as some writers noted to me. Now if you can help Pat with any 'firsts' or records you think you may have, especially any from GD, GU, GJ, then please contact him; Mr. Pat Allely GW3KJW, Dwyfor, Rhiw, Pwllheli, Gwynedd, LL53 8AE, Wales.

Thanks also to Gordon G8PNN who also sent me information on his 23cm QSO with SM1BSA at a distance of 1248km, unfortunately this falls far short of the UK record.

QSL Listing

Summer 1993 QSL Update

appeared on 6m to give many amateurs a new country (QSL via IK0FVC direct to; F Valsecchi, Via Bitossi 21, I-00136, Roma, Italy). This was another new one for Ela G6HKM, who incidentally has just had her QSLs acknowledged for 100 Countries confirmed on 50MHz, I am told that this is the first UK Class B claim, well done Ela, we await confirmation.

The afternoon of the 18th brought W1/2/3/4/5 very weakly into France and the UK, Spanish stations were having a ball into the USA, and France had a short opening to LU. Then 144MHz opened between the UK and EA8 and CT, and there was also a large 50MHz European back scatter opening, G4KUX (IO94) was into GJ at S5.

Into the record books goes Melvin G1SSL, he got in on a quick short 50MHz opening on the 26th to SV9ANJ, this is believed to be the first G to SV9 contact to take place.

Other new ones heard on six during July were LZ2UU (KN12), OH0/PA3DWD (JP90), SP6GZZ and SP6BVI (both in JO81).

2-70-23

Not many reports on these bands I'm afraid, tropo has been poor with very few of the normal anticyclones we usually get in the summer appearing. Let's hope for better in the autumn. G6HKM says, "I got the impression that 'ES' on 144MHz was better in other parts of the country", however she did bag OK2BTI and SP9DHQ (both in JN99) plus LZ2FO (KN13) on the 8th.

VHF/UHF Field Day was not much better this year, no exotic DX was heard in GJ.

All in all, not a full repeat of June's propagation but enough on the bands to keep the interest there. Maybe this is why many 144MHz and 432MHz operators are turning to EME, at least when conditions are good somebody is always there. But even then along comes an aurora and kills the lot, you just cannot win.

Beacon News

Another new beacon came into operation during July, this is 4N1SIX on 50.047MHz. It is located in KN04 and was widely reported around Europe at S9+, power is 10W we are told!

The 9M6SMC 6m beacon is nearing completion and should be shipped over to SMC for shipment to Malaysia, a replacement beacon is also being made for TF, but this will not be shipped until after the winter.

432MHz operators may like to know that OK0EP is active on 432.885MHz from JO80ob. The power level is 2W

- C31HK - Fred Olte, Cortal Comabella, Sant Julia de Loria, Andorra
- C91A - Via IK4QIZ. PO Box 65, Forli, I-47100, Italy
- C91J - Via W8GIO. P.Vest, Rt 1 Box 140-42, Bunker Hill, WV 25413, USA
- CN8CC - Via F6FNU. See 5R8DG.
- CN8NS - Said Nouamani POB 6577, Rabat, Morocco.
- CT3FT - Cedric Rourke, Box 86, P-9400, Porto Santo, Madeira, Via Portugal
- EH1DKV - Jose Fernandez, Ronda de Monte Alto 20 4, 15002 La Coruna Spain
- EH1KV - Andres Figueroa, Box 5128, 36200 Vigo, Pontevedra, Spain
- EH1TA - Jose Olmo, Pepin Rivero 5 6-11, 15011 La Coruna, Spain
- EH2BUF - Luis Garcia, Box 3164, 20080 San Sebastian, Guipuzcoa, Spain
- EH3CUU - Pedro Crespo, Clavells 11, 17800 Olot, Girona, Spain
- EH3LL - Jose Llagostera, Box 310, 43200 Reus, Tarragona, Spain
- EH3UM - Magin Biosca, Ave 317 27, 08860 Castelldefels, Barcelona, Spain
- EH4CAV - Antonio Garcia, Luis Cabrera 48 1, 28002 Madrid, Spain
- EH5BZS - Juan Cardona, Box 401, 12080 Castellon de la Plana, Spain
- EH6IF - B Vidal, Ciudadela 4, 07740 Mercadal, Menorca, Balearic Is. Spain
- EH6FB - J. Sala, Box 8, Suliva, 07830 San Jose, Ibiza, Balearic Is. Spain
- EH7AG - Andres Jimenez, Box 664 04080 Almeria, Spain
- EH7DZI - Jose Sanchez, Apartado Postal 637, 11080 Cadiz, Spain
- EH7BVD - Jose Jungiuto, Roma 15, 14012 Cordoba, Spain
- EH8ACW - Leoncio Rodriguez, Apartado de Correos 2537, 35080, Las Palmas, Gran Canaria, Canary Is, Spain.
- EH9IB - Pedro Ruiz, BDA la Constitucion 4 2, 29800 Melilla, Spain
- EH9MH - Manuel Paez Perez, Plaza Tarragona 9, Melilla, Spain
- EV5D - Via DL5BAC. Hans Mueller, Dorfstr 14 A, D-2862 Worpswede, Germany
- EV5K/EV5M/EV5N etc... see EV5D
- EV80, UC2AA, UC2AAA, EV8A, EV9A ..via F6AML
- ET3DX - Via JH1AJT. Y. Miyazawa, PO Box 8, Asahi-Ku, Yokohama, Japan 241
- F6AML - S. Chojnacki, Box 40, F-77120 Coulommiers, France
- GD0TEP - Andy Kissack, 30 High View Rd, Douglas, IO99 1AA, Isle of Man
- HB9QQ - P. Pasteur, Sunnhaldenstr 28A CH 8600, Duebendorf ZF, Switzerland
- HB0/HB9QQ - See HB9QQ.
- HB0/DA1WA - Via DJ0LC. H Jakobljevich, Am Weinberg 10, D-6200 Wiesbaden-Auringen, Germany
- HV3NAC - Via IK0FVC. F. Valsecchi, Via Bitossi 21, I-00136, Roma, Italy

watts and as seen in the photo it is well sited.

VK News

Eric VK5LP sent in a copy of the Australian top 50MHz operators, these should bring back memories. VK4KK; 93 countries, VK3OT; 92, VK4BRG; 85, VK2QF; 83, VK2BA; 69, VK4ALM; 68, and VK4ZAL; 68, who will get that first DXCC?

Next Month

Next month I will be looking at a few problems that we have encountered

with TVI (no, I haven't myself!). European amateurs have been having problems, especially on 50MHz and above, and there will be a couple of filter designs which you can build in a couple of minutes for under £2. So don't miss next month's HRT. My thanks to the UKSMG for the information from *Six News*, and all others who sent in reports.

Please send any photos, news or views to Geoff Brown, GJ4ICD, TV Shop, Belmont Rd., St. Helier, Jersey. C.I. JE2 4SA or phone/fax 0534 77067.

The OK0EP beacon



QRP Corner

Dick Pascoe G0BPS says 'now's the time to check your aerial system'



G3YCC's homebrew 80/40/20m transceiver

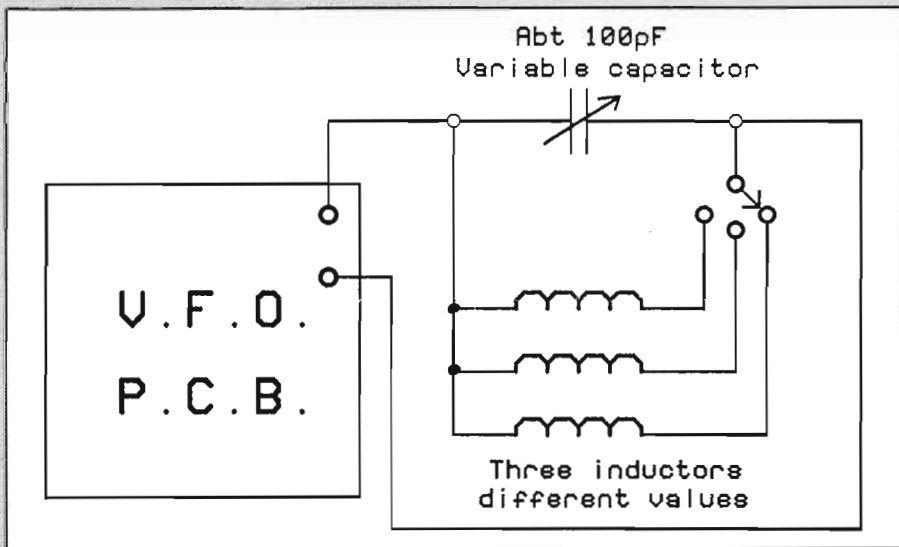


Fig. 1 - Relay switched VFO coils

A brief sojourn in Cornwall enabled me to get away from the hustle and bustle of work for a few days, but I didn't expect to get seven days of almost continual rain. This put paid to thoughts of any operating. Most of the other caravans on the site were occupied with TVs on to entertain the children. Oh well, perhaps next year...

I was pleased to get a letter from Frank Lee G3YCC, who spends a lot of time on the air with his homebrew three band CW transceiver for 80m, 40m and 20m bands (see photo). He switches bands by employing relay switching of

the tuned circuitry in the VFO, and Frank considers that this method of changing the VFO frequency is better than crystal mixing. It does, of course depend on the stability of the VFO in the first place. He managed to work the famous GM30XX on one QSO, who when switching in his 270Hz filter gave good reports of little or no drift of the signal.

For those who have not come across this method of multi-banding a rig, it's very simple to do. Build your VFO and set it on the required frequency. This is normally done by selecting the balance of inductance and capacitance

in the tuned circuit. I tend to use a variable capacitor of about 100pF and an inductor wound of about 28 turns on a 6mm core to resonate the VFO on 5-5.5MHz. The number of turns can be varied to change the resonant frequency of the VFO, and the 100pF variable capacitor controls the amount of 'swing' of the VFO. I tend to select a swing of about 500kHz, but if a larger, or lesser swing is required then the value of this capacitor should be changed, a smaller capacitor will of course give a lesser amount of the band covered.

If we stick to the same capacitor, i.e., 100pF, then by changing the number of turns on the inductor the resonant frequency of the tuned circuit will change, see Fig. 1 for more details.

One other thing that is occasionally overlooked is that if you only have a capacitor of, say, 150pF and require a lower value, this can be changed by either adding a further fixed capacitor in series or by 'teasing' out some of the capacitor plates using a fine pair of pliers. A capacitance meter will show the required value, but of course a frequency counter will give you the exact VFO frequency. If you should by chance take one too many plates out, then the addition of a very small capacitor in parallel with the variable will assist. The main intention of this information is to help to promote experimentation. This will work and I have set many VFOs on frequency using this method.

The Weather Cometh!

Winter is fast approaching, and Murphy's Law will operate as sure as 'eggs is eggs', the moment you get that rare bit of DX, *something* will break or fall down! As in previous years I shall be outside checking over my aerials and feeders, even though my aerial farm has only been up for a few months. I've found an hour or two checking these for safety and dryness pays off in the end. Remember that a few dB of loss in the feeder caused by a bit of damp will play havoc with your few watts of RF, if in doubt spend a few pounds and put new up. A check of the aerials and the 'U' bolts may also be beneficial at this time, stronger winter winds *could* cause that breakage - checking it all out in the relative warmth of an autumn evening will be much better than making the repair in the teeth of a howling gale, in freezing rain/sleet/snow in the depths of a winter night.

On that happy note I bid you goodbye until next month. News and views to me please, either via HRT Editorial, GB7ZAA, or to Seaview House, Crete Road East, Folkestone CT18 7EG. 72 de Dick G0BPS.