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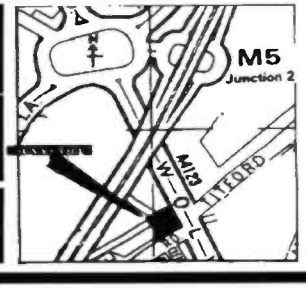

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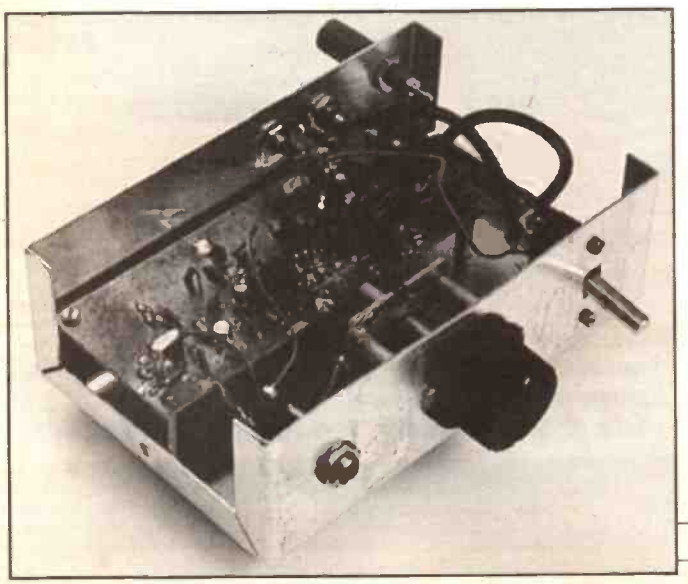

Kenwood TS-690S Reviewed

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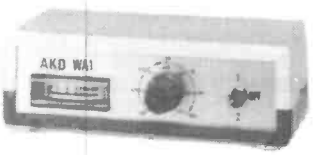

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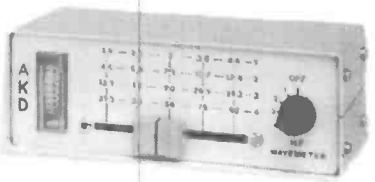

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A New 'Radio Amateur of the Year' Award

Many radio amateurs are heard on the air, and indeed seen through the letters page of HRT, discussing ways they believe amateur radio should be going. The same happens in radio clubs, where the members decide what the club should do (well that's what some clubs do, others might just sit around not doing anything - that's why they don't get into the monthly HRT 'Club News'). The end result may be something like 'we need more newcomers to amateur radio', or 'we should strive for better operating standards', or 'we should ensure the public are aware of the benefits of amateur radio to the community'. The list goes on and on, but I'm sure you get the idea, you hear it every day on 80m and the 2m/70cm natter channels. You see so much of it on the packet radio network.

All this is great — it's good that radio amateurs can have some good constructive ideas. But after all the discussions, what happens then? It's often up to a smaller number of amateurs to go out there and do something about it. Sometimes no-one does anything about it, and the idea remains simply that — an idea. Do one or two vociferous personalities spring to mind that you may already know of? Yes that's right, the 'sayers' rather than the 'doers'.

The 'sayers' are the amateurs who say this should be done, that should be done, and why doesn't so-and so do something about it. But when it comes to the action part, they expect others to do all this. The 'doers' are not as you may think the people who end up as the blind followers of the 'sayers'. The 'doers' are the people who get off their behinds and into action, often without being asked, because they believe they have something to contribute to the hobby and jolly well do it, rather than expecting others to.

Did you help out at your club's last field day? Or the local rally? Or your novice course? How about helping that newcomer who came on the air last night, making a mess of their first QSO? Did you come in with some friendly advice, or did you just listen and bemoan the fact that the standards of new licensees are dropping? Maybe you did, congratulations! Of course, many amateurs quite understandably have more important commitments such as their job and family, and amateur radio *is* only a hobby after all! But maybe you know someone locally who's a pillar of the amateur radio society where this is concerned? If so, then read on.

The HRT 'Amateur of the Year'?

This is the end result of several ideas I've had put to me over the last year from HRT readers. Many readers ask if I would feature the occasional 'prominent' amateur within the pages of HRT. Well I'm hoping to briefly feature some or all of our regular HRT columnists in the magazine soon, a photo plus a few words about them, so that our readers may get to know a little more about the name behind the column. But going back to the first question of 'prominent' amateurs, *who* decides who is a 'prominent' amateur? After much discussion I'll be taking this a bit further, and the best way to do this is to ask *you*.

The end result is that I plan to put up an award for the person, *of any age*, whom HRT readers believe is the 'Amateur of the Year'. This will be an award gained by nominations received from HRT readers for the person they believe has contributed most to the hobby in the past year, and will be decided upon after taking all information into account. The award nomination may be gained from giving technical advancement to the hobby, it may be for their work in educating newcomers, or for organising good publicity for amateur radio in their area, their own country or others, or indeed worldwide. We're not going to exclude anyone apart from the members of HRT Editorial staff (it would hardly be fair to include us, would it?). So if you think a volunteer official in RAYNET, the RSGB, AMSAT or whatever should be nominated, just let us know!

But prior to formally deciding on what features should constitute the award of this, I'd like **your** views on what may be valid reasons for nominations. Maybe we should just leave it open as 'The person who, in their own way, has helped amateur radio the most in the last year'. As well as a suitably inscribed shield, we're also hoping to offer a material prize such as a small transceiver each year to the winner. So give us **your** thoughts, maybe at the HRT stand at the Leicester Exhibition this month if you'll be visiting, and in a couple of issues time I'll be pleased to finalise the details. In the meantime, get your thinking caps on, and look around you to see who **you** think should be the first winner. We'll then be pleased to present the first award at the time of next year's Leicester Exhibition.

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LETTERS

Letter of the month

Dear HRT,

Thank you for your interesting 'CQ' section. You appear to have exactly the same problems to discuss in Europe that we have in New Zealand. We introduced a Novice grade licence in 1977. Howls of protest from some operators who said we were making it too easy. It did not take off for quite a long time as most worked for their full license, but lately there are quite a few appearing on a restricted part of the band. We too have plenty of complaints from operators that the national organisation (NZART) is not doing enough for them (they usually won't stand for office or pay up). There is a lot of very good work going on in the 2m plus area. A national (link system) on 70cm, 2m packet digipeaters and quite a bit of activity on ATV and satellites. I enclose our latest call book which you may find useful.

We are also discussing the future of 'A' radio, it must progress and change is inevitable. Ideas put forward include making two or three options available for further study — perhaps having CW as one option. We have to try to keep up with technology and yet not frighten people off the hobby completely. On the front of the call book is a picture of a group that are sending up transmitters by balloon. We use the national link system to report signals as the balloon goes up higher and higher.

Keep up the good work!
73 Stan Whyte, ZL1BYR

Editorial comment;
Thanks for the callbook Stan — I can see it cost you quite a few dollars in airmail (we're sending Stan a few 'goodies' in return!). From the comprehensive information in this it certainly seems that amateur radio technology in ZL land isn't standing still by any means. You're quite right in saying that the continually evolving nature of amateur radio must 'move with the times' to reflect the interests of potential newcomers to the hobby, and it looks like some amateurs in the UK are not the only country to realise this. There's no need to 'teach an old dog new tricks' of course, as many experienced amateurs know very well what they're good at and how they wish to spend their time on the air. We of course strive to meet that need through HRT, but at the same time by publishing pioneering work carried out by amateurs, such as new digital technologies and satellite communication. Like it or not, we must not advocate amateur operation of only 'how it always used to be' if we wish to keep hold of our bands. For this is not the future, and it is new technology (e.g. computer and space communication) which today gives fascination to potential youngsters coming into the hobby.

Dear HRT,

What a refreshing point of view was put forward by young Martin in the August issue on the subject of the Morse test. For too many years now this 'holy cow' of the amateur fraternity has been allowed to dominate the thinking and decisions of those in authority. Martin's comments echo, I am sure, those thoughts of most 'B' licensees when faced with the prospect of having to spend an inordinate amount of valuable time in learning a language which is, at best, unsophisticated and ponderous in use. Even after many years practice and experience, 25 or 30 words a minute seems to be the absolute limit in all but a few exceptions, whereas virtually everyone is able to speak at one hundred and twenty words a minute without any practice whatever! The speeds needed to pass the test will avail the amateur little when having to compete with the machine-sent Morse so often heard today on the HF bands. The test can therefore no longer be regarded as an adequate demonstration of an amateur's competence to operate on the HF bands. Having spent a great deal of time in learning Morse, I intend soon to take the test but have no intention of using the mode thereafter except perhaps for novelty purposes, the method of transmission will not be appropriate to my requirements, nor do I have the time to spend an hour over what is in effect a ten minute QSO. The replacement of the, lets face it, simply administered and lucrative Morse test will however require a certain amount of lucrative thinking on the part of the ruling body to introduce a meaningful and relevant test more geared to the requirements of radio today as opposed to radio yesteryear. Perhaps the introduction of such a scheme may do something towards halting the decline of what is only a hobby, fruitful and absorbing though it may be.

Yours faithfully,
Les Wolstenholme, G7HRA.

Editorial comment
A 'knowledge of Morse Code' is currently required for amateur HF use internationally, but as we know many countries, notably Japan (who built your rig then?) with over 1,000,000 amateurs on HF with no Morse qualification, do not enforce this. The results of our readers survey very clearly show the majority of both unlicensed readers and Class B amateurs feel the mandatory Morse test should not continue, but instead be replaced with something more in line with today's needs, although most Class A amateurs feel it should be retained. We've already passed these findings onto the RA at a recent informal meeting, and we'll be following this up formally as an expression of the views of our readers.

Dear HRT,

Regarding the A licence for radio amateurs. It seems to me that just by passing the RAE exam, amateurs have earned the right to operate on all bands. I am not a licence holder so I have no axe to grind. Out of fifty A licence holders I have spoken to about this, only two ever used Morse, the rest telling me they were incapable of doing so. If there were to be a restriction, I suggest that after one year of operation (i.e. probation period) an 'A' license should be issued.

Yours sincerely,
A. Jahsen.

Editorial comment;
It's a very common occurrence (again we've found this from our reader's survey) that many Class A amateurs do not use CW at all, probably just passing the test to

£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 HRT, A.S.P., Argus House, Boundary Way, Hemel Hempstead, HP2 7ST.

attain an A Class licence. Whether or not there should be no extra 'qualification test' between Class A and Class B is debatable however — what do other readers think?

Dear HRT,

Every year, since I first joined the RSGB (1985), I have been faced with an increase in the membership fees, yet I have never encountered a single voice from their committees in that time raised in favour of some simple way of easing the ever increasing yearly burden. I know that there have been suggestions made to them, due to the fact that I have written to them many times on this very subject, all to no avail.

It is an accepted fact that we do obtain value for our money, but I believe it is in the interests of amateur radio and the society to move towards a multi-level method of pament; (a) yearly for those people who prefer to pay once only and can afford it, (b) half yearly, and (c) quarterly payments. One must also remember that we do not live in a perfect world and there will always be people less fortunate than most of us, so for these people a monthly subscription should be arranged.

Membership should not be denied them as it is at present, due to their financial hardship.

Yours sincerely,
J. D. Bolton, G4XPP.

Editorial Comment;
Many organisations have facilities for payments in stages, sometimes by 'disguised' advance payments such as savings stamps. I suppose one could always pay by credit card for some bills to 'spread the cost' bearing in mind the associated added interest payments, although this often causes other problems. As the cost of belonging to our national society gets higher each year, this amount normally being considerably higher than a subscription to a local radio club etc., this certainly can cause a financial burden on the less fortunate. People can and do vote with their feet of course, although with the recent management reforms in the RSGB I'm sure our friends there are taking a very careful look at this one!

Dear HRT,

I am just writing to say thank you. Recently I got interested in scanners and a friend lent me one of your mags. After looking at the ads I saw one for Jaycee Electronics Ltd. in Glenrothes. The service I got from this man was second to none, which is hard to find these days. He explained everything about them, I am now a regular reader of your mag.

Yours sincerely,
Allan Murdoch.

Editorial comment;
It's good to know there are some good companies about, willing and able to offer good advice and assistance. If any of our other readers have been 'bowled over' by good service, let us know as we get many letters asking 'can you advise a good dealer?'.

Dear HRT,

I have for several years been an assessor for City and Guilds for a series of skill testing examinations known as the 7261 Information Technology series. I cover parts of Devon, Somerset and Cornwall.

To my mind the 7261 series is far more suited to testing would-be radio amateurs than the method in current use and could have easily incorporated the new Novice exam. I have written to the RSGB who are of course not interested. If I explain the 726 series to you would it be possible to give it a mention in HRT? I am sure many amateurs in education are using the series already and it would be interesting to hear their responses.

Firstly, the 7261 series is a skill testing exam at 4 difficulty levels; 726 — Introductory (this could be novice level), 726 — Elementary (present VHF licence?), 726 - Intermediate (present full licence?), and 726 — Advanced (future use?).

Any centre, on paying a fee, can apply to offer the exams and at any level. I as an assessor visit the centre applying (and later to ensure it is being run correctly) and assess their technical ability, accommodation and equipment to offer the modules requested and make the necessary recommendations to City and Guilds.

Centres in my area using 726 range from secondary schools, prisons, colleges, youth and adult training schemes etc. In fact anyone meeting the required criteria (why not radio clubs?). The format of the exams is such that the centres using it are sent the course content — which includes a log book for the trainee that covers the course elements — and of course the exam questions and answers (which the examinations secretary must keep locked away!). The exams consist of several parts, multi choice papers, practical tests, tutor devised tests, and short answer papers. The exams are marked at the centre and the results known at once.

If a pupil fails a test he/she has only to wait one week before retaking it, not 6 months as at present. On completion the certificate is requested via the centre assessor who signs and approves the request. I believe that the drop-out rate would be far less using this method and it includes practical tests far more suited to the radio amateur. At present anyone can take the RAE and have little idea of how the equipment they are using works!

Yours sincerely,
Barrie Kissack, G3MTD.

Editorial comment;
Over to our readers — what do you think?

NOVICE NOTES

Receiver Sensitivity and Selectivity — what do the figures mean? Chris Lorek G4HCL explains

So you're trying to decide on your first rig, or even an upgrade to a better rig, and the manufacturer's glossy data sheets give all sorts of impressive figures. But what do they mean? One comment I heard last week whilst visiting an amateur radio dealer in Kent, was that a recent customer preferred a receiver with a 0.5uV sensitivity to another with a 0.25uV sensitivity, as this was a higher, and thus apparently a better, figure. But what are these strange 'uV' definitions? What is SINAD anyway?

Sensitivity

Sensitivity, as many readers know, is the ability of a receiver to demodulate a weak signal. In our HRT technical reviews, in common with many manufacturer's data sheets, we give the measured receiver sensitivity in uV pd for 12dB SINAD.

Let's explain this. A uV is simply a millionth of a Volt, so when your set is receiving a signal of 1uV it means there is one millionth of a Volt's worth of the wanted signal present at the receiver's aerial input. The term 'pd' simply means 'potential difference', i.e. the potential difference across the receiver input, as opposed to 'EMF' which is an unterminated measurement and is normally completely different in level.

Which leaves SINAD. Now we should always have a sensible and repeatable reference to base receiver sensitivity on, rather than just quoting a figure to raise the squelch, or to read S9 on the meter, or whatever. SINAD is the audio ratio between the wanted signal and the ***Signal plus Interference,Noise And Distortion***, normally measured at the receiver loudspeaker terminals with a 1kHz audio tone. 12dB SINAD is a 12dB ratio between the wanted signal and all the background noise, the SINAD figure of 12dB being a fully readable signal in normal usage. So when we see a figure of, say, 0.2uV pd for 12dB SINAD, this means that the receiver will give you a 12dB SINAD signal at its loudspeaker terminals with a 0.2uV pd received signal at the aerial terminal.

Typical Figures

What should you expect from typical 'state of the art' equipment? On VHF and UHF FM, a typical 'good' figure of sensitivity for 12dB SINAD in a dedicated transceiver would be around 0.15 to 0.25uV pd, the lower the figure, the more sensitive the set. Sometimes you'll find a sensitivity, particularly on VHF, of below 0.15uV, meaning the receiver is very sensitive indeed. For SSB and CW, due to the narrower bandwidth and other factors a figure of around 0.10 to 0.15uV pd is typical of a 'state of the art' receiver, below 0.10uV pd and the set is getting very sensitive.

The same applies at HF, although on the lower frequencies such as 160m, 80m and 40m, absolute sensitivity isn't always necessary as band noise is normally the limiting factor, so even sensitivities such as 0.5 to 1.0uV pd or even higher would not be inappropriate in many cases.

Selectivity

We can take SINAD one stage further. As the SINAD degrades, i.e. the dB ratio becomes less, then the signal you hear in your loudspeaker becomes more and more difficult to understand. When you get to around 6dB SINAD, the going starts to get tough on your ears. This may be caused by the wanted signal simply becoming weaker, but QRM can also degrade the readability of an otherwise perfectly readable signal through additional interfering 'noises'. Here's when we take advantage of SINAD again to measure the effect of interfering signals on the wanted signal.

Let's say we have a wanted signal which gives us 12dB SINAD, i.e. good readability. Then if an off-frequency signal comes up, limitations in the receiver filters, or front end and mixer circuits, can result in QRM and thus degrade the SINAD ratio. If we take 6dB SINAD as a reference amount of degradation, then by looking at the signal ratio in dB needed between the wanted and the QRM (unwanted) signals, to degrade a 12dB SINAD signal to 6dB SINAD, then we've got another handy 'reference' to compare receivers with! You'll see we do this in every HRT technical review.

Types of QRM

In an FM rig, you can often get QRM due to limitations in the receiver filters from other amateurs operating 12.5kHz and 25kHz away, i.e. on adjacent channels. The ability of a receiver to cope with this is, not surprisingly, called 'Adjacent Channel Selectivity'. In a typical test, an off-channel signal is modulated with an interfering tone, such as 400Hz, and the relative level of this compared to the wanted signal to degrade it from 12dB SINAD to 6dB SINAD again, gives the Adjacent Channel Selectivity. Typical figures would be around 55dB-70dB rejection of 25kHz spaced signals, with correspondingly less for 12.5kHz unless the set was specifically designed for this close separation.

On SSB and CW, for example on HF receivers, things get a little different. Here, strong off-channel heterodynes and varying level signals can often be more important, so a measurement is taken of the 'selectivity curve' of the receiver. Here, the signal level is progressively increased in, say, 20dB steps and is moved away from the centre receiver frequency until the detected signal level is the same as before with no increase. The final chart of results then shows you the frequency difference needed to provide a given rejection. A good receiver selectivity shouldn't start 'widening out' significantly above the -60dB mark, an excellent receiver will provide in excess of - 80dB before the selectivity starts 'flattening'.

Blocking

Signals at other frequencies, such as out-of-band transmissions can also degrade the readability, this 'blocking' often being caused by limitations in the receiver front end and mixer circuits. So an identical test, but with greater separations of, say, 1MHz or so, can reveal how well a HF receiver copes with 'monster' signals on an adjacent broadcast band, or how a VHF receiver copes with strong transmissions from your local police and fire stations. An 80-90dB rejection ratio is good, greater than this is often found at higher separations and at closer separations on the better HF receivers.

Manufacturer's Figures

You'll sometimes see manufacturer's specification figures for adjacent channel selectivity and blocking giving, simply, a 'dB' figure. OK, dB over what, and for what? Likewise for sensitivity, if simply a 'uV' figure is given, then make sure it shows what you get from the receiver in terms of readability for that input level! Be careful to compare like with like. Better still, take a look at figures such as those given in the HRT reviews, where all measurements are made in exactly the same manner.

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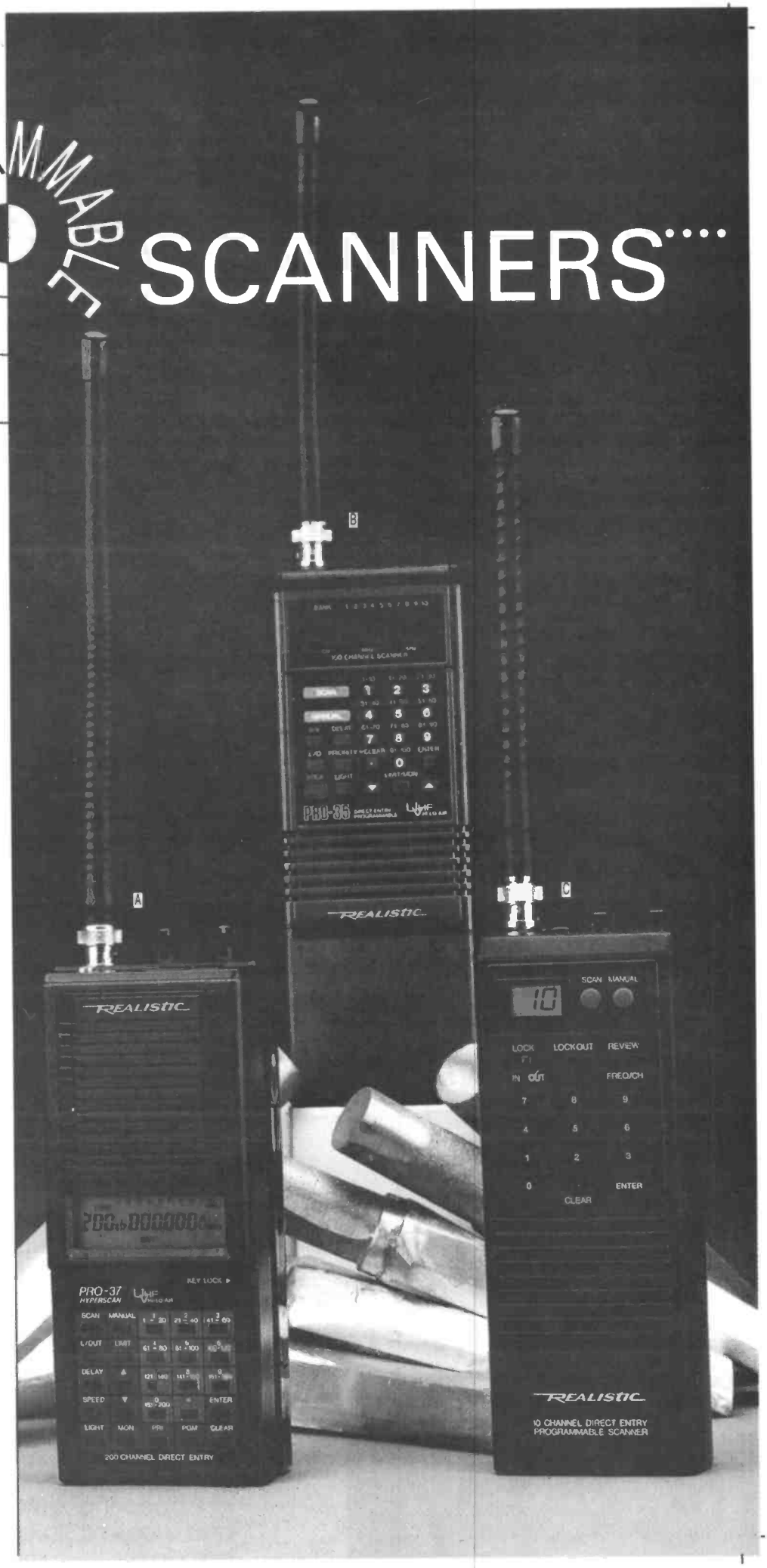

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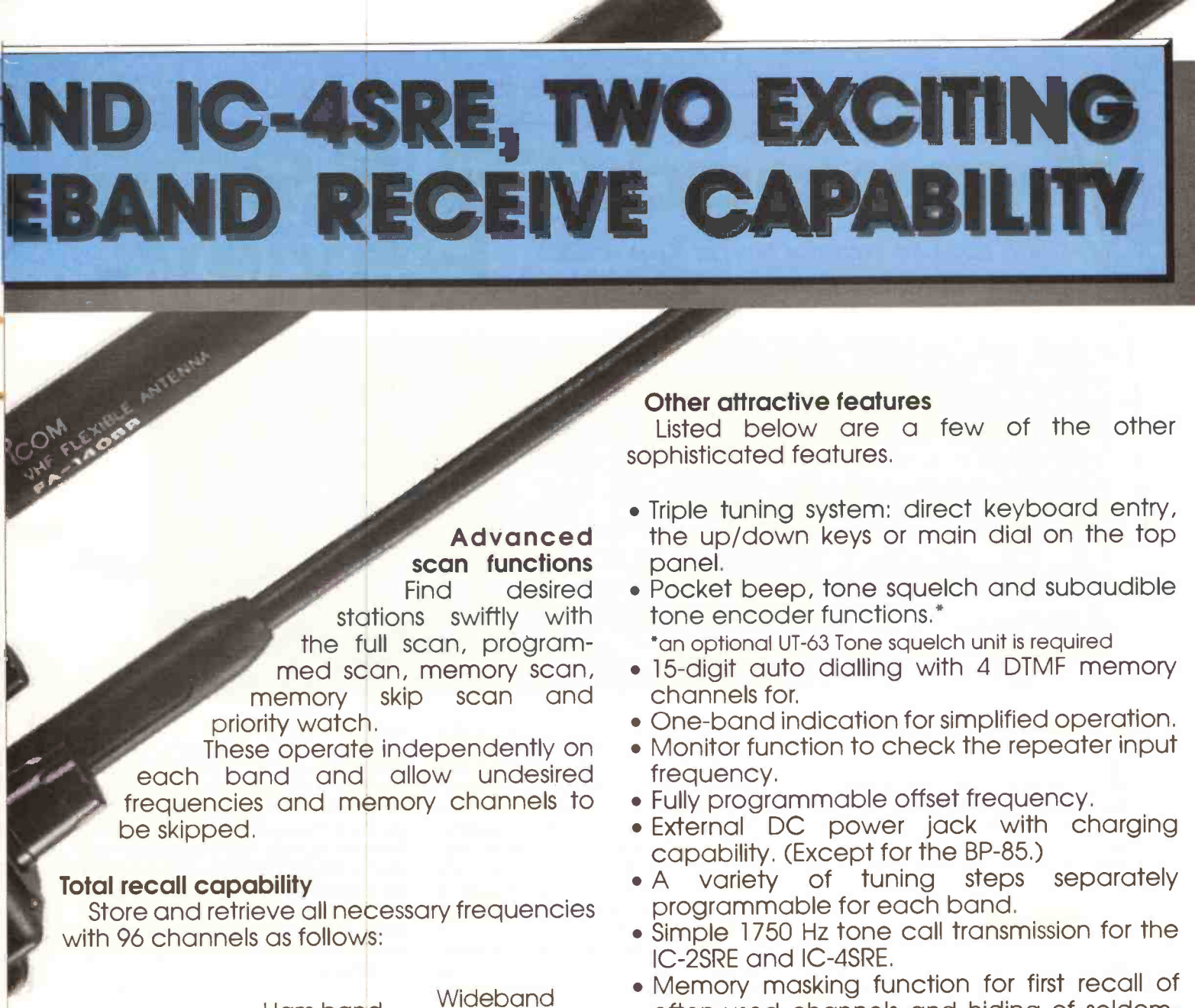

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Kenwood TS-690S Review

G4HCL takes an exclusive look at Kenwood's new HF transceiver - 6m included!

Kenwood's latest HF transceiver has just hit the market, and HRT were again pleased to be offered the first available review sample. The TS-690S/450S follows in the footsteps of the TS- 680S/440S, the TS-690 basically being similar to the TS-450 apart from the addition of a 6m transceive capability.

Features

The set covers the usual WARC HF amateur bands (i.e. 160m- 10m) on transmit, plus it gives general coverage receive operation over the 500kHz to 30MHz range. The TS-690S also gives transmit and receive operation over 50-54MHz.

Modes of operation are CW, SSB, AM, FM and FSK (F1A, e.g. for RTTY), and on transmit a maximum output power of 100W is provided on HF, and 50W on 6m (40% of this maximum power in the case of AM). You'll need an external 13.8V DC source capable of around 20A to power the transceiver, this can either be an AC power supply or of course a directly-wired vehicle supply if you're going to be running the set mobile.

Controls

The front panel of the set is sensibly laid out so that most of the operating controls are within easy reach, with lesser-used controls such as the carrier level, VOX delay, TX power and mic gain having smaller controls on the bottom right of the facia. Seldom-used controls, i.e. VOX gain and anti-VOX, are accessible as small presets at the side of the case.

You can adjust the tension of the main tuning knob to your liking, i.e. as a 'flywheel' type for use at home or a stiffer tension for use when mobile, and with a couple of button-pushing operations you can even disable some of the controls to prevent accidental operation whilst mobile. Two tuning rates are provided with the knob, the 'normal' rate and with a front panel button push a 'fine' rate for use when you've settled on the wanted frequency range.

In VFO mode, the large front panel Up/Down buttons change between amateur bands, with each band recalling your last-used frequency and mode — a nice touch. As well as this you can of course use the multi-function keypad for direct frequency entry. For general-coverage receive use, the Up/Down buttons may be quickly switched from the front panel to become 1MHz up/down controls.

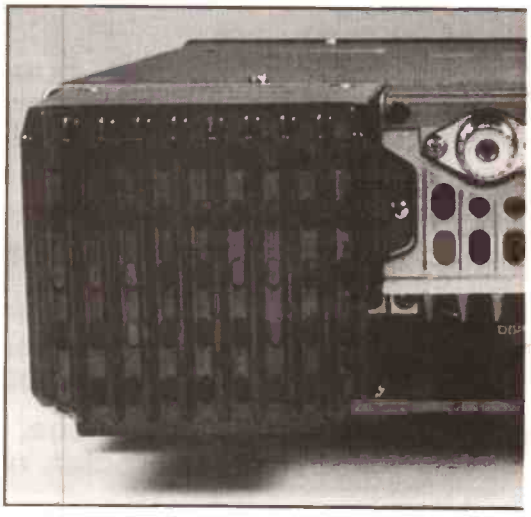
Receive Filters

The receiver uses IFs (Intermediate Frequencies) of 73.05MHz, 8.83MHz and 455kHz. The first is used to provide roofing selectivity as well as good image rejection and the like, with close-in selectivity provided by the 8.83MHz and 455kHz IFs. You can individually select the crystal filters here from the front panel by repeated presses of the '8.83' and '455' buttons. A small matrix section the left hand side of the main display shows you which filters you've selected from a choice of 6kHz, 2.4kHz, and 500Hz bandwidths on the 8.83MHz IF (plus a 'through' selection which switches in an L-C filter), and 12kHz, 6kHz, 2.4kHz and 600Hz bandwidths on the 455kHz IF.

The 8.83MHz 'through' L-C and 6kHz filters, and the 455kHz 12kHz, 6kHz and 2.4kHz filters are fitted as standard, other filters such as the 500Hz CW filter positions being vacant to allow optional filters to be fitted. CW enthusiasts may also be pleased to know that a push of the front panel 'Rev' button switches the CW BFO from USB to LSB and vice-versa, to allow a further degree of protection against QRM in crowded band conditions.

Connectors

As may be expected from a transceiver of this calibre, a large array of connectors are provided for the addition of all sorts of external devices. Sockets on the side and rear panels allow a Kenwood DSP-100 Digital Signal Processor



to be connected (see HRT March 91 for details of this), and a variety of sockets on the rear panel provide for RTTY and Packet terminal units, linear amplifier switching and the like.

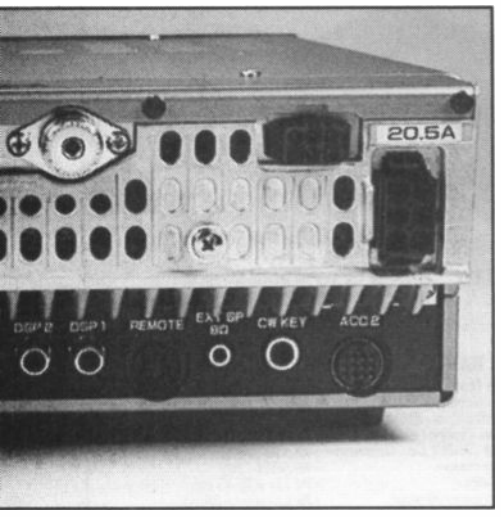
A useful facility on the TS-690S version is that of two aerial connectors. One is a common 1.8MHz-54MHz connector, and by the flick of a switch the second connector becomes used for 50- 54MHz whilst the original connector becomes active on HF only. This allows the use of separate HF and 6m aerials if required, alternatively one of the combined HF/ 6m 'compact yagis' may be directly connected without the need for an external splitter unit.

Computer Control

With an optional Kenwood IF-232C computer interface, the transceiver may be controlled from the RS-232 port of a personal computer given appropriate software. So if you're a budding program writer, from your keyboard you can control the set's frequency, mode, meter function and signal readout, AIP, CW pitch and the like. A twenty page 'external control' addition to the operating manual is provided for software writers to make use of these control functions.

ATU

As well as the options already mentioned, other additions are possible to extend the versatility of the set, allowing you to 'customise' the set that bit further. One of these is the internal Automatic Aerial Tuning Unit which may be fitted in the TS-450S version (not the TS-690S), the ATU operating between 3.5MHz and 29.7MHz. This is specified to cope with an input VSWR of up to 3:1, and as well as automatic control the ATU may be preset manually for those 'difficult to get' matches. Remember however that this will probably be of little use for aerials such as long wires or types like the G5RV,



where an external ATU will probably be needed.

In Use

As I'd already used the TS-850S 'bigger brother' transceiver, I found operation of this set to be very easy indeed. For 'first time' users however, the transceiver comes with a comprehensive handbook set, with instructions in six languages including (American) English, giving in general a good guide on the operation of the set.

As well as a receiver attenuator, the set has an 'AIP' (Advanced Intercept Point) function, which is designed to help overcome strong signal handling problems on bands below 10MHz at the expense of a slightly reduced receiver sensitivity. The default setting of the receiver has the AIP function enabled on the 160m, 80m and 40m bands, which could be handy for users of 'monster' aerials. With my inverted-L aerial system for 80m and 40m, with its corresponding large earth mat, I found little difference with the AIP in or out apart from the reduced receiver sensitivity, so I normally just kept this switched out.

On tuning around the bands I was pleased to see that not once could I get the receiver to misbehave through overloading effects or whatever, very nice! The selectable IF filters I found I just kept at the 2.4kHz positions for general listening around, but I really would have preferred variable slope tuning (i.e. individually variable filters) rather than an IF shift control (i.e. both filters shifted together), as on crowded bands I sometimes cursed the QRM from stronger signals on either side when I was trying to extract a weak DX station during the inevitable 'pile-ups'. The 'notch' facility helped little unfortunately, as I found this was an audio notch which had no effect on the IF selectivity.

The multi-function display, which shows a very comprehensive amount of information, I found very easy to use. The meter section could be switched to read between several different TX functions such as power output, ALC etc., and on receive it could be set to indicate as either an S-meter or a dB audio level meter - novel! A 'peak hold' facility on this helped give accurate readings as well as allowing me to set my transmit audio accurately so as not to exceed the ALC limits.

On transmit the set was again a pleasure to use, and reports of my transmitted audio were very good even with the internal speech processor enabled. On packet, grounding a pin on the rear accessory connector for the TNC muted the microphone plugged into the front panel connector. So to save disconnecting this, a quick arrangement with a couple of diodes linked to the PTT line from my TNC then allowed me to keep both the TNC and the microphone permanently connected. For RTTY enthusiasts, in 'true' FSK mode the transceiver may be switched between default of a 2125Hz 'space' tone (as used in the USA) and a 1275Hz space tone (as used by the rest of the world), to provide interchangeability - some early transceivers could only be used with the American tones which was bad news with some terminal units! For data modes, use of the optional 500Hz filters, with suitable adjustment of the IF shift as needed, I believe could prove very useful indeed although these filters weren't fitted on the transceiver I tested.

100 memories were fitted, and as well as the usual memory scanning facilities 10 of these had the facility of storing the frequency limits for a 'search' mode. These memories I found useful for 6m, allowing me to leave the set searching either for general activity or for scanning the international 6m beacon frequencies. Unfortunately I found the 6m section of the TS-690S operated only on 50-54MHz, I would have preferred a wider coverage on receive to allow for checking of Band I broadcast signals to warn of 'lifts', but inspection of the circuit diagram suggested this could be possible with a software control.

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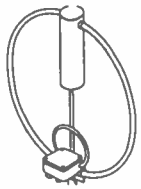

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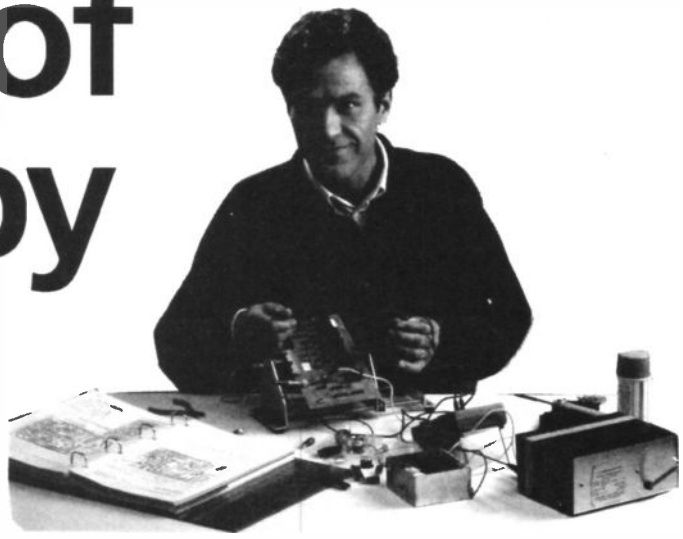

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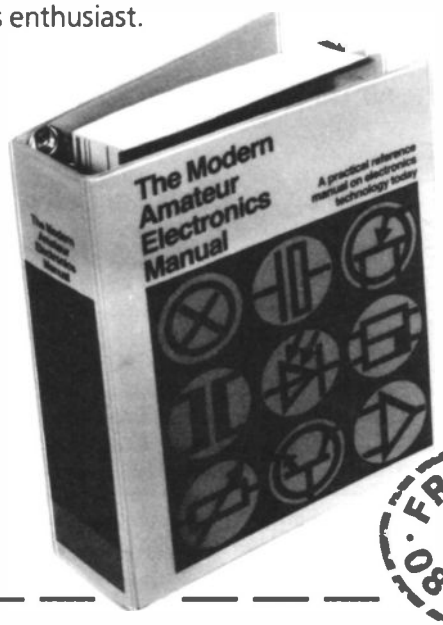

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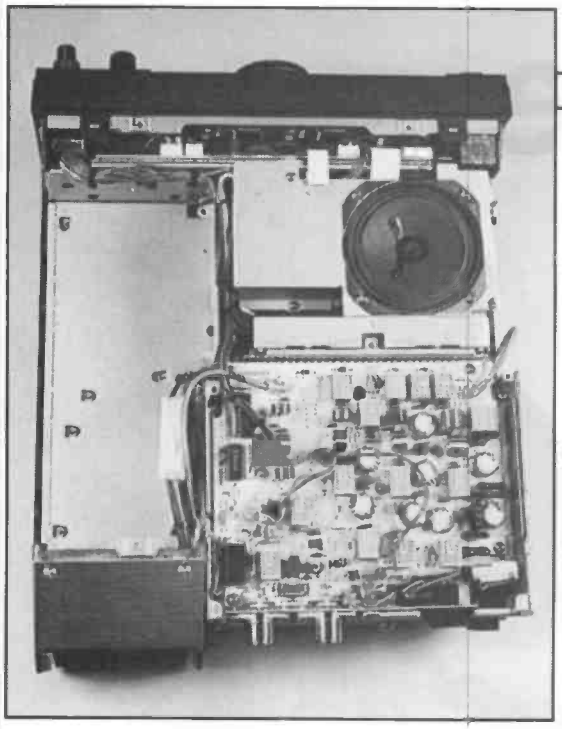

Circuitry

On receive an array of diode switched bandpass filters are used, prior to the RF amplifier consisting of a pair of parallelled 2SK520 FETs. An additional preamp is also switched into circuit above 21.5MHz on HF and 6m. With the 'AIP' enabled, these preamps are switched out, to be replaced instead by a passive L-C filter stage. The first mixer consists of no less than four 2SK520 FETs, upconverting to the first IF of 73.05MHz where a monolithic crystal filter provides a degree of 'roofing' selectivity. Two further 2SK520s are used in the second mixer, converting down to 8.83MHz where the first portion of close-in filtering takes place, then onto 455kHz via a pair of 3SK131 FETs and subsequent close-in filtering.

A DDS (Direct Digital Synthesiser — see last month's HRT) in the carrier generator provides 8.375MHz and 455kHz mixing signals to the third and fourth mixer stages, the main Phase Locked Loop section providing the 73.15-133.05MHz first mixer signal input and the 64.22MHz second mixer signal. With this combination, the set provides frequency resolution down to 1Hz steps in 'fine' tuning mode, the carrier generation PCB having just a few multi-pin ICs present rather than the usual VCOs.

On transmit, a pair of 2SC2879 bipolar transistors in push-pull are used, driven by a pair of 2SC2509 transistors again in push-pull.

LABORATORY RESULTS:

RECEIVER;

All measurements carried out in SSB mode with 2.4kHz bandwidth unless stated.

Sensitivity;

Input level in uV pd required to give 12dB SINAD, bracketed figures measured with AIP enabled;

Freq. MHz	SSB/CW	AM	FM
1.8	0.15 (0.55)	0.49 (1.60)	—
3.5	0.12 (0.39)	0.37 (1.25)	—
7.0	0.11 (0.35)	0.34 (1.05)	—
10.1	0.12 (0.37)	0.38 (1.10)	—
14.0	0.11 (0.34)	0.31 (0.97)	—
18.1	0.11 (0.34)	0.34 (0.99)	—
21.0	0.11 (0.29)	0.33 (0.95)	—
24.9	0.08 (0.32)	0.21 (0.93)	—
28.5	0.10 (0.35)	0.29 (1.02)	0.16 (0.56)
29.5	0.16 (0.47)	0.49 (1.33)	0.31 (0.73)
50.2	0.08 (0.56)	—	0.14 (0.98)
51.5	0.08 (0.55)	—	0.14 (0.92)

Selectivity;

	SSB/CW (2.4kHz)	AM (6kHz)	FM (12kHz)
-3dB	1.95kHz	5.50kHz	7.70kHz
-6dB	2.38kHz	6.60kHz	8.40kHz
-20dB	2.98kHz	9.10kHz	9.80kHz
-40dB	3.42kHz	10.6kHz	12.10kHz
-60dB	3.69kHz	12.8kHz	13.30kHz
-80dB	3.83kHz	13.5kHz	13.70kHz

Blocking;

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

	AIP Off	AIP On
21.4MHz;		
+/-50kHz;	102.6dB	102.4dB
+/-100kHz;	107.7dB	107.5dB
+/-200kHz;	108.7dB	108.6dB
50.2MHz;		
+/-50kHz;	100.7dB	102.0dB
+/-100kHz;	105.1dB	106.3dB
+/-200kHz;	107.2dB	108.7dB

3rd Order Intermodulation Rejection;

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

	AIP Off	AIP On
50/100kHz spacing;	98.1dB	92.2dB
100/200kHz spacing;	97.0dB	93.5dB

Image Rejection;

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

Freq. MHz	Image Rej.	IF Rej.
1.8	75.1dB (77.3dB)	92.9dB (71.7dB)
3.5	76.0dB (79.0dB)	93.7dB (75.5dB)
7.0	76.3dB (83.1dB)	97.2dB (77.6dB)
10.1	89.8dB (64.5dB)	95.3dB (76.2dB)
14.0	90.6dB (66.1dB)	92.3dB (78.5dB)
18.1	92.4dB (66.1dB)	91.4dB (77.6dB)
21.0	93.5dB (66.1dB)	92.3dB (79.7dB)
24.9	>110dB (92.8dB)	>110dB (87.4dB)
28.5	109.9dB (>110dB)	>110dB (>110dB)
29.5	>110dB (>110dB)	>110dB (>110dB)
50.2	104.7dB (>110dB)	95.0dB (79.2dB)
51.5	103.6dB (>110dB)	94.8dB (79.0dB)

S-Meter Linearity

Measured at 14.25MHz;

Indication	Sig. Level	Rel. Level
S1	1.02uV pd	-27.8dB
S3	2.75uV pd	-19.1dB
S5	6.54uV pd	-11.6dB
S7	11.4uV pd	-6.8dB
S9	24.9uV pd	0dB ref
S9+20dB	194uV pd	+17.8dB
S9+40dB	2.13mV pd	+38.6dB
S9+60dB	18.0mV pd	+57.2dB

TRANSMITTER;

A switched bank of filters follow to provide out-of- band spurious signal attenuation, prior to the metering detector, aerial changeover relay and rear panel aerial socket.

TX Power;

Freq MHz;	Power;
1.8	108W (16.4A)
3.5	112W (16.5A)
7.0	112W (15.7A)
10.1	113W (15.8A)
14.0	113W (17.7A)
18.1	108W (17.1A)
21.0	108W (17.8A)
24.9	106W (15.5A)
28.5	106W (14.9A)
29.5	107W (15.1A)
50.2	55W (10.5A)
51.5W	56W (10.9A)

S-Meter S9 Level;

Freq. MHz	Sig. Level
1.8	35.2uV pd
3.5	26.7uV pd
7.0	25.7uV pd
10.1	28.0uV pd
14.0	22.1uV pd
18.1	29.0uV pd
21.0	26.2uV pd
24.9	26.3uV pd
28.5	28.0uV pd
29.5	24.1uV pd
50.2	16.5uV pd
51.5	17.1uV pd

Harmonics;

Freq. MHz	2nd	3rd	4th	5th
1.8	<-90dBc	-78dBc	<-90dBc	-80dBc
3.5	-73dBc	-85dBc	<-90dBc	-75dBc
7.0	-87dBc	-62dBc	<-90dBc	-87dBc
10.1	-57dBc	-63dBc	-63dBc	-69dBc
14.0	-65dBc	-47dBc	-77dBc	-89dBc
18.1	<-90dBc	-63dBc	-86dBc	-84dBc
21.0	-82dBc	-84dBc	-87dBc	-84dBc
24.9	<-90dBc	<-90dBc	<-90dBc	-81dBc
28.5	-80dBc	-82dBc	-84dBc	<-90dBc
29.5	-77dBc	-81dBc	-86dBc	-85dBc
50.2	<-90dBc	-82dBc	<-90dBc	<-90dBc
51.5	<-90dBc	<-90dBc	<-90dBc	<-90dBc

SSB IMD Performance;

Measured with a two-tone AF signal, as dB below PEP level.

	3rd Order	5th Order	7th Order	9th Order	11th Order
14.25MHz;					
ALC Onset	-40dB/ -36dB	-49dB/ -45dB	-51dB/ -56dB	-59dB/ -53dB	-64dB/ -64dB
Mid ALC	-38dB/ -34dB	-48dB/ -45dB	-55dB/ -53dB	-66dB/ -66dB	-64dB/ -64dB
50.2MHz;					
ALC Onset	-26dB/ -27dB	-38dB/ -38dB	-41dB/ -41dB	-53dB/ -52dB	-60dB/ -56dB
Mid ALC	-27dB/ -29dB	-37dB/ -37dB	-41dB/ -42dB	-55dB/ -652dB	-59dB/ -55dB

Laboratory Tests

Followers of the short HRT series 'What goes on inside your rig' will by now be starting to comprehend many of the figures in the laboratory results, such as intermodulation (see last month's HRT) and the like. From the results achieved we see the set should certainly be capable of holding it's own when operated on crowded bands, with few problems from off-frequency signals. Measuring the selectivity showed this to have a very good shape factor with hardly any spreading around the 'skirt', the rejection continuing to be effective even when my cavity tuned signals generators started to become the limiting factor. The 'AIP' however sometimes gave indifferent results. Testing for strong-signal handling gave an increase in absolute intercept point level, although the blocking rejection in relative terms was little different. The intermodulation rejection, again in relative terms, I found actually worsened with the AIP switched in — a check of my external hybrid combiner was quickly made to ensure this wasn't the cause! Even so, the strong signal handling should be good enough for most amateurs' needs!

On transmit, I found the SSB linearity very good, a clean signal being transmitted both with the processor switched in or out.

Conclusions

I found the transceiver pleasant to use, the operating controls all fell to place nicely, and I found no limitations in the strong signal handling capabilities at my location. I would have preferred independent IF slope tuning (this could easily have been fitted — any modification merchants out there?) or at least an IF notch to help here. But apart from this the transceiver is certainly in the 'DX class' for HF enthusiasts who'd rather not pay the £2,000 plus often associated with a main HF rig.

With the TS-690S currently priced at £1,325, and allowing for the extra cost of the required 20A power supply needed, the set could be worthy of serious consideration. If you're not a 6m user, the TS-450S version will currently set you back £1,150 plus the cost of a PSU, and this allows the optional fitment of an internal ATU which could be handy for mobile operation and the like as well as for fixed station use.

My thanks go to Lowe Electronics for the loan of the review transceiver.

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FNB26	7.2V 700mAh nicad	**NC42**	Desktop quick charger
FNB27	12V 600mAh nicad	**MH12A2B**	Speaker/microphone
E-DC-5	DC adaptor c/w noisefilter	**MH18A2B**	Mini speaker/mic
MMB49	Mobile bracket	**MH19A2B**	Earpiece c/w mini mic
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CSC55	Vinyl case for FNB26/27		

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Kenpro KT-44 Review

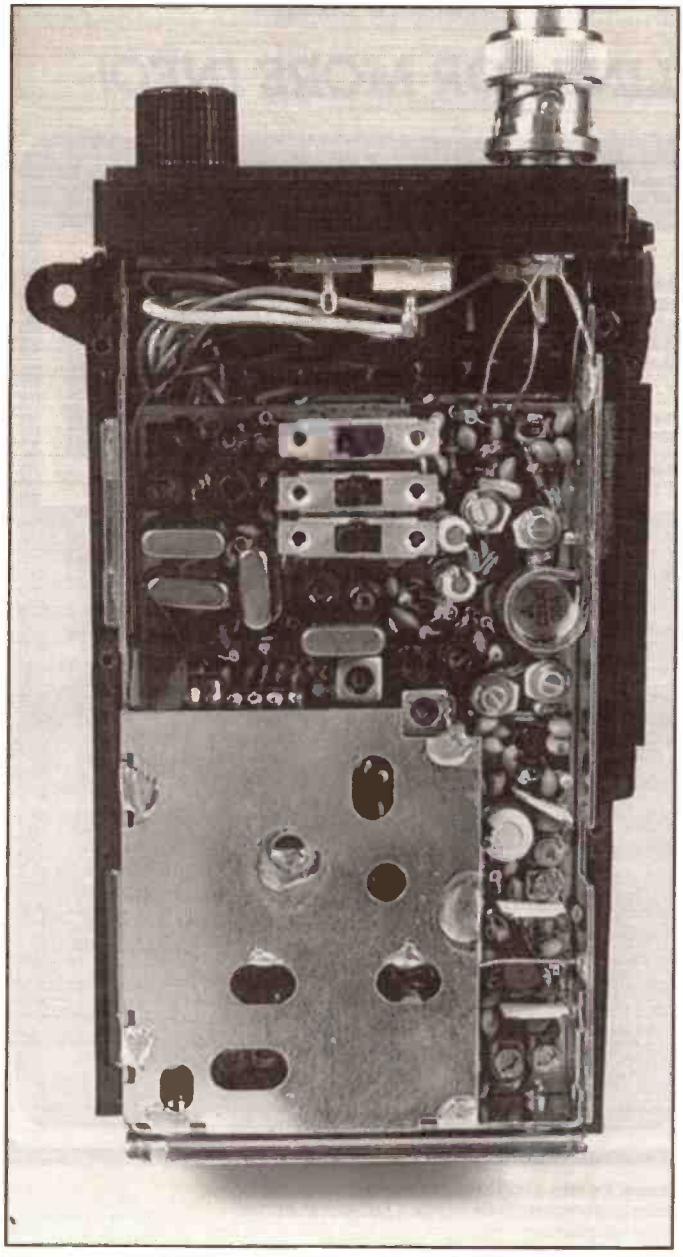
It has often been said that many of today's transceivers are becoming too 'gadgety' and a recent, albeit small but significant, influx of 'simple' transceivers are beginning to raise their heads on the market.

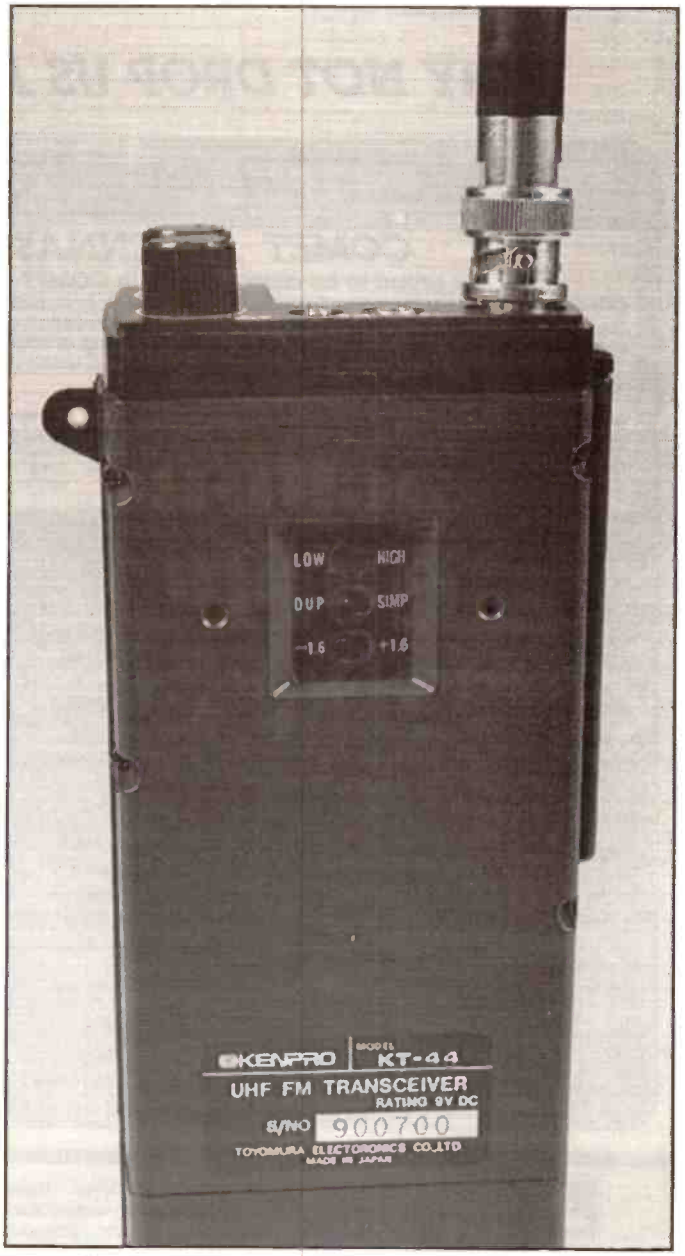
A low cost rig for 70cm — perfect for the novice. Chris G4HCL goes 70cm portable

Traditional Controls

Some amateurs may well remember the arrival of the AOR AR- 240 thumbwheel-controlled 2m portable several years ago, hotly followed by the broadly similar Icom IC-2E portable which became extremely popular. These were synthesised portable rigs with their frequency being controlled by the use of small 'thumbwheel' switches on the top facia. Since then, many popular transceivers have used this approach.

The KT-44 follows this tradition, using the same well-proven control arrangement and dispensing with LCDs, memories, frequency scanning and the like. To set the frequency you just dial it up using the small edgewise knobs, with the first digit indicating the MHz digit (all frequencies being 43x.xxxMHz), the second indicating 100s of kHz, the third indicating 10s of kHz. Thus a setting of '335' would give an operation frequency of 433.350MHz, a setting of '336' giving 433.360MHz and so on. To attain 5kHz increments, a front panel mounted *0k / +5k* switch is used. A front panel 'Tone' button provides a 1750Hz tone for repeater access, and repeater shifts are taken care of by a couple of rear panel switches, these giving either Simplex or





Duplex operation, with either a +1.6MHz or -1.6MHz transmit shift available. An adjacent switch gives either low or high transmit power, to allow you to let the nicad last a bit longer for local QSOs when needed.

A look at the other controls on the top panel shows, besides the thumbwheel selectors, the usual On/Off/Volume knob with the squelch control adjacent, together with again the 'usual' 2.5mm socket for an optional external microphone and a 3.5mm socket for an external speaker, these disabling the internally fitted microphone and speaker. As such, the set should be capable of reasonably simple 'set and forget' use, for operation into a local repeater for example or maybe on a 70cm packet channel. The usual BNC aerial connector is fitted, to allow you to replace the supplied set-top whip with an external aerial for base or mobile use.

Specifications

The set covers 430.000-439.995kHz in 5kHz steps, the transmitter providing a nominal 1.5W output power when using the supplied 8.4V slide-on nicad pack with a switchable 150mW nominal low power level. The transceiver itself may be operated from a supply anywhere between 5.5V and 12V, the transmitter power output varying accordingly. An AC wall charger is supplied with the set to allow you to recharge the nicad, and a range of different nicad packs are available as options. With the supplied nicad the set measures 170mm (H) x 60mm (W) x 40mm (D) and weighs 490g. A range of optional operating accessories, such as a carrying case and external speaker/microphone are available from the suppliers.

In Use

Within seconds of connecting the charged nicad onto the rig I was operational on my semi-local UHF repeater, although I must confess to initially setting the '+1.6/-1.6MHz' repeater shift for the wrong shift...tut tut...at least I didn't transmit out of band in this instance! I found in use the set gave me a solid, rugged feel, with good-size controls which I could operate quite well with gloved hands (often essential for outdoor use in winter).

As well as testing the set while portable using the supplied whip aerial, the transceiver joined me for a few hundred miles worth of travelling as a passenger in the editorial car to see how the set performed mobile. I found there was plenty of audio available from the internal speaker, with the set not being one of the 'ultra-miniature' types no doubt the larger internal speaker helped here, and the internal microphone picked up little background noise. It is of course possible to plug in an external speaker-mic for this use together with a 13.8V DC charging lead to keep the nicad topped up, however I found the supplied nicad normally gave me several hours of use without a recharge.

The receiver I found was slightly less sensitive than other (admittedly

more expensive) transceivers I use, but with the 1.5W transmit power I found I could always hear with good strength the repeaters I could access. A quick test on packet, using one of the small self-contained u-21 portable TNCs plugged directly into the Ear/Mic connectors showed the set to work without fault, although I found the squelch rise time needed an appropriately set distant TXDelay time of 200mS or over.

Conclusions

Overall the set gave good performance, nothing outstanding but then I found nothing detrimental. Considering the selling price of £159 including nicad and charger, I believe it could make an good 'starter' rig for the novice operator. It could indeed be difficult to even home-brew a synthesised 70cm transceiver giving these facilities for the same price! As interest grows or as a supplement to more comprehensive sets, the KT-44 can usefully be employed as a 'stand alone' rig for packet or portable use.

My thanks go to Nevada for the loan of the review transceiver.

LABORATORY RESULTS:

All measurements taken at 435 MHz unless otherwise stated.

Receiver;

Sensitivity;

Input level required to give 12dB SINAD;

430MHz;	0.39uV pd
435MHz;	0.35uV pd
440MHz;	0.40uV pd

Harmonics;

Measured as dB below carrier power, 8.4V supply, high power.

2nd Harmonic;	-82dBc
3rd Harmonic;	-78dBc
4th Harmonic;	-77dBc

Peak Deviation;

4.96kHz

Toneburst Deviation;

3.80kHz

Frequency Accuracy;

+260Hz

Squelch Sensitivity;

Threshold;	0.11uV pd (3.0dB SINAD)
Maximum;	0.28uV pd (10.8dB SINAD)

Adjacent Channel Selectivity;

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

+12.5kHz;	38.5dB
-12.5kHz;	9.5dB
+25kHz;	64.5dB
-25kHz;	60.5dB

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;	80.5dB
+1MHz;	90.0dB
+10MHz;	95.0dB

Intermodulation Rejection;

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

25/50kHz spacing;	60.0dB
50/100kHz spacing;	60.0dB

Maximum Audio Output;

Measured at 1kHz on the onset of clipping;

3 ohm load;	365mW RMS
8 ohm load;	318mW RMS
15 ohm load;	230mW RMS

Image Rejection;

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

59.5dB

Current Consumption;

Standby,	Squelch Closed;	22.6mA
Receive,	Mid Volume;	48.2mA
Receive,	Max Volume;	115mA

Transmitter

TX Power and Current Consumption;

Freq MHz	Power	8.4V Supply	12.0V Supply
430MHz	High	1.81W/690mA	3.49W/925mA
	Low	130mW/300mA	340mW/380mA
435MHz	High	1.88W/680mA	3.70W/910mA
	Low	230mW/320mA	580mW/435mA
440MHz	High	1.81W/635mA	3.49W/870mA
	Low	280mW/345mA	520mW/410mA

Project — A 40m QRP Transmitter

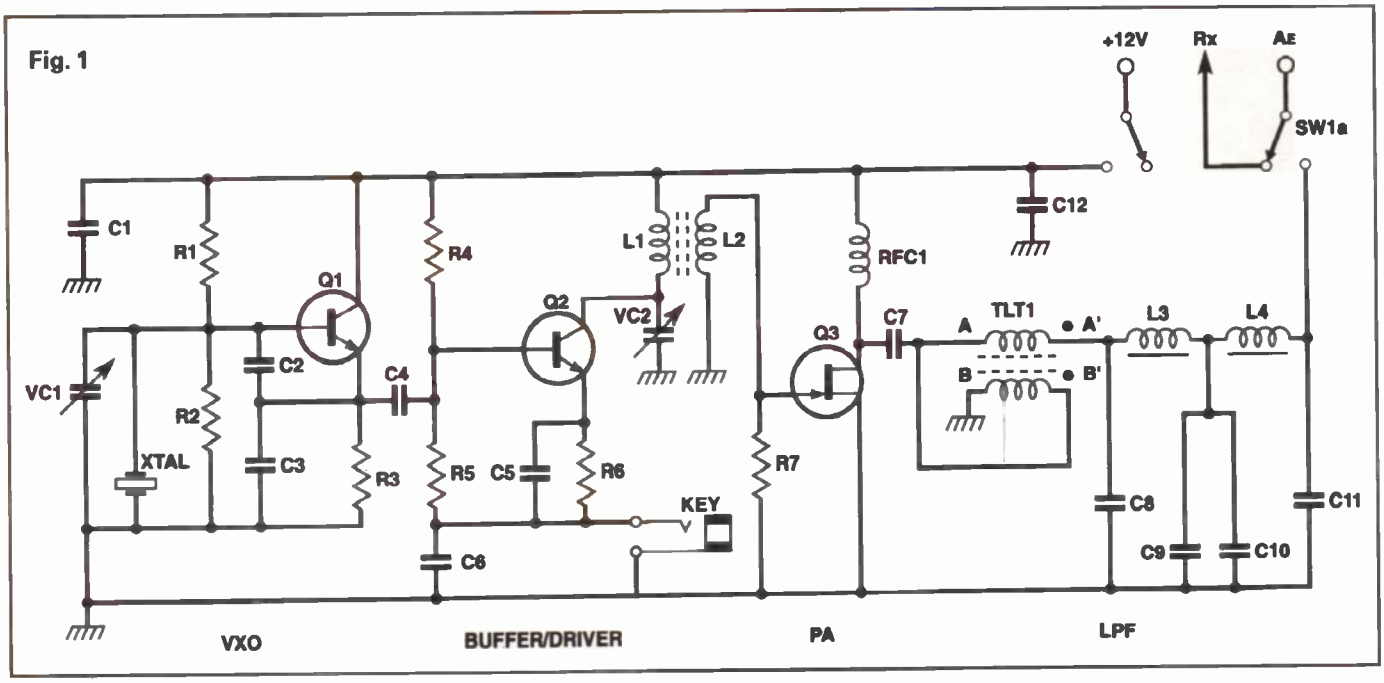
Did you build the 7MHz Direct Conversion Receiver published in HRT quite recently? Well if so, here is a matching 7MHz QRP transmitter to complete a 40m QRP station.

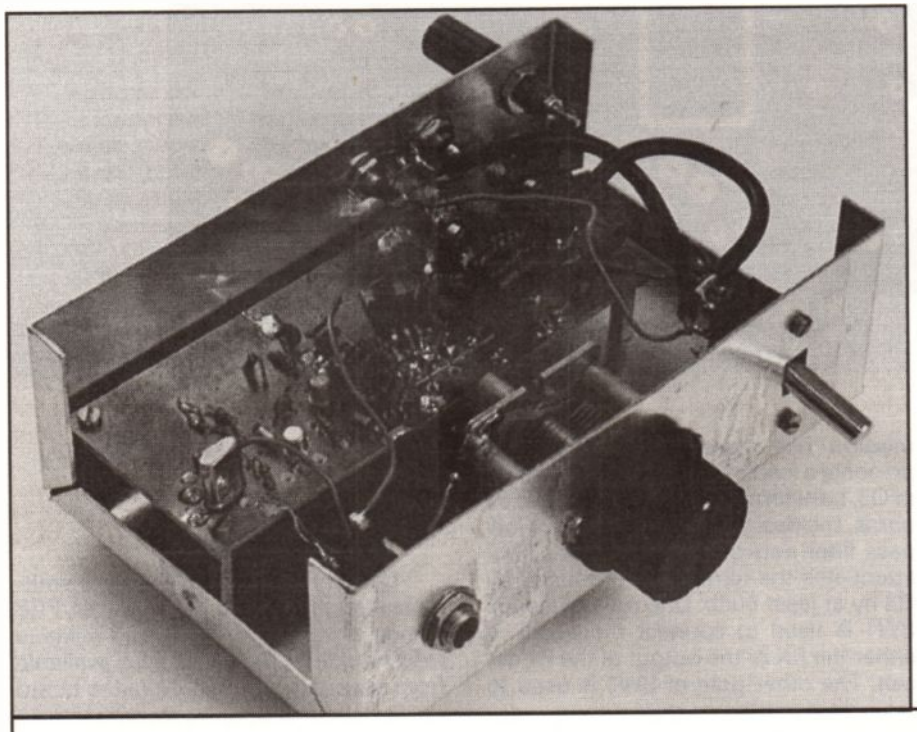
Gee Goodrich G4NLA, designs and constructs a 7MHz QRP TX to accompany the HRT 7MHz receiver

Circuitry

The circuit is illustrated in Fig 1, the semiconductors utilised are all readily available in the UK. While a VFO could have been employed, most QRP activity is centred around 7.030 MHz hence the carrier is generated by utilising Q1 in a VXO configuration. A VXO has the benefit of excellent stability, with the additional bonus of allowing the operator to QSY a few kHz in order to dodge QRM. The crystal's nominal frequency of 7.030MHz may be 'pulled' by the variable capacitor VC1.

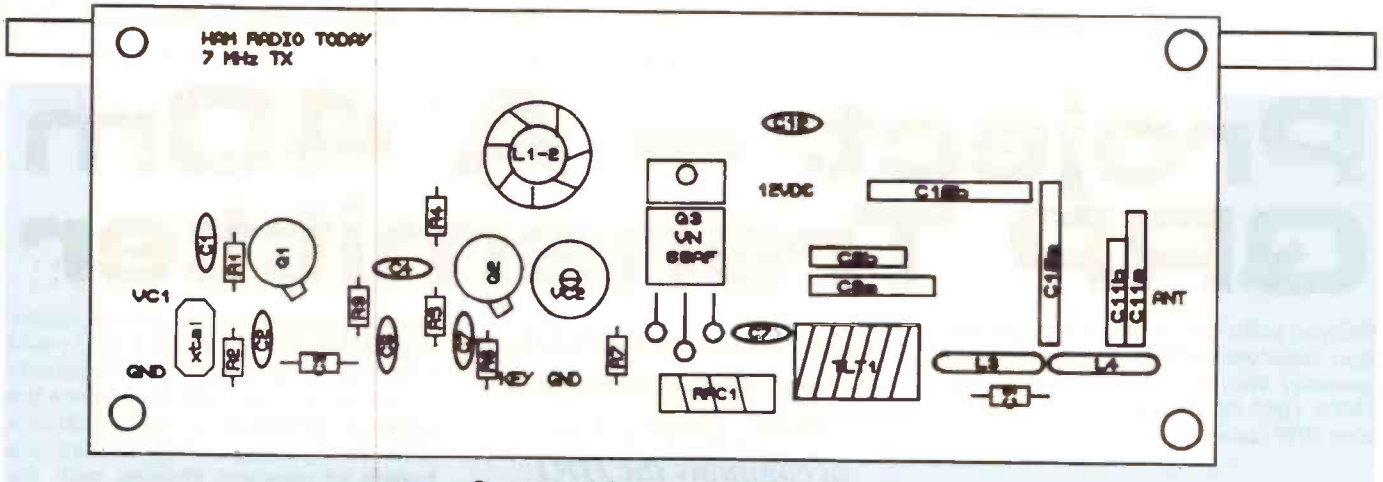
Fig. 1



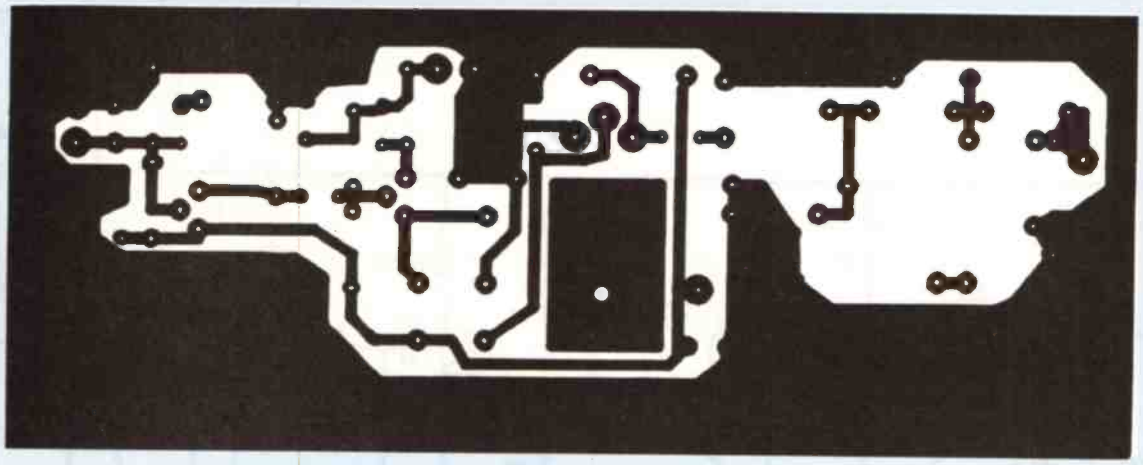


The network R1 and R2 provide the bias for Q1, with C2 and C3 providing the feedback. The output of the oscillator is generated across R3, and decoupled by C4 to the input of the buffer/keying stage. This stage is handled by Q2, and R4 and R5 are the bias components. With the key in the 'off' position, Q2 is effectively turned off, since there is no DC connection to 0V. Keying the Morse key 'on' allows Q2 to act as a Class A amplifier with the 7.030MHz signal being developed across the tank circuit comprising L1 and trimmer capacitor VC2.

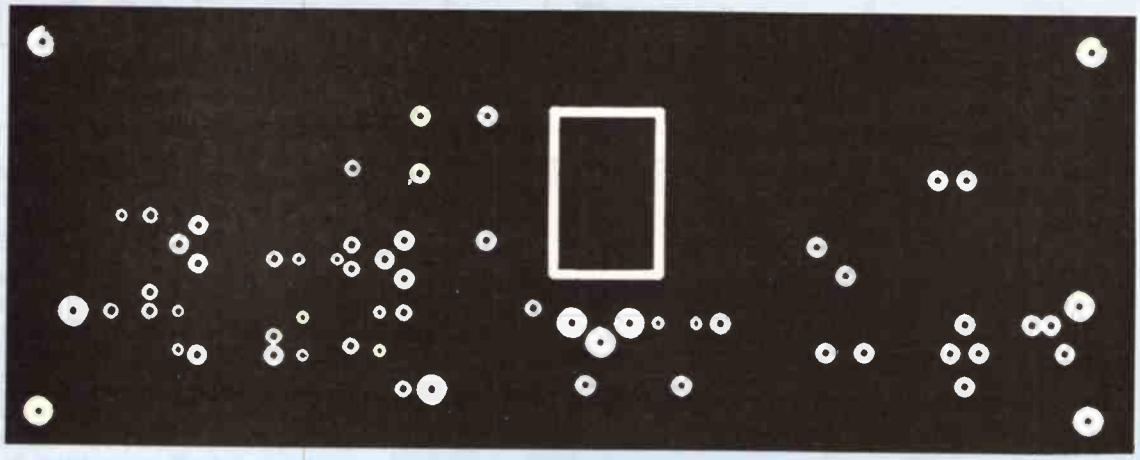
The 7.030MHz signal is coupled by L2 to the gate of Q3, a VN66AF device. The VN66AF is over-rated for the power demanded of the PA, with a specified power dissipation of 12W. However this leaves an excellent margin of error for the mistakes we all sometimes make (forgetting to connect an aerial for example!). In addition to the dissipation



Suggested Components layout



Solder side



Component side

Fig. 2

parameter, the VN66AF shares a characteristic common to all VMOS devices. These devices demonstrate a *negative* thermal characteristic, i.e, as they get hotter so the more resistive the drain-source channel becomes. This prevents the device from suffering thermal runaway. The 7.030MHz carrier (and its harmonics) is generated across RFC1 and decoupled by C7 to the input of a transmission line transformer TLT1. TLT1 presents a load of 12.5 ohms to the drain of Q3, transforming the impedance to 50 ohms, the design impedance of the low pass filter network. The low pass filter attenuates the harmonics produced by Q3 by at least 60db. One pole of switch SW1 is used to connect the aerial to either the RX or the output of the PA circuit. The other pole of SW1 is used to apply 12V to the transmitter circuit.

Methods of Construction

Construction of this little transmitter is straightforward. A suggested PCB design is shown in Fig 2, and suitable ready-made PCBs will also be available from advertisers in HRT. Note the board

is double sided, with most of the component side being used as a ground plane. The only areas not used in this fashion are the connections to the gate and drain of the VN66AF, the large 'island' on this side being used as a small heatsink for the device. All components that require connection to 0V are soldered directly to this side of the board, as illustrated in Fig 3.

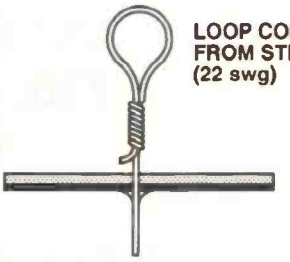
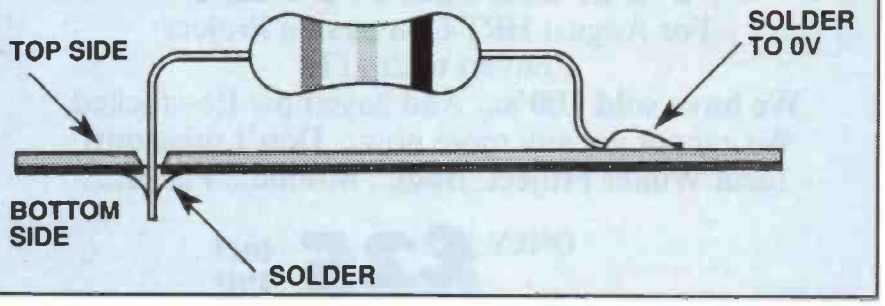


Fig. 4
'G4NLA' TERMINAL MOUNTING

Fig. 3



Some constructors may not wish to use a PCB, don't panic there is an alternative technique available to you, indeed the prototype was constructed in this fashion. The technique involves creating 'islands' on the solder side by utilising a sharp instrument and a steel rule to cut away the copper between isolated pads. My favourite instrument for this is a small needle file, and with a little practice very neat results can be obtained. Don't worry too much if your first attempts are a little ragged, the solder side is normally hidden from view in any event! Unless you have been very clever in preparing the PCB etch resist when making your own board, after drilling the component holes you will need to clear away some copper on the component side of the board around each hole. I simply use a 6mm drill to perform this operation.

Having prepared the PCB, construction and testing can begin, we will construct each circuit and test on a module by module basis. The only test equipment required is a receiver tuned to 7.030MHz, a multimeter, preferably a VSWR RF power meter with a 1- 10 Watt range and a 50 ohm dummy load. An oscilloscope is helpful but by no means essential.

VXO

The first circuit to build is the VXO. Fit and solder the following components, remembering that connections to 0V are made to the component side of the board. C1-C4, R1-R3, XTAL and finally Q1. A Veropin, or a 'G4NLA' terminal connection (Fig 4) is used as the take-off point for the 'hot end' of VC1. VC1 is a panel mounted component, but connect this to the circuit temporarily for testing. Further pins are used to supply 12V and 0V to the circuit board. Now attach a length of wire (say 30cm) to the yet unconnected end of C4. Check the orientation of the components and inspect both sides of the board for bad joints and bridges etc. Apply 12V to the board, and using your receiver tune around until the carrier is found. Adjusting VR1 will give you an idea of how much swing the VXO is going to give you. Assuming all is well, you can remove the 'aerial', VC1 and power connections for the time being.

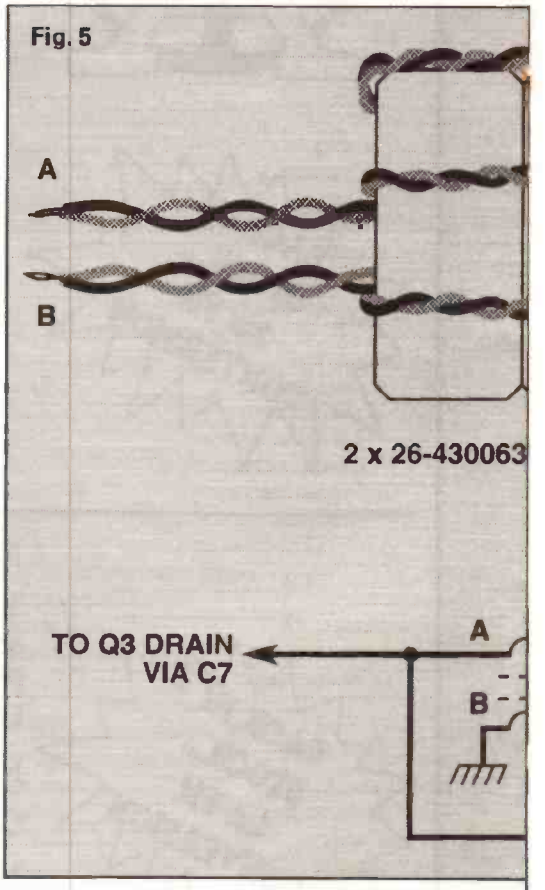
Buffer/Driver

Now we will assemble the Buffer/Driver circuit. We'll commence with L1 and L2, which are wound on a T50-2 toroid. Start with L1 first which comprises 30 turns of 24 SWG enamelled copper wire. The windings should be evenly spaced around the former. A tip — identify the ends of the windings with a bit of Sellotape or similar. Now wind L2 (10 turns of 24 SWG) evenly over L1. Scrape away the enamel from the tails of L1 and L2, and tin the exposed copper. Fit and solder the following components, R4-R6, C5, C6, VC2, L1 and L2. Finally, fit and solder Q2, then fit a pin for the 'KEY' connection. Again perform a visual inspection of your handiwork prior to installing the little aerial to the free end of L2. Temporarily connect a CW key to the KEY connection. Now refit VC1 and connect 12V power, and listen on your RX. Send a bit of CW with the key, and listen on the receiver. There may be a bit of residual carrier on key up, but this will be caused by direct radiation from the VXO components.

PA/Low Pass Filter

Finally to the PA stage and Low Pass Filters. I'll start with the transmission line transformer, because preparing this is a lot of fun! The TLT is wound over two stacked ferrite cores (Fair-Rite 26-43006301, available from Cirkit), Fig. 5 shows how the cores are arranged. Now for the windings, first we're going to construct a 50 ohm twisted pair. Take two lengths of 24 SWG wire about 1m long, and mark the ends and the middle of one length with Sellotape or a dab of nail varnish. Now manufacture a 'fish hook' from a section of heavy wire (clothes hanger wire is ideal) and insert the 'fish hook' into the chuck of a hand drill. Attach one end of the 24 SWG wires to a nail in the bench, the other to the fish hook contraption. Keeping a moderate amount of tension on the wire, twist the hand drill until the wires are twisted to about 5 turns per cm, and there we have it, a 50 ohm transmission line. Cut the transmission line in the middle prior to the next stage. The job in hand now is to parallel the two lines to achieve a 25 ohm transmission line. They only need to be loosely coupled, so aim for a couple of twists per centimetre.

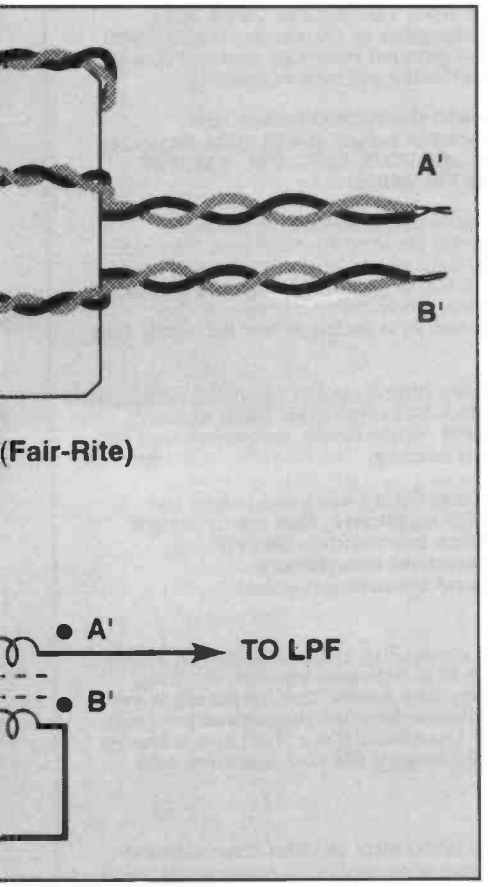
Fig. 5



Now we need to connect the wires up. First strip and tin all the wire ends. Connect the two 'Sellotaped' wires together at either end, now do the same for the remaining wires. Let us call the 'Sellotaped' wires *A*, and the bare wires *B*. Wind six turns through the stacked

cores and solder them as shown. You've now built a 4:1 transmission line transformer.

The other inductors associated with the PA and LPF circuits are a good deal



easier to construct. A single Fair-Rite 26-43006301 is used with about 50 turns of 24 SWG wire wound over it for RFC1. L3 and L4 are identical, consisting of 14 turns of 22 SWG enamelled copper wire wound on T68-2 toroids. Fit and solder R7, noting that the connection to the gate of Q3 is made to the pad on the component side of the board. C7 and RFC1 are also connected in this fashion. Now fit and solder TLT1, L3, L4, C8- C12 and finally Q3. Q3 should be bolted, finger tight, to the PCB.

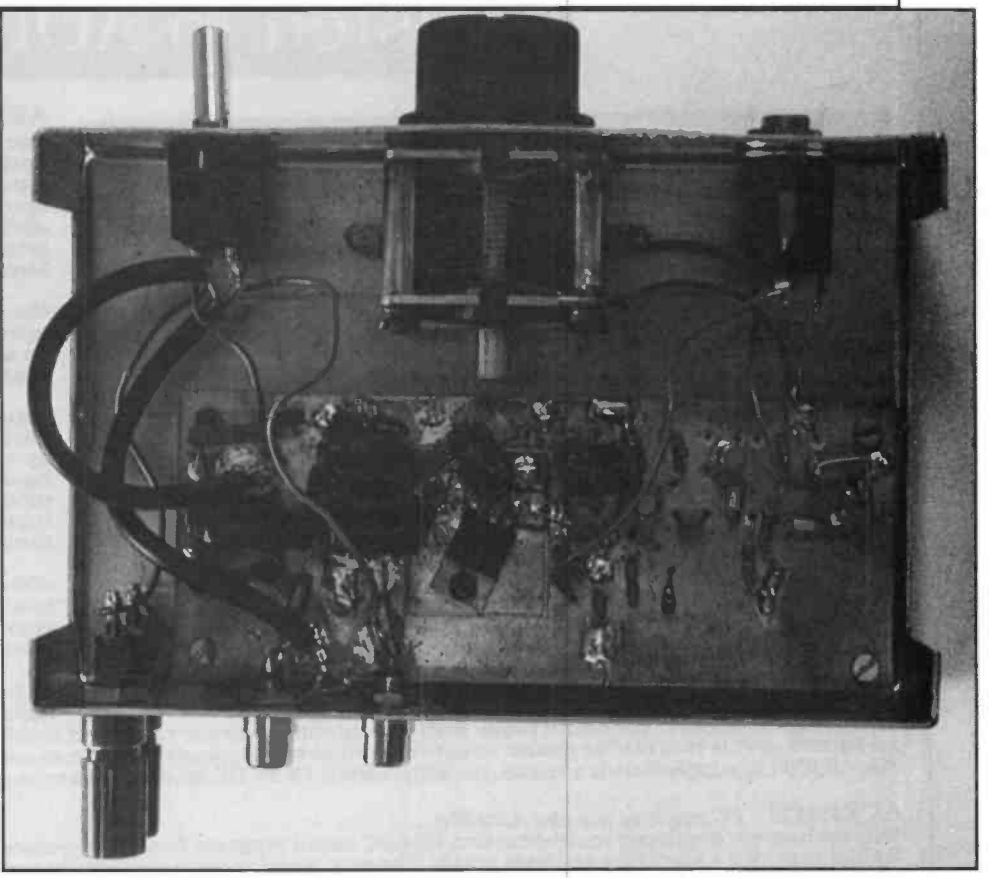
Checks

Now for the final test, place the multimeter, set to read around 1A, in series with the 12V supply so that we can measure the current drawn by the transmitter. Install the VSWR meter between the output of the low pass filter and the dummy load. Reconnect VC1 and a suitable CW key. Apply 12V, and transmit some CW. Peak VC2 for maximum current as shown by your multimeter, 350mA being about right. Check the VSWR meter, if the VSWR is not 1:1 then suspect the orientation of TLT1.

Now all that remains is to install the unit into a suitable case. The prototype was housed in a small case measuring 155mm x 110mm x 50mm. The RF connections for the unit were simple phono plugs, which if good enough for Collins are good for me!

Finally, if you find the construction of the transmission line transformer a little confusing, don't panic! £1.50 + SAE sent to me at Holly Cottage, 35 Shipley Common Lane will obtain the device ready wound for you!

(My thanks go to Badger Boards for providing the PCB pattern artwork and suggested components layout. Note that C10, C8 and C11 may each be replaced with a pair of capacitors if you have difficulty in obtaining the correct value — Ed)



Component List

Component	Designation/ Value
Q1, Q2	2N2222A
Q3	VN66AF
VC1	100pf variable
VC2	200pf trimmer
C1, C2, C6, C4	0.1uf 15V ceramic
C5, C7	0.01uf 50V ceramic
C2, C3, C9	100pf polystyrene
C8, C11	430pf silver mica
C10	750pf silver mica
R1, R2	12k 0.25W
R3	3k3 0.25W
R4	1k8 0.25W
R5	4k7 0.25W
R6	33R 0.25W
R7	22R 0.25W
L1, L2	Wound over T50-2
L3, L4	Wound over T68-2
RFC1	26-43006301
TLT1	2 x 26-43006301
XTAL	7.030MHz
SW1	DPST

See HRT classified (back pages) and display ads for suppliers of components, PCBs, and if you prefer, complete kits.

Listen to AOR

AR3000 *widest range monitor...*

The AR3000 now extends your listening horizons further than anyone believed was possible. Covering the entire frequency spectrum from **100 kHz to 2036 MHz** without any gaps in the range, the AR3000 brings the general coverage receiver to a new level of performance and versatility.

Not only will the AR3000 cover this extremely wide range, it will allow listening on any mode: **USB, LSB, CW, AM, FM (narrow) FM (wide).**

Tuning rates are selectable from an ultra-fine 50 Hz step for SSB and CW, right up to 100 kHz steps for the TV bands and Band-2. A slight pull on the spring-loaded rotary tuning control will increase the tuning speed by a factor of ten for really fast tuning.

400 memory channels are provided arranged in 4 banks x 100 channels. Each memory channel will retain mode, frequency and RF attenuator setting.

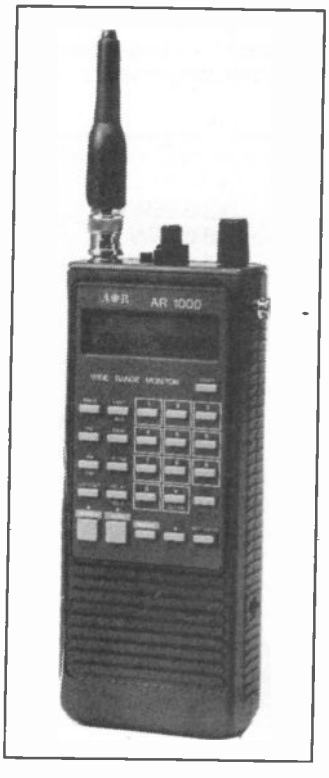
15 band pass filters are used before the GaAsFet RF amplifiers, this ensures high sensitivity throughout the entire range with outstanding dynamic range and freedom from intermodulation effects.
An **RS232** port is provided to enable remote operation by plugging directly into most **personal computers.**
The AR3000 is supplied with a telescopic whip aerial, 13.8V DC lead, AC power supply and operating manual.

ACEPAC3 *PC control for the AR3000...*

This exclusively developed multi-function IBM-PC based program further increases the versatility of the AR3000. A sweep facility provides a spectrum analysis graph. The very latest version displays frequencies in X axis and squelch opening percentage on each frequency in the programmed frequency search range. This indicates 'how active' the frequencies are in the programmed search range. In addition to the graphic display, ACEPAC3 can produce a detailed numerical list from the graphic information. One memory file has 400 channels divided into 4 banks of 100 channels. More than one memory file can be created to increase the memory storage capability. If you make just one extra memory file you can store 800 memory channels!

DA3000

Wide band 16 element discone aerial for external mounting. Frequency range 25 MHz to 2000 MHz (2 GHz). The aerial is supplied with approx 15m of coax terminated in a BNC connector ready to plug in and use with any AOR receiver. 'V' bolts and clamps are provided, however an additional supporting pole will be required for installation.



AR2000 *ultimate portable monitor receiver...*

AOR have followed on from the successful AR1000 and have made the specification of the AR2000 even better. (One major change is the replacement of the 154.825 MHz crystal with a highly-stable 12.8 MHz reference and multiplyer chain). Whether out in a field running hand-portable, in the car or at home the AR2000 enables you to listen to both VHF and UHF airbands. Of course if you get tired of listening to airband, you can push a button or two and the world is yours! 'If it moves you can monitor it' - *well almost.* The choice of listening is endless, marine, Amateur band, airbands even BBC radio 2 on VHF FM. There are 1000 memory channels and 10 search banks, even a rotary tuning control is fitted to further enhance operation.

UK Specific:
For ease of operation in the UK, the search banks have been pre-programmed at the factory. They may be easily re-programmed by the user.
Each of the ten numeric keys is labelled with the corresponding search band, simply press one button and the receiver starts looking for interesting frequencies.

Frequency coverage:
The receiver has an exceptionally wide frequency coverage from 500 kHz to1300 MHz (1.3 GHz) with no gaps. The modes available are AM, FM (narrow) and FM (wide). Any available mode may be selected at any frequency within the receiver's coverage. There is no frustration in mode selection encountered here, you are *not forced* to listen to a specific mode at a specific frequency or band.

Accessories supplied:
DA900 single wide band whip aerial for VHF and UHF
AC charger
4 x AA High capacity rechargeable NiCad batteries
12V DC lead fitted with a cigar lighter plug for mobile operation
Soft case with carry strap
Belt hook
Earphone

Everything you need is included to just switch on and start listening - today.

Also available: AR2800, AR2500, etc.
For a complete set of leaflets and price list please send a S.S.A.E. (32p).

AOR™ AOR (UK) Ltd.
Room 2, Adam Bede High Tech Centre,
Derby Road, Wirksworth, Derbys. DE4 4BG.
Tel: 0629 - 825926 Fax: 0629 - 825927
E&OE

Scanners International Guide To Scanners

Choosing a Scanner

The majority of letters we receive at the *Scanners International* office are from readers asking the question "What's the best scanner for me to buy?". As always, it depends on what you want to receive, where you want to receive it, and of course how much you want to spend! Here's a few guidelines based on the many letters and queries we get;

Frequency Bands

First of all, what do you want to listen to? If it's only civil airband, there's probably little point in buying a do-everything scanner with coverage from DC to light, as many of these are essentially 'compromises' in terms of their size and performance. Alternatively, if you're new to scanning and you're still deciding on what you want to primarily listen to, it would be wise to keep your options open in the first instance. Here, when you eventually 'specialise' (there's so much to listen to that trying to comprehensively monitor everything is more than a full-time affair!) you'll no doubt find that your scanner may fulfil your present needs, and if you do eventually want better performance you can 'trade in' or even obtain a second dedicated scanner for this purpose, whilst keeping the first one for more 'general' listening.

Our regular 'Frequency Finder' listings show who operates where. With this feature being a general guide only, most scanner dealers worth their salt should be able to advise you in greater detail to ensure you make the right choice for your individual interests. But here's a few things worth bearing in mind before you part with your hard-earned money;

Memory Channels

You need these to store the frequencies you wish to listen to and scan. Some scanners have up to 1000 channels, some over 2000, which is all well and good if you can remember what's in them! Others have a smaller number with some handheld scanners having just 10 channels which may be limiting if you wish to monitor, for example, the amateur VHF and UHF FM channels whilst you travel around. Think about what you want to listen to, and ensure you have enough channels to cope.

Search Mode

This is very useful when you're initially trying to find active frequencies to monitor within a given frequency range. In use, this mode searches all channels between pre-programmed upper and lower frequency limits, halting on any sampled channel where the receiver squelch opens. This allows you to have a listen, and to enter this into a memory channel for future use if required.

Why not use this mode all the time? The main reason is that of 'birdies'. These are often internally-generated signals from within the scanner which halt the scan on a given frequency, or a number of frequencies, within the search range. Also with the proliferation of microprocessor controlled products and other sources of unwanted radio frequency signals, you'll find that your scanner may pick these up also, from next door's computer for example. With the new Pan-European EMC regulations the level of external unwanted signals should eventually reduce, but right now they're still a problem in many locations. So don't rely on 'search mode' in place of memory channels to scan across a large number of channels, make sure you have enough memory channels to suit your needs.

Portable or Base?

If you're out and about a lot, then a portable scanner would appear to be the best bet as an 'all round' monitor. These sets invariably have a BNC aerial connector, which lets you replace the set-top aerial with a remotely mounted outdoor or loft-mounted type, connected to the scanner with coaxial cable. (See next month's *Scanners International* for a comprehensive roundup of external types, including a review on an inconspicuous low-cost version).

However, the overall performance of portable scanners is invariably less than that of base or mobile types, particularly where strong signals on other frequencies are present. Because portable scanners are designed primarily for use with a small set-top aerial, when you connect an external aerial far higher signal strengths are present. Here, the scanner's 'front end' and 'mixer' circuits can easily overload with signals from other channels, sometimes to provide an indecipherable 'mush' instead of increasing the readability of the wanted signals. This is especially true on short wave (HF), where international broadcast stations run higher and higher powers to obtain a stronger signal than their competitors. In this case, a dedicated short wave receiver with an attenuator and/or RF gain control to reduce the sensitivity is a wise choice for anything other than occasional listening with just a set-top or small wire aerial connected.

Reception Modes

On VHF and UHF in Europe, narrowband FM is predominantly used for amateur, CB, and other mobile radio services, although there are also a number of private mobile radio services using AM in the UK. So if you're a taxi operator with a licensed private mobile radio system, and you wish to know how your staff are doing while you're at home or whatever, check whether you have an AM or an FM scheme before you go out and purchase a handheld scanner to carry in your top pocket. Many such UK systems are AM whereas some budget scanners receive AM only on airband, if at all.

Some top-range scanners include the facility for SSB (Single Sideband) monitoring, others fulfil this purpose by the use of the AM mode with a switched-in BFO (Beat Frequency Oscillator). An SSB reception mode is generally needed for receiving HF signals from those services other than broadcast stations, i.e. radio amateurs, international shipping and aeronautical traffic and the like. Where a dedicated 'SSB' mode is used as opposed to a switched-in BFO, the set often employs purpose-designed narrow filters to separate the required signal from adjacent channel signals, whereas in the case of a switched-in BFO you may have to expect some degree of adjacent channel interference due to the wider AM filters used in the receiver.

Wideband FM reception is useful if you want to monitor Band II broadcast stations or TV sound channels, but is of limited use for non-broadcast signals.

Budget Restrictions

OK, it's all well and good saying you need this and you need that, but all of this costs money! At the outset, a basic, economy scanner can prove a very good introduction, remembering that when you 'specialise' you can trade up or get a dedicated set, for airband for example. Our 'Buyers Guide' should help steer you to making a decision here, and if you're interested in more details of a particular scanner these may be found either in our regular *Scanners International* reviews or in manufacturers' and dealers' literature.

Next month, we continue with a look at external aerial systems for your set, the greatest improvement you can normally make to any scanner.

Buyers Guide

Here's an extended roundup of virtually all scanners available on the UK market today, together with their frequency coverage, modes of operation, number of memory channels available, typical selling price, and which issue the set was reviewed in (SI indicates Scanners International, HRT indicates Ham Radio Today, back numbers and photocopies available from the addresses given at the front of the main magazine). All frequencies are given in MHz, with 'H' signifying a Handheld scanner, 'B' signifying a Base/Mobile scanner.

Mode of operation indicate those which may be selected on any entered frequency. Note that some scanners have AM limited to Airband coverage only, where this is the case this is clearly shown. All scanners have a 'Search' facility apart from those where this is also clearly shown.

Details of the scanner distributors and dealers are given in the advertising pages of this and previous issues of 'Scanners International', and these dealers will be pleased to offer full details including the latest prices of the scanners they stock.

Make	Type	Freq Coverage	Modes	Mem Ch.	Typ. Price	Reviewed
AR 800E	H	75-105 118-174 406-495 830-950	AM/FM	20	£169	HRT Sep 88
AR 900	H	108-174 220-280 300-380 406-470 830-950	AM/FM	100	£199	HRT Aug 89
AR-950	B	60-88 108-136 137-174 220-290 291-380 406-470 830-950	AM/FM	100	£254	
AR 1000 MkII	H	0.5-600 805-1300	AM/FM/ WFM	1000	£249	SI No.3
AR 2000	H	0.5-1300	AM/FM/ WFM	1000	£259	WFM
AR-2002	B	25-550 800-1300	AM/FM/ WFM	20	£487	HRT Oct 86
AR-2500	B	0.5-1500	AM/FM/ WFM/SSB	1984	£419	
AR-2800	B	0.5-600 800-1300	AM/FM/ WFM/SSB	1000	£395	
AR-3000	B	0.1-2036	AM/FM/ WFM/CW/ SSB	400	£759	
Bearcat UBC50XL	H	66-88 136-174 406-512	FM No search	10	£100	HRT Apr 88
Bearcat BC55XLT	H	29-54 136-174 406-512	FM No search	10	£99	
Bearcat BC70XLT	H	66-88 118-174 406-512	FM AM Air	20	£199	HRT Jul 88
Bearcat UBC100XL	H	66-88 118-174 406-512	FM AM Air	16	£179	SI No.1
Bearcat	H	66-88	FM	100	£199	HRT

Make	Type	Freq Coverage	Modes	Mem Ch.	Typ. Price	Reviewed
UBC100XLT		118-174 406-512	AM Air			Apr 87
Bearcat UBC175XL	B	66-88 118-174 406-512	FM AM Air	16	£169	
Bearcat UBC200XLT	H	66-88 118-174 406-512 806-956	FM AM Air	200	£229	SI No.1
Bearcat UBC760XLT	B	66-88 108-174 350-512 806-956	FM AM Air	100	£235	
Bearcat BC800XLT	B	29-54 118-174 406-512 840-912	FM AM Air	40	£149	
Bearcat UBC950XLT	B	29-54 118-174 406-512 806-956	FM AM Air	100	£235	SI No.1
Black Jaguar MkIII	H	28-30 50-88 115-178 200-280 360-520	AM/FM	16	£199	HRT Jun 88
Fairmate HP-100	H	15-550 805-1300	AM/FM/ WFM	1000	£249	HRT Apr 90
Fairmate HP-200	H	0.5-600 805-1300	AM/FM/ WFM	1000	£269	
Icom IC-R1	H	0.1-1300	AM/FM/ WFM	100	£369	SI No.2
Icom IC-R100	B	0.1-1800	AM/FM/ WFM (SSB opt.)	100	£510	SI No.2 (No.3)
Icom IC-R7000	B	25-1300	AM/FM/ WFM/SSB	99	£925	HRT Feb 89
Icom IC-R9000	B	0.1-2000	AM/FM/ WFM/SSB/ CW/FSK	1000	£3995	

Make	Type	Freq Coverage	Modes	Mem Ch.	Typ. Price	Reviewed
JIL SX-200N	B	28-88 108-180 380-514	AM/FM	16	£325	
JIL SX-400N	B	26-520 WFM	AM/FM/	20	£649	
Jupiter MVT6000	B	25-550 800-1300	AM/FM/ WFM	1000	£369	
Kenwood RZ-1	B	0.5-905	AM/FM/ WFM	100	£465	HRT May 88
Nevada MS1000	B	0.5-600 805-1300	AM/FM/ WFM	1000	£279	
Realistic PRO-34	H	68-88 108-136 136-174 380-512 806-960	FM/ AM Air	200	£249	
Realistic PRO-35		68-88 108-174 406-512	FM AM Air	100	£180	
Realistic PRO-38	H	68-88 136-174 406-512	FM No search	10	£99	
Realistic PRO-2005	B	25-520 760-1300	AM/FM	400	£329	SI No.1
Realistic PRO-2006	B	25-520 760-1300	AM/FM	400	£250	SI Jun 91
Realistic PRO-2022	B	68-88 108-136 136-174 380-512 806-960	FM AM Air	200	£229	
Realistic PRO-2024	B	68-88 108-136 136-174 380-512	FM AM Air	60	£159	
Realistic PRO-2025	B	68-88 136-174 406-512	FM No search	16	£99	SI Oct 91
Regency HX850E	H	60-89 118-136 140-174 406-495	AM/FM	20	£179	
Regency HX-2000	H	60-89 118-174 406-512	AM/FM	20	£99	HRT Jan 87
Revco RS-3000	B	26-32 60-90 118-180 380-512	AM/FM	50	£225	
Signal R535	B	108-143 220-380	AM	60	£255	
Sony AIR7	H	0.1-2.2 76-136	AM/FM/ WFM	30	£229	
Sony ICF PRO80	H	0.15-108 115-223	AM/FM/ SSB	40	£299	HRT Dec 87
Sony ICF 2001D	B	0.15-30 76-108 116-136	AM/FM/ SSB	32	£299	SI No.1
Standard AX700	B	50-905	AM/FM/ WFM	100	£545	
WIN108	H	108-143	AM	20	£179	
Yaesu FRG9600	B	60-950	AM/FM/ WFM/SSB	100	£520	HRT Jul 87
Yupiteru VT-125	H	108-142	AM	30	£179	SI Aug 91
Yupiteru MVT5000	H	25-550 800-1300	AM/FM	100	£249	HRT Nov 89
Yupiteru MVT7000	H	8-1300	AM/FM WFM	200	£289	SI Sep 91

Marine Band Finder

Channel		Post-July '91 Shore	Post-July '91 Ship	Pre-July '91 Shore	Pre-July '91 Ship
4 MHz					
401		4357.0	4065.0	4357.4	4063.0
402		4360.0	4068.0	4360.5	4066.1
403		4363.0	4071.0	4363.6	4069.2
404		4366.0	4074.0	4366.7	4072.3
405		4369.0	4077.0	4369.8	4075.4
406		4372.0	4080.0	4372.9	4078.5
407		4375.0	4083.0	4376.0	4081.6
408		4378.0	4086.0	4379.1	4084.7
409		4381.0	4089.0	4382.2	4087.8
410		4384.0	4092.0	4385.3	4090.9
411		4387.0	4095.0	4388.4	4094.0
412		4390.0	4098.0	4391.5	4097.1
413		4393.0	4101.0	4394.6	4100.2
414		4396.0	4104.0	4397.7	4103.3
415		4399.0	4107.0	4400.8	4106.4
416		4402.0	4110.0	4403.9	4109.5
417		4405.0	4113.0	4407.0	4112.6
418		4408.0	4116.0	4410.1	4115.7
419		4411.0	4119.0	4413.2	4118.8
420		4414.0	4122.0	4416.3	4121.9
421	***	4417.0	4125.0	4419.4	4125.0
422		4420.0	4128.0	4422.5	4128.1
423		4423.0	4131.0	4425.6	4131.2
424		4426.0	4134.0	4428.7	4134.3
425		4429.0	4137.0	4431.8	4137.4
426		4432.0	4140.0	4434.9	4140.5
427		4435.0	4143.0		
428		4351.0	varied pairings		
429		4354.0	varied pairings		

Channel		Post-July '91 Shore	Post-July '91 Ship	Pre-July '91 Shore	Pre-July '91 Ship
6MHz					
601		6501.0	6200.0	6506.4	6200.0
602		6504.0	6203.0	6509.5	6203.1
603		6507.0	6206.0	6512.6	6206.2
604		6510.0	6209.0	6515.7	6209.3
605		6513.0	6212.0	6518.8	6212.4
606	***	6516.0	6215.0	6521.9	6215.5
607		6519.0	6218.0	6218.6	6218.6
608		6522.0	6221.0	6221.6	6221.6
8MHz					
801		8719.0	8195.0	8718.9	8195.0
802		8722.0	8198.0	8722.0	8198.1
803		8725.0	8201.0	8725.1	8201.2
804		8728.0	8204.0	8728.2	8204.3
805		8731.0	8207.0	8731.3	8207.4
806		8734.0	8210.0	8734.4	8210.5
807		7837.0	8213.0	8737.5	8213.6
808		8740.0	8216.0	8740.6	8216.7
809		8743.0	8219.0	8743.7	8219.8
810		8746.0	8222.0	8746.8	8222.9
811		8749.0	8228.0	8749.9	8226.0
812		8752.0	8231.0	8753.0	8229.1
813		8755.0	8234.0	8756.1	8232.2
814		8758.0	8237.0	8759.2	8235.3
815		8761.0	8240.0	8762.3	8238.4
816		8764.0	8243.0	8765.4	8241.5
817		8767.0	8246.0	8768.5	8244.6
818		8770.0	8249.0	8771.6	8247.7
819		8773.0	8252.0	8774.7	8250.8
820		8776.0	8255.0	8777.8	8253.9
821	***	8779.0	8258.0	8780.9	8257.0

Channel	Post-July '91 Shore	Post-July '91 Ship	Pre-July '91 Shore	Pre-July '91 Ship
822	8782.0	8261.0	8784.0	8260.1
823	8785.0	8264.0	8787.1	8263.2
824	8788.0	8267.0	8790.2	8266.3
825	8791.0	8270.0	9793.3	8269.4
826	8794.0	8273.0	8796.4	8272.5
827	8797.0	8276.0	8799.5	8275.6
282	8800.0	8279.0	8802.6	8278.7
829	8803.0	8282.0	8805.7	8281.8
830	8806.0	8285.0	8808.8	8284.9
831	8809.0	8288.0	8811.9	8288.0
832	8812.0	8291.0		
833	8291.0	non-specific pairing		
834	8707.0	non-specific pairing		
835	8710.0	non-specific pairing		
836	8713.0	non-specific pairing		
837	8716.0	non-specific pairing		
12Mhz				
1201	13077.0	12230.0	13100.8	12330.0
1202	13080.0	12233.0	13103.9	12333.1
1203	13083.0	12236.0	13107.0	12336.2
1204	13086.0	12239.0	13110.1	12339.3
1205	13089.0	12242.0	13113.2	12342.4
1206	13092.0	12245.0	13116.3	12345.5
1207	13095.0	12248.0	13119.4	12348.6
1208	13098.0	12251.0	13122.5	12351.7
1209	13101.0	12254.0	13125.6	12354.8
1210	13104.0	12257.0	13128.7	12357.9
1211	13107.0	12260.0	13131.8	12361.0
1212	13110.0	12263.0	13134.9	12364.1
1213	13113.0	12266.0	13138.0	12357.2
1214	13116.0	12269.0	13141.1	12370.3
1215	13119.0	12272.0	13144.2	12373.4
1216	13122.0	12275.0	13147.3	12376.5
1217	13125.0	12278.0	13150.4	12379.6
1218	13128.0	12281.0	13153.5	12382.7
1219	13131.0	12284.0	13156.6	12385.8
1220	13134.0	12287.0	13159.7	12388.9
1221 ***	13137.0	12290.0	13162.8	12392.0
1222	13140.0	12293.0	13165.9	12395.1
1223	13143.0	12296.0	13169.0	12398.2
1224	13146.0	12299.0	13172.1	12401.3
1225	13149.0	12302.0	13175.2	12404.4
1226	13152.0	12305.0	13178.3	12407.5
1227	13155.0	12308.0	13181.4	12410.6
1228	13158.0	12311.0	13184.5	12413.7
1229	13161.0	12314.0	13187.6	12416.8
1230	13164.0	12317.0	13190.7	12419.9
1231	13167.0	12320.0	13193.8	12423.0
1232	13170.0	12323.0	13196.9	12426.1
1233	13173.0	12326.0		
1234	13176.0	12329.0		
1235	13179.0	12332.0		
1236	13182.0	12335.0		
1237	13185.0	12338.0		
1238	13188.0	12341.0		
1239	13191.0	12344.0		
1240	13194.0	12347.0		
1241	13197.0	12350.0		
16MHz				
1601	17242.0	16360.0	17232.9	16460.0
1602	17245.0	16363.0	17236.0	16463.1
1603	17248.0	16366.0	17239.1	16466.2
1604	17251.0	16369.0	17242.2	16469.3
1605	17254.0	16372.0	17245.3	16472.4
1606	17257.0	16375.0	17248.4	16475.5
1607	17260.0	16378.0	17251.5	16478.6
1608	17263.0	16381.0	17254.6	16481.7
1609	17266.0	16384.0	17257.7	16484.8
1610	17269.0	16387.0	17260.8	16487.9
1611	17272.0	16390.0	17263.9	16491.0
1612	17275.0	16393.0	17267.0	16494.1
1613	17278.0	16396.0	17270.1	16497.2
1614	17281.0	16399.0	17273.2	16501.3
1615	17284.0	16401.0	17276.3	16503.4
1616	17287.0	16405.0	17279.4	16506.5
1617	17290.0	16408.0	17282.5	16509.6
1618	17293.0	16411.0	17285.6	16512.7
1619	17296.0	16414.0	17288.7	16515.8
1620	17299.0	16417.0	17291.8	16518.9
1621 ***	17302.0	16420.0	17294.9	16521.0
1622	17305.0	16423.0	17298.0	16525.1
1623	17308.0	16426.0	17301.1	16528.2
1624	17311.0	16429.0	17304.2	16531.3
1625	17314.0	16432.0	17307.3	16534.4
1626	17317.0	16435.0	17310.4	16537.5
1627	17320.0	16438.0	17313.5	16540.6
1628	17323.0	16441.0	17316.6	16543.7
1629	17326.0	16444.0	17319.7	16546.8
1630	17329.0	16447.0	17322.8	16549.9
1631	17332.0	16450.0	17325.9	16553.0
1632	17335.0	16453.0	17329.0	16556.1
1633	17338.0	16456.0	17332.1	16559.2
1634	17341.0	16459.0	17335.2	16562.3
1635	17344.0	16462.0	17338.3	16565.4
1646	17347.0	16465.0	17341.4	16568.5
1637	17350.0	16468.0	17344.5	16571.6
1638	17353.0	16471.0	17347.6	16574.7
1639	17356.0	16474.0	17350.7	16577.8
1640	17359.0	16477.0	17353.8	16580.9
1641	17362.0	16480.0	17356.9	16584.0
1642	17365.0	16483.0		
1643	17368.0	16486.0		
1644	17371.0	16489.0		
1645	17374.0	16492.0		
1646	17377.0	16495.0		
1647	17380.0	16498.0		
1648	17383.0	16501.0		
1649	17386.0	16504.0		
1650	17389.0	16507.0		
1651	17392.0	16510.0		
1652	17395.0	16513.0		
1653	17398.0	16516.0		
1654	17401.0	16519.0		
1655	17404.0	16522.0		
1656	17407.0	16525.0		
18MHz				
1801	19755.0	18780.0		
1802	19758.0	18783.0		
1803	19761.0	18786.0		
1804	18764.0	18789.0		
1805	19767.0	18792.0		
1806 ***	19770.0	18795.0		
1807	19773.0	18798.0		
1808	19776.0	18801.0		
1809	19779.0	18804.0		
1810	19782.0	18807.0		
1811	19785.0	18810.0		
1812	19788.0	18813.0		
1813	19791.0	18816.0		
1814	19794.0	18819.0		
1815	19797.0	18822.0		

Channel	Post-July '91 Shore	Post-July '91 Ship	Pre-July '91 Shore	Pre-July '91 Ship
22MHz				
2201	22696.0	22000.0	22596.0	22000.0
2202	22699.0	22003.0	22599.1	22003.1
2203	22702.0	22006.0	22602.2	22006.2
2204	22705.0	22009.0	22605.3	22009.3
2205	22708.0	22012.0	22608.4	22012.4
2206	22711.0	22015.0	22611.5	22015.5
2207	22714.0	22018.0	22614.6	22018.6
2208	22717.0	22021.0	22617.7	22021.7
2209	22720.0	22024.0	22620.8	22024.8
2210	22723.0	22027.0	22623.9	22027.9
2211	22726.0	22030.0	22627.0	22031.0
2212	22729.0	22033.0	22630.1	22034.1
2213	22732.0	22036.0	22633.2	22037.2
2214	22735.0	22039.0	22636.3	22040.3
2215	22738.0	22042.0	22639.4	22043.4
2216	22741.0	22045.0	22642.5	22046.5
2217	22744.0	22048.0	22645.6	22049.6
2218	22747.0	22051.0	22648.7	22052.7
2219	22750.0	22054.0	22651.8	22055.8
2220 ***	22753.0	22057.0	22654.9	22058.9
2221	22756.0	22060.0	22658.0	22062.0
2222	22759.0	22063.0	22661.1	22065.1
2223	22762.0	22066.0	22664.2	22068.2
2224	22765.0	22069.0	22667.3	22071.3
2225	22768.0	22072.0	22670.4	22074.4
2226	22771.0	22075.0	22673.5	22077.5
2227	22774.0	22078.0	22676.6	22080.6
2228	22777.0	22081.0	22679.7	22083.7
2229	22780.0	22084.0	22682.8	22086.8
2230	22783.0	22087.0	22685.9	22089.9
2231	22786.0	22090.0	22689.0	22093.0
2232	22789.0	22093.0	22692.1	22096.1
2233	22792.0	22096.0	22695.2	22099.2
2234	22795.0	22099.0	22698.3	22102.3
2235	22798.0	22102.0	22701.4	22105.4
2236	22801.0	22105.0	22704.5	22108.5
2237	22804.0	22108.0	22707.6	22111.6
2238	22807.0	22111.0	22710.7	22114.7
2239	22810.0	22114.0	22713.8	22117.8
2240	22813.0	22117.0	22716.9	22120.9
2241	22816.0	22120.0		
2242	22819.0	22123.0		
2243	22822.0	22126.0		
2244	22825.0	22129.0		
2245	22828.0	22132.0		
2246	22831.0	22135.0		
2247	22834.0	22138.0		
2248	22837.0	22141.0		
2249	22840.0	22144.0		
2250	22843.0	22147.0		
2251	22846.0	22150.0		
2252	22849.0	22153.0		
2253	22852.0	22156.0		
25MHz				
2501	26145.0	25070.0		
2502	26148.0	25073.0		
2503	26151.0	25076.0		
2504	26154.0	25079.0		
2505	26157.0	25082.0		
2506	26160.0	25085.0		
2507	26163.0	25088.0		
2508	26166.0	25091.0		
2509	26169.0	25094.0		
2510 ***	26172.0	25097.0		

*** Distress and calling channel

NEVADA...EVERYTHING!

UK's Largest Distributor of Scanning Receivers

YUPITERU

VT 125 UK AIRBAND RECEIVER

A new and powerful pocket size air band radio that leaves the competition standing. Covers all the new UK airband frequency allocations.

- Covers 108-142 MHz
- 30 direct entry memories
- Search, scan and keyboard operation
- Search steps 25,50, 100 kHz
- Very sensitive receiver
- Pass and delay functions
- Supplied with UK charger

£179

MVT 7000 HANDHELD

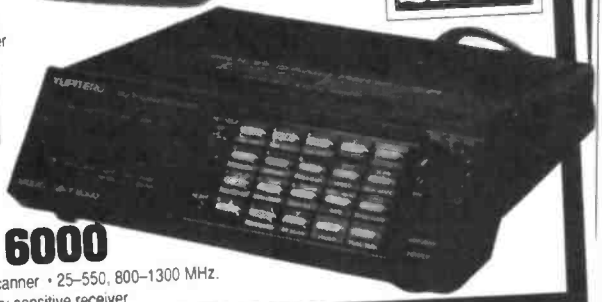
The latest in a family of Three..!

- Frequency Coverage From 8 to 1300MHz... (100KHz - 1300MHz at reduced sensitivity)
- 200 Memory channels
- Rotary or Keypad Frequency Control
- AM/FM Narrow & Wide FM Modes
- Large Easy Read Display with Signal meter.

£289

Every set comes complete with:- Full set of high power ni-cads, telescopic antenna, 240Vac mains charger, DC power lead and carry strap.

£299



MVT 6000

Base/mobile scanner • 25–550, 800–1300 MHz. • 100 mem very sensitive receiver

ACCESSORIES

MOBILE AMPLIFIERS

Zetagi LA0545 45W (140-155MHz)	£69.95
Zetagi B150 80W (14-30MHz)	£49.95
Zetagi B300P 200W (14-30MHz)	£158.00
Zetagi B550P 500W (14-30MHz)	£251.79
Zetagi B303 200W (14-30MHz)	£117.50
Nevada TC50 15W (50-52MHz)	£29.95
Nevada TC35DX 30W (26-30MHz)	£24.95
CTE Mod 737 80W (26-30MHz)	£29.95
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Microset R25 30W (140-146MHz)	£79.00

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Zetagi HP12 12 amp	£79.95
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Freq Range:- 500kHZ – 600MHz, 805MHz – 1300MHz.

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- Tape Recorder Output Socket
- Auto Signal Operated Tape Recorder Switching.
- All metal case for improved EMC compatibility.

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- Continuous Freq. Coverage from 100kHz to 1300MHz
- 1000 Channels of memory
- Keypad or rotary control
- AM, FM and Wide FM Modes
- Search steps from 5kHz to 995kHz

EVERY SET COMES COMPLETE WITH:- Full set of high power ni-cads, 2 antennas, carrying case, earphone, DC cable, belt clip, strap & charger.

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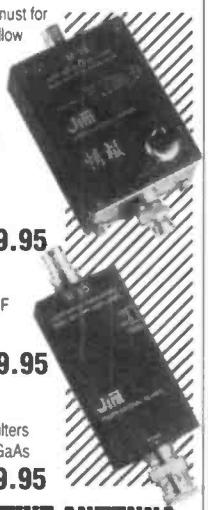

MODEL M75

For base and handheld scanners

- 25-2100 MHz.
- Low noise GaAs FET.
- Selectable filters for improved performance.
- Variable Gain Control.

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MODEL M100

Same spec as M75 but with full RF switching, may be used with transeivers on transmit up to 5 watt o/p power.

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A new low cost pre-amp without filters or gain control. Offers low noise GaAs FET at 20 dB fixed gain.

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(500kHz – 1500MHz) A base antenna with 20dB pre-amp.
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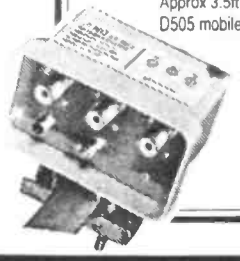
D505 mobile version.... £69.00



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Connectors:- N Type

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Covers 30kHz to 30MHz.
Receives all modes (FM optional)

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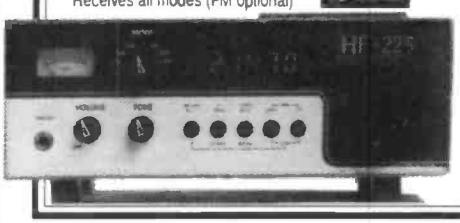

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- Complete with mounting

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The AR2002 is a versatile unit covering a range of applications including airband, marine, amateur band, professional monitoring etc. If you already have a receiver, perhaps now is the time to consider buying your standby or second set.

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Control of the AR2002 is via a positive (non membrane) keypad. UP-DOWN frequency change is also available through a conventional rotary tuning control. External computer control is possible through the rear connector, the levels are not RS232 so a small interface is required (available from Garex Electronics).

Twenty memory channels are provided, with easy keyboard entry and recall. Each memory channel stores frequency and mode information without restrictions. The memories can be recalled manually or scanned in sequence for easy and enjoyable listening.

A programmable search facility is provided. The complete frequency coverage of the receiver can be scanned in 5 kHz, 12.5 kHz or 25 kHz steps, if desired two limits, one high and one low can be programmed by the used and searching is possible upward or downward. The speed of scan and search is selectable in two speeds. A delay facility may be switched to cope with the slight delay encountered when listening to simplex communications. Memory one may be used as a priority channel being monitored every two seconds.

Front panel readout of information is by liquid crystal display (LCD) which provides frequency, increment, delay, channel lockout and even a real time clock. A bar graph signal indicator allows comparable measurements to be made, this also helps with direction finding.

The AR2002 is powered from 12-14V DC. The set is supplied with a suitable mains adaptor, DC lead, telescopic aerial and operating manual.

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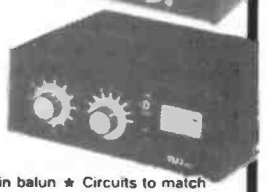

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★ TU1 is ideal for SWL

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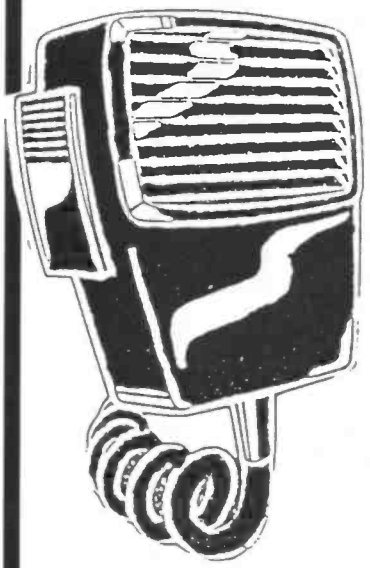

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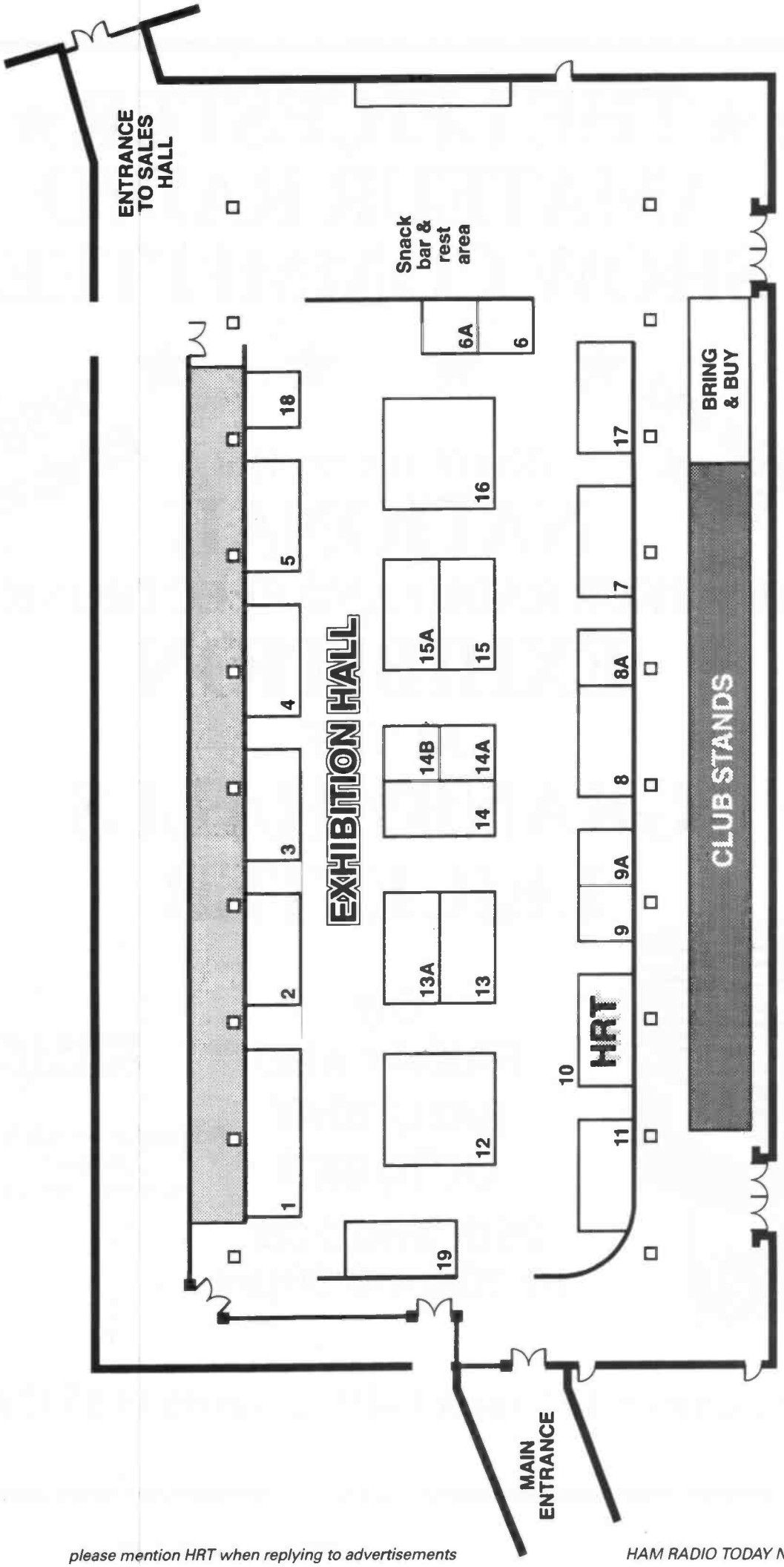
ENTRANCE TO SALES HALL
Snack bar & rest area
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BRING & BUY
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CLUB STANDS
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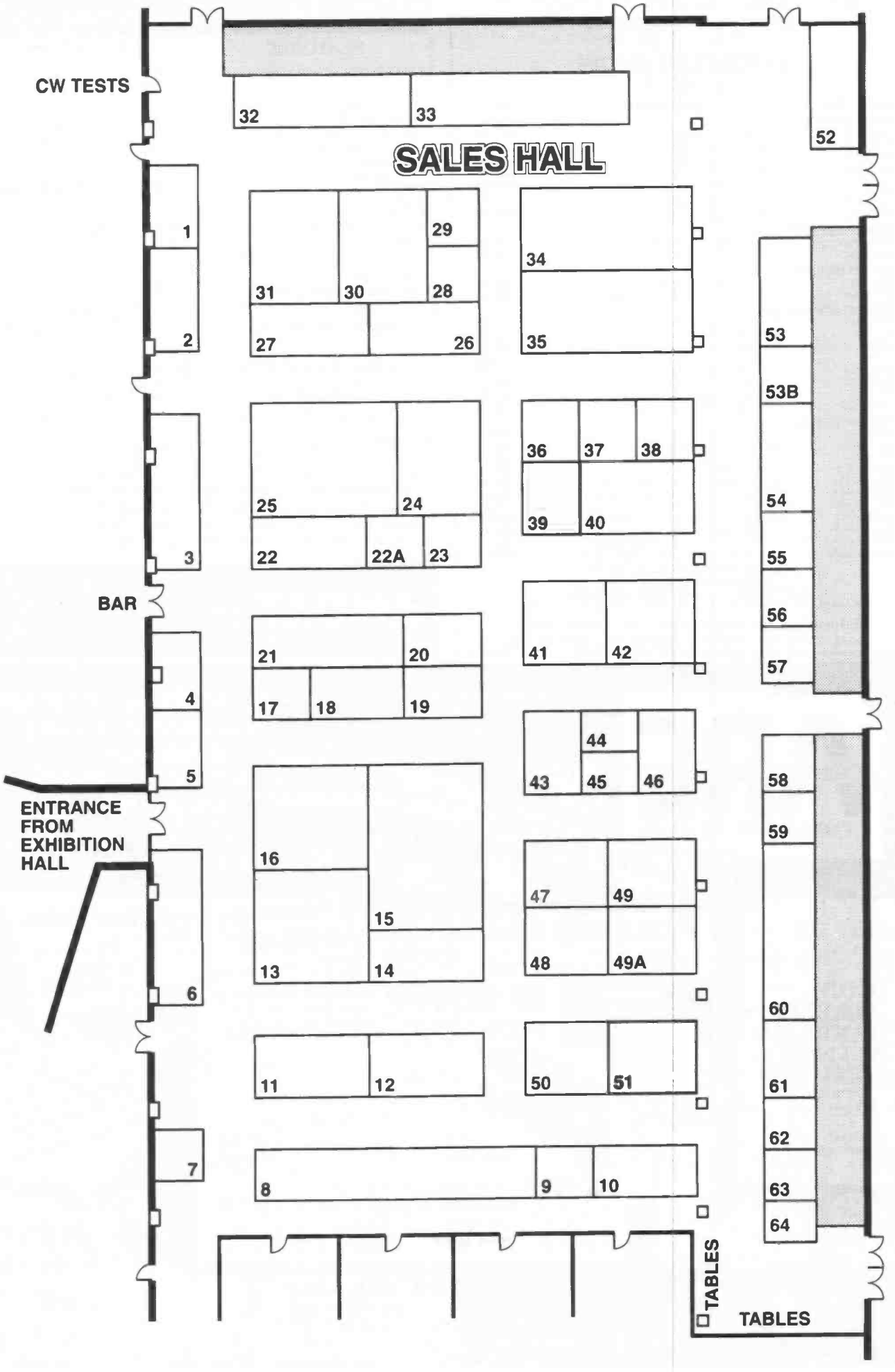
EXHIBITION HALL
MAIN ENTRANCE


CW TESTS
SALES HALL
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ENTRANCE FROM EXHIBITION HALL
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- HF Packet
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- RTTY
- ASCII
- 400 bps PSK (satellite telemetry)
- 1200bps PSK (satellite packet)
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4	Dewsbury Electronics
5	Greens Telecom
6	Elliott Electronics
6a	Lake Electronics
7	
8	South Midlands Comms.
9	JPE Computers
10	Amateur Radio Comms.
11	
12	Weirmead
13	Display Electronics
14	Strumech Eng.
15	Waters and Stanton
16	JMG Electronics
17	Mutek
18	Dressler Comms.
19	Dressler Comms
20	Heatherlite
21	KW Communications
22	Eastern Comms.
22a	
23	H. Morgan Smith
24	UMF
25	Anchor Surplus
26	Barenco
27	J. Birkett
28	R. J. Holderness
29	R. J. Holderness
30	Syon Trading
31	Capco
32	
33	Arrow Radio
34	Marco Trading
35	SGS Electronics
36	Raycom Comms.
37	J.A.B. Electronics
38	J & P Electronics
39	Stevens Electrical
40	M & B Radio
41	ARE Comms.
42	Nevada Comms.
43	Brial Services
44	Trident Systems
45	Astley Videos
46	Procomm
47	RAS (Nottingham)
48	Computer Junk Shop
49	Oasis Computers
49a	Giacomelli
50	Westlake
51	Radiotronics
52	New Cross Radio
53	Lee Electronics
53a	Strikalite
54	TAR Communications
55	SEM
56	Rollertec
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60	Dee Comm.
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PTV Electrical

EXHIBITION HALL

1	RSGB
2	ICOM
3	PW/SW Mags
4	Martin Lynch
5	Sandpiper Comms.
6	2J Sound
6a	R & D Electronics
7	ICS Electronics
8	Merlin Systems
8a	Poole Logic
9	Jandek
9a	Howes Comms.
10	**HRT Magazine**
11	Alan Kelly Comms.
12	Lowe Electronics
13	Rich Electronics
13a	T. W. Wraith
14	A1 Electronics
14a	R.A. Kent
14b	Technical Software
15	Amdat
15a	Tennamast
16	Dataphone
17	Siskin
17a	Mainline Electronics
18	Wilson Valves

QRP CORNER

Dick Pascoe G0BPS, constructs low pass filters

Winter is approaching, and with it a change in band conditions. The higher frequency bands such as 10m and 15m are open less of the time, and 80m and 160m are of more use.

Although I'm sitting here in mid summer (it has to be summer - the rain is warm!) I'm looking forward to the winter months as here the joys of QRP operating really come to the fore. Summer is for the sun, the beach and the barbecue.

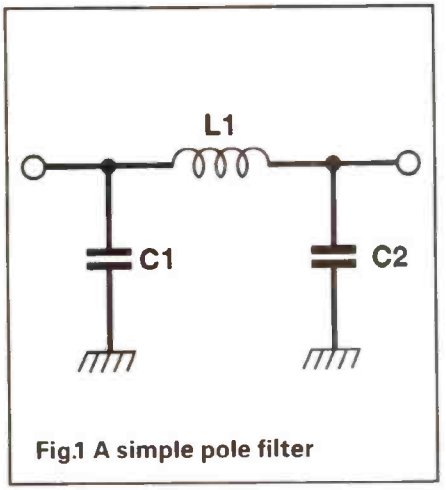


Fig.1 A simple pole filter

As winter evenings draw in, there are less and less reasons to venture out (in the cold rain) and more reasons to fire up the latest project. So you can look forward to dusting off the homebrew rig and firing up some RF into the ether.

I have two favourite bands, 15m (21MHz) and 160m (1.8MHz). I like 15m because the DX is still there to be worked without the pile-ups of 20m and most of the operators found on 15m are 'gentlemen' (and ladies), 160m because it is still a great challenge to 'cross the pond' on the band. One other advantage of the band is that it is quite easy to generate a signal on 1.8MHz. Yes we *are* limited in the power we can use, but so what? What we *can* use goes further!

Low Pass Filters

I have occasionally received comments from various amateurs that their small homebrew transmitter was working well, but they couldn't use it because they couldn't get the SWR low with the ATU!

Some builders forget that in some systems like the QRP club 'OXO' and 'ONER' projects, the oscillator is operating on the base frequency of the crystal selected. This is good in normal terms, a crystal with an operating frequency of 3.560MHz will provide a good stable signal on that frequency.

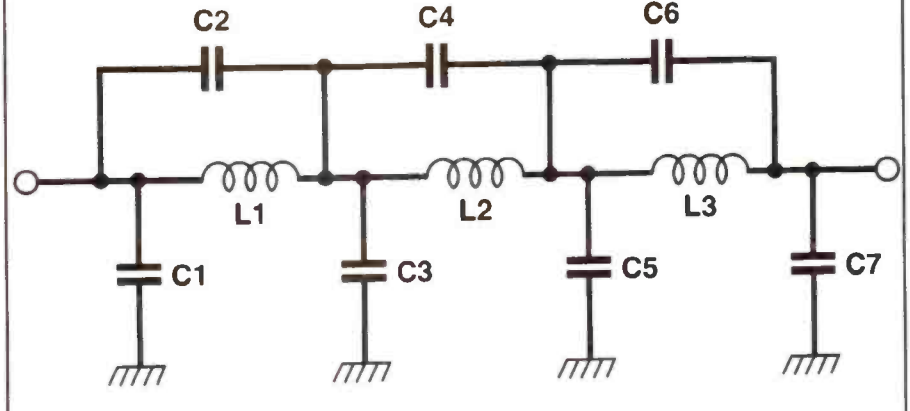
In these simple transmitters, it may be forgotten that your crystal operating on 3.560MHz is also putting out a signal on 7.12MHz, 10.68MHz, 14.240MHz, 17.800MHz, 21.360MHz and 28.480MHz. Yes, by the time it gets to these harmonics it will *(or at least, should)* be a very weak signal but it will still be there!

So, having connected our ATU to the output of the small transmitter, which signal are we trying to tune the ATU to? Initially it will be the 80m signal, but all the others may be present at the same time, and under some mismatch conditions this could be why you sometimes cannot tune the ATU to show a low SWR.

This is where the Low Pass Filter (LPF) come in. An LPF can be set up on any band of your choice, usually it is just above the outer edge of the band required. It may only be a simple 3 pole filter as in Fig. 1. A better filter is that shown in Fig. 2.

The values for the capacitors in Fig. 2 are shown in table 1, the cores are wound on a T37/2 dust iron ring, the wire size is not critical.

Fig.2 10 pole, 7th order eliptical filter



Novice Award

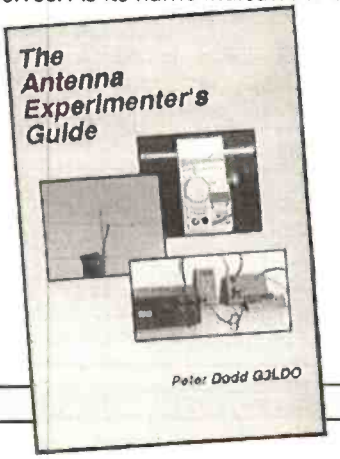
By now, the new novice licencees will have been operating for several months, most will probably gather on 70cm with their commercial rigs but it is hoped that some will also become active on HF.

To give some incentive to newcomers to the bands, the G-QRP club offers an award to any member who has 50 contacts on CW in the first month of their holding a licence. There are two types of award, the class A, is for those who's 50 contacts are all QRP and the class B for those who use higher power.

I am also pleased to announce that the club has introduced a novice manager for the benefit of its novice members. News of interest to novices will be published each quarter in the club's magazine SPRAT. For more information contact the Novice Manager.. David Gosling, G0NEZ, at 31 Semphill, Hemel Hempstead, Herts.

The Antenna Experimenters Guide

This is another new book to hit the shelves. As its name indicates it is not a



BAND	C1	C2	C3	C4	C5	C6	C7	L1	L2	L3
160	560+ 560	60+ 20	2000+ 100	2000 750	750-	470	1000	32	31	29
80	560+ 30	20+ 20	1200	180	1200	120+ 120	470+ 30	23	23	21
40	295	20	470+ 150	100	470+ 120	120	270	16	16	15
30	200	30- 30	330+ 100	68	330 82	82	180	15	15	14
20	150	20- 20	180+ 120	47	295	68	82+ 47	11	11	10
17	60+ 60	8p2	200+ 20	82- 68	200	47	100	11	11	10
15	100	8p2	200	68- 68	150+ 47	82- 82	82	9	9	8
12	60+ 27	6p8	180	27	100+ 68	82- 68	120- 180	9	9	8
10	120 180	5p6	150	47- 47	150	47- 82	68- 680	8	8	8

NB the '+' indicates the two values are in paralell
the '-' indicates they are in series

list of aerials that you can build at home. The chapter headings give a very good idea of what may be found in the book, with subjects covered including measurements of resonance, impedance, field strength and aerial performance, which are invaluable to the avid aerial builder such as myself. Other chapters cover such varied topics as mathematical modelling, masts and materials and experimental aerials. It is full of ideas, on aerials and the test equipment needed to test them to the full.

For anyone interested in the theory of aerials, guidance on how to build effective ones and how to test them to the full, I highly recommend this book from the pen of Peter Dodd G3LDO. It's available from Peter at 37 The Ridings, East Preston, West Sussex BN16 2TW, priced at £8.90 plus £1.20 p/p. (Please mention HRT when you write.) Watch out for a forthcoming comprehensive book review of this in a future issue of HRT.

Finally, I hope to see many of you at the G-QRP Club mini convention at St Aiden's Church Hall, Manchester Road, Rochdale, on October 19th starting at 2.00pm.

That's it for now. Let me have your news and views either on packet at GB7SEK, via. HRT editorial, or at 3 Limes Road, Folkestone.

VHF/UHF Message

Geoff Brown GJ4ICD, reports on the VHF/UHF scene

Welcome to the VHF/UHF message. Firstly, our thanks must go to Ken G5KW for all the past reports and propagation news he has brought us all during the past years. Many exciting records and special happenings regarding 50MHz have gone down in the history books. However, propagation on the higher bands has been poor to say the least during the earlier part of this year.

Ken G5KW, has now retired from the VHF/UHF message but will still continue to provide us all with special features whenever possible. Thank you Ken, you're going to be hard to follow!

Some of you out there may have heard of my callsign, but, for those who haven't here is a brief summary of my amateur activities. In 1964 as an SWL I became fascinated in the world of VHF/UHF, I just could not put to terms the vast distances that could be worked on the old AM system on 144MHz. As time has gone on, so has technology, and now even longer distances are being recorded on 50MHz, 144MHz and 432MHz. In the late 70s I realised that GJ was in an excellent spot for VHF/UHF propagation and for several years won many 144/432 contests using home-brew equipment.

50MHz also had its soft spot, I was lucky enough to be one of the original 40 permit holders, but due to the pressure of my business, I had to give this band a miss. However, lost ground has been picked up as in February this year I completed my DXCC for this band, along with over 450 squares and during May I collected the first ever 100 countries VHF certificate ever to be issued to a British Isles amateur. Now is the time to relax a little and reativate GJ on frequencies that are needed by many of you. So, see you on 50/144/432/1296MHz?

YU gets 50MHz

Starting with 50MHz, during June/July sporadic E has returned and with it came YU of which many of you have reported working. As of present, only YU2 and YU3 seem to be active, has anybody worked any other call areas? Maki YU3ZM, the VHF manager of Yugoslavia, sent the following information regarding permits:

As of the 14th June Yugoslavian radio amateurs are allowed to work 50MHz legally subject to the following conditions; The frequency allocation will be 50.000MHz to 51.900MHz, only class A amateurs permitted. Power limits are 10dBW ERP in urban locations or 20dBW outside of urban locations, no mobile

operation will be permitted, and allowable modes are A1A, J3E, F1B and F2D.

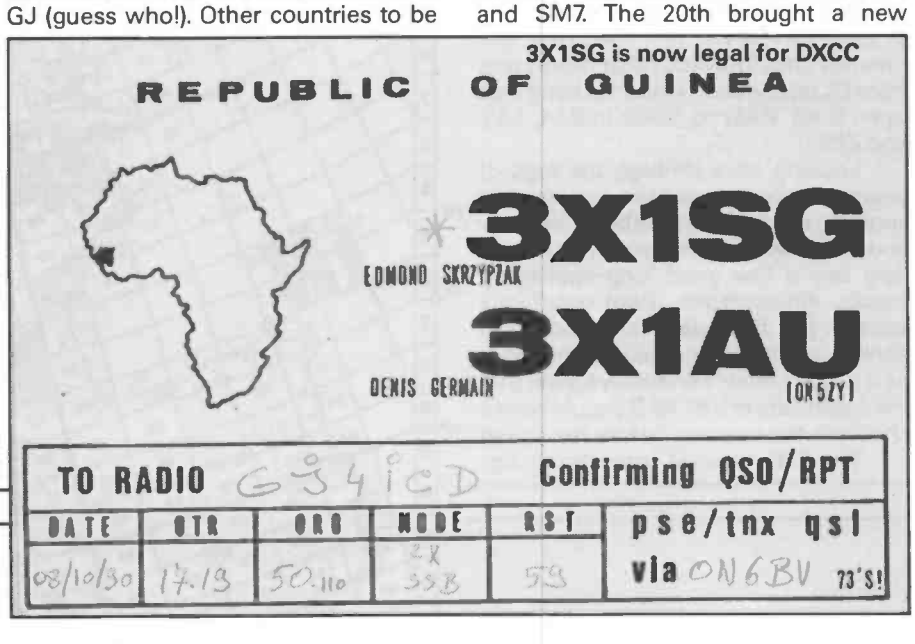
During a phone call from EA4CGN he told me that the Spanish PTT have agreed in principle to issue 50MHz to EA stations, the basic information is as follows: Spanish stations will be allowed 50.000MHz to 50.200MHz, ERP will be 30W, modes allowed are SSB/CW. It is envisaged that 90 permits will be issued for a one year trial period, it is hoped around the November/December period. Also 1A0KM has been active, this counts as a separate DXCC country. On July 20 many hundreds of QSOs were made again into the UK via sporadic E, the QSL route is via I0AMU, A1 Porreta, Largo S, PIO V 16, I-00165, Roma, Italy. **Please do not forget** to include return postage as these rare DX stations cannot return cards direct without funds.

A copy of the 4J1FS DXpedition's log has now arrived in Jersey, this shows contacts with over 40 G stations and one GJ (guess who!). Other countries to be worked were; DL, F, LA, OH, ON, OY, OZ, PA, SM and our new friends to six YU. Jari OH2BU states in his letter that QSLs should be sent out in early August, they have a mammoth task as 27,000 QSOs were made on HF/VHF. Any donations towards costs and QSLs can be routed via OH2BU.

Other happenings of interest on 'six' include strong TEP openings to the south, these usually occur around 1600z-1900z. Although stations in the south of England have the majority of these openings, Murphy's law proved this one wrong when GW3LDH worked 7Q7RM in Malawi and nothing was heard in GJ. Also G0JHC made the grade with 9J2HN in Zambia during July, this was obviously an extension of sporadic E which did not favour the south of England for once.

Other summarised reports from the UK include; *20/6/91* AM, the 5B4 beacon was heard for over three hours in the UK, but no activity was worked. Later in the day at 1500z the FR5SLX beacon on Reunion Island on 50.022.5MHz was reported at S6 but again no activity was reported. For those of you wondering where FR5 is, just have a look on your world map, east of Madagascar. *21/6/91* PM, 1700z, 9J2HN appeared at S9++ and what a pile-up on him, with many stations calling him on his TX frequency when he requested split operation!

Many more openings occured to ZS, A22 etc. for the rest of June with the Es assisted signals. In July the story was much the same as regards to Es. Nearly each day brought openings to YU, OH, SM0, CT, 9H1, OE, DL, CN8, and the highlight must be the dreaded 13th, when to everyone's suprise (well not everybody, like those who watch solar figures) there was a very large aurora. Signals on 6m in the south were unbelievable at 40 over S9 from GM, GW, DL, PA, ON, OE, I, OZ and SM7. The 20th brought a new



country for many UK stations in the form of 1A0KM (see previous notes), YO7, YU, 12 and on the 22nd a report was received of 12ADN/P/IM0 working CO2KK in the caribbean.

During the last week of July, many amateurs reported real DX returning to the Southern shores of the UK in that ZS stations were becoming 'common' again. A22BW, 9J2HN, and PY5CC were worked by many stations both in the north (Isle of Man) and the south. Look out for new ones around October like 9X5HN, and 9Q5EE. During the next few months 50MHz propagation should return to VK, JA, KG6, DU, VS6. Mid October should be the time to watch 50.110MHz at around 0700z-1000z for those of you who still need those really exotic callsigns. November may well see the return of Stateside stations re-appearing if the solar flux levels continue at the present rates during the 'prime sun angle'.

FM on 70MHz

Not many reports have been received on this band, ZB0W has been reported by a few correspondents having been worked on FM via sporadic 'E', signals were very strong and fully quietening.

Many amateurs are now using rigs like the Pye Europa for 70MHz, for general chitchat use across the town, but I'll bet it was a pleasant surprise for some to hear a ZB0 booming through the loudspeaker!

144MHz Es

Well where has all the brilliant Es gone which we usually see around June? At 1600z on June 2nd GJ0FTZ reported there was an opening to LZ, SP, I, for about one hour and only a few reports within Europe seem to exist. Stations in DL worked into 9H on the 10th at 1640z, and on the 15th PAs worked EA5. DLs had a ball (well a pipeline) into UA3/4 on the 16th at around 1830z. Stations in the Kent area worked into LZ on the 17th at 2140z as did German stations a few minutes later. The only other report was from DL on the 22nd when the band was open from 1545z to 1630z to EA4, EA7, and ZB0.

Looking back through the logs of years gone by, it does seem strange that sporadic E events are now becoming few and far between, have *you* any answers? July saw a few good long-haul tropo events, although the usual conditions existed for field day, rain and wind dampened most people's enthusiasm as it usually does! Personally I think that the organisers of VHF NFD should have a chat with the heavens before the event!

The 20th brought very strong signals from EA and southern France into central England. F6HRE in IN93 was reported into the UK at 40dB over S9, this coincided nicely for the French contest (somebody gets it right!). The 26/27th also produced some fine propagation, here in GJ signals were booming in from EA1 land, this time it coincided with the QRP contest in the UK. How did *you* do and what was your best DX?

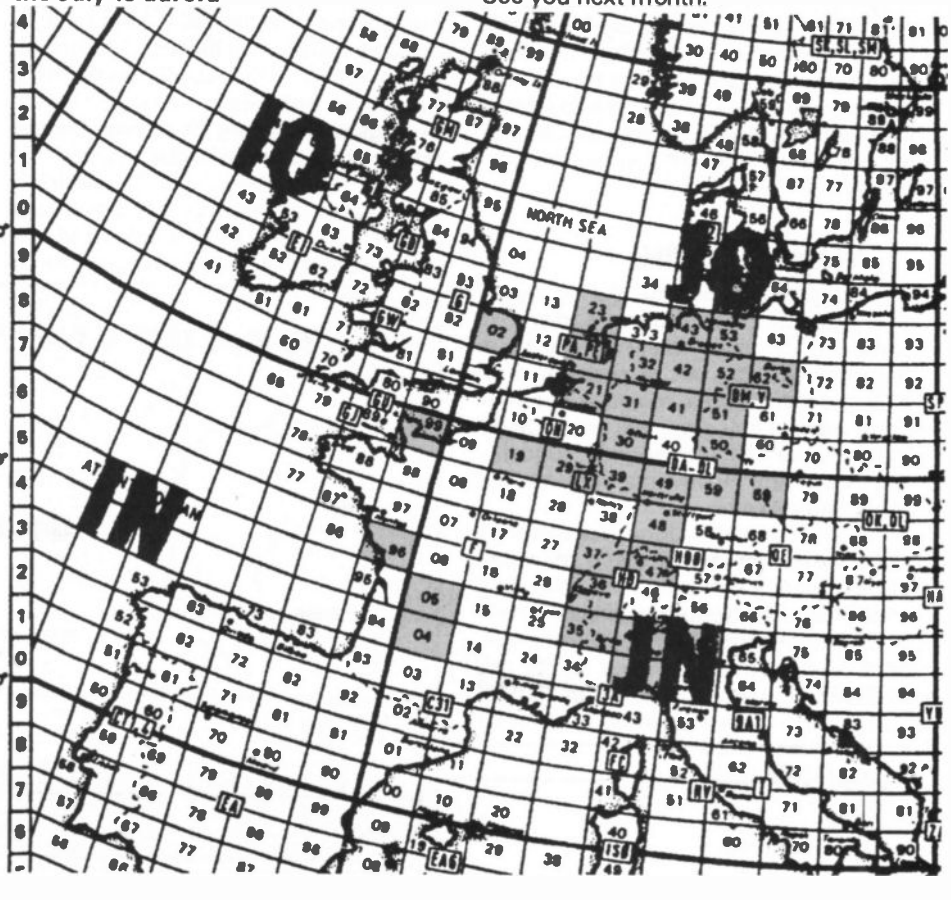
I have not received any reports on 144MHz EME as to date, please drop me a line and let's see what you are all up to on this front *(I'll start by twisting my local 2m EME operator's arm - Ed)*. Maybe we can start a table of countries worked via the moon!

July produced many auroras, Ela G6HKM swept into action on the 13th showing the men how to really go! 79 QSOs were made with many HB9s and continentals plus IK2GSV/JN55 for a new square. Ela also comments that up to the 26th July no sporadic 'E' had been heard on 144MHz.

DX on 432MHz

Auroras dominated the propagation scene during July, and down in GJ they have to be good to get in on the act. July 13th was a plesant suprise, after hearing 50MHz and 144MHz I then looked at 432MHz. Many auroral signals were heard but only a few stations were worked. Tropo conditions were good on the 27/28th from the UK to EA and southern France. For once the weather had got it right, yes you've guessed it, a contest weekend and with fabulous conditions. Even the QRP stations were S9++, GB3MLY (432.910MHz) was S8 in GJ as was the EI beacon on 432.870MHz. Ela, G6HMK in Essex reports working GM3CKR/P (IO85) and GM4OGI/P (IO74) during field day. On the 15th July Jon G0NFH (Avon) was worked.

Squares worked by G6HKM on 2m in the July 13 aurora



Late News

Confusion has reigned over the 5NO/G3GJQ situation on 50MHz. At 28/7/91 the final outcome is as follows; ARRL will allow 5NO for DXCC, RSGB will not accept 5NO for any award. ARRL also confirmed 3X1SG is now valid for DXCC along with stations operating from TK. This is a very confusing situation as I have received written documentation from France to say that **no** foreign stations can obtain permission to operate in TK! However, if ARRL have investigated the above then someone somewhere is wrong!

G4SMC/8R1 (GJ06, Georgetown, Guyana) operated by G4CCZ and G4CVI will be operational on 6m as well as some HF bands, between approximately 24th Oct and 1st Nov. They hope to run a beacon on 50.100MHz, and a watch will be also be kept on 28.885MHz, the station operation will be subject to other work commitments.

Your reports are needed on all VHF/UHF activity for the next issues, they can be faxed anytime on 0534 77067 which is a combined fax/telephone line, and also my work QTH during the day. Urgent last information can be phoned on 0860 740727 day or night, or you can write to me, Geoff Brown GJ4ICD, The TV Shop, Belmont Rd, St Helier, Jersey JE2 4SA. See you next month.

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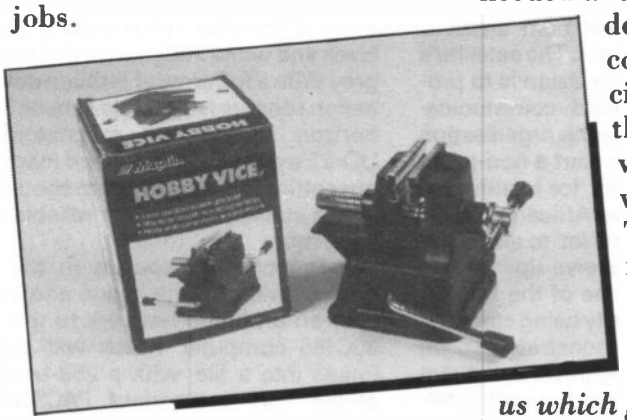

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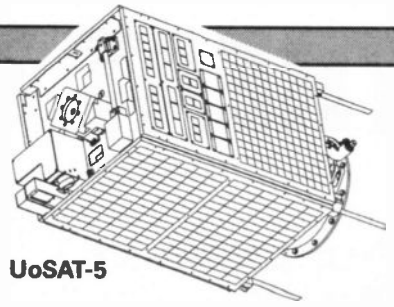


UoSAT-5

This month's AMSAT-UK news provided by Richard G3RWL tells of the new OSCAR-22

On July 17 a new amateur radio milestone was achieved: **UoSAT- OSCAR-22** was successfully launched. UO-22 now joins the following operational OSCARs on-orbit: AO-10, UO-11, AO-13, UO-14, AO-16, DO-17, WO-18, LU-19, FO-20, AO-21, RS-10/11, RS-12/13.

Orbit

UoSAT-OSCAR-22 is performing well in a 775 km polar, sun-synchronous, Earth orbit. The five payloads on this launch were; ERS-1 (Primary payload) and the 4 microsats; UoSAT-F (Now UoSAT-5 or UoSAT-OSCAR-22); SARA; TUBSAT; and Orbcomm-X. Satellite deployment seems to have been normal with the exception of a premature separation indication on TUBSAT.

UO-22 will support both amateur and non-amateur RF links. The satellite's primary non-amateur mission is to provide store- and-forward communications for SatelLife, a health organisation who will use UO-22 to start a non-profit electronic mail network for health professionals. Initially, five African medical schools will use 'HealthNet' to exchange electronic mail and receive up- to-date medical literature. Some of the HealthNet stations have already being commissioned and demonstrated on UoSAT-OSCAR-14. HealthNet is a direct application of store-and-forward satellite communications techniques developed within the Amateur Service.

As well as serving HealthNet on non-amateur frequencies, UO- 22 will transmit and receive on amateur frequencies. Modulation, data formats and frequency bands will be exactly as used by UoSAT- OSCAR-14; AX.25 data using 9600 bit/second FSK modulation. Stations already equipped for UO-14 operation will be able to work UO-22 with the software and hardware which they already use.

UO-22 will transmit telemetry, status messages, and files, in the same pattern as UO-14. Files will be broadcast using the PACSAT Broadcast Protocol, already in use on PACSAT, LUSAT and UO- 14.

UO-22's role in the amateur satellite service will be similar to that of UO-9, UO-11 and WEBERSAT. Instead of providing a two-way communication service, it will transmit experimental data and telemetry. An interesting aspect of this mission is the CCD camera, its design incorporates all of the lessons learned from previous UoSAT CCD experiments. It has a 110-degree wide-angle lens providing a field of view only slightly smaller than the satellite's footprint. Images will measure 1600 by 1800 kilometres, making identification of ground features much easier than on previous OSCAR cameras. The image array measures 578 pixels by 576 pixels, providing ground resolution on the order of 2 km. Each pixel is 8 bits, giving a black and white image with 256 levels of grey. With a full array of attitude determination sensors (sun-angle sensor, Earth-horizon sensor and magnetometer), UO-22's gravity-gradient and magnetorquer attitude control system should provide a stable platform for reliable Earth imaging.

The two Transputers in the CCD module will take the image and send it over an on-board network to the main 80C186 computer which will put the image into a file, with a 256-byte preamble and a standard PACSAT File Header. UO-22 will broadcast the CCD image files routinely using the standard PACSAT Broadcast Protocol.

For those interested in writing their own display programs, complete technical details of the image file contents will be available soon. A display program for IBM-PC compatible computers will be released as soon as the camera has been commissioned. The program will be available as a broadcast file on UO-14 and UO-22, so any station equipped to receive the images will immediately be able to get a copy of the display program. This on the air bootstrapping and updating of ground station software is a regular feature of the new PACSAT satellites.

UO-22 Frequency Plan:

Downlink;
435.120 MHz
9600 bps FSK
1200 bps AFSK (backup)
5 W or 2 W

Uplink;
145.900 MHz
9600 bps FSK
1200 bps AFSK (backup)

Note: The uplink channel will be used by ground stations transmitting 'hole lists' for the PACSAT Broadcast Protocol. There should be little interference with the Microsat uplink on the same frequency.

Oscar 13

The schedule for this, from September 18 to December 12 is;

Mode-B	:	MA 000 to MA 095
Mode-JL	:	MA 095 to MA 125
Mode-LS	:	MA 125 to MA 130
Mode-S	:	MA 130 to MA 140
Mode-B	:	MA 140 to MA 256
Omnis	:	MA 240 to MA 030

Note that from November 17 to December 9, the B transponder will be off during MA 10-40. There are long eclipses during late November, when the mode-B transponder will be off for these 3 weeks as indicated.

Oscar 10

As I write this, OSCAR-10 is currently available for Mode B operation, but as usual **please do not** attempt to use it if you hear the beacon or the transponder signals FMing.

MicroSats

AO-16's computer crashed on July 8th. At the present time the Ground Command Team are unsure about the cause of the hang- up. This crash came as a surprise since this version of the software had been working flawlessly for over 120 days.

All AO-16 users are asked to refrain from attempting to use the BBS until they see a message being 'broadcasted' announcing that the BBS is back in operation. Initially Amsat-NA had promised the reload would only take about a week but this promise has not been kept; probably because of events related to the launch of UO-22.

There is a bright side to the crash, the new software to be uploaded will be identical to that aboard UO-14 with many new features in the protocol, including hole filling whereby users need request only those blocks of a message that they haven't received.

Phase 3D

AMSAT-DL have received confirmation from the European Space Agency that a launch slot has been identified for Phase 3D on- board an ARIANE-5 rocket tentatively timed for October 1995. Until this announcement the basic structure could have looked like either a box or doughnut shaped satellite. However, because of the number of satellites that will be squeezed aboard on this ARIANE-5, Phase 3D's shape has now been solidified in the form of a doughnut 3.2m in diameter and about 0.65m tall, weighing around 500kg. Now the P3D team can now start the construction of the most advanced and largest OSCAR ever built. Because a 3m spacecraft is too big for doors, elevators, etc., P3D will probably be made in separate pieces and the blocks finally assembled at the launch site.

The current intention is to fine-tune the orbital period to exactly 16 hours in order to give regular and repeatable access times with consecutive apogees occurring, and repeating, over Europe, USA, and the Far East; target times for access are local- time-synchronous at 0500-0800 and 1800-2400.

Finally, as the doughnut has a hole in the middle, the question arises 'can we mount something inside this area?'. It is possible that this void may have an extra AMSAT-DL payload, a spacecraft to send to ***Mars***. The possibility of accurate arrival is low but, in the interim, much experience would be gained in interplanetary communications. One-way propagation delays of 5 to 15 minutes would be experienced and links would probably be on 2400 MHz. Software writers — we need a tracking program for interplanetary objects — please.

Short Bursts

The French radio-astronomy satellite *SARA* launched with UO- 22 has been heard with a strong signal on 145.955MHz, rising about 5 minutes after UO-22. It transmits AFSK data at 300 baud, being the digitised noise from Jupiter received on some HF channels.

The *Satellite News bulletin* service via UoSat-Oscar-11 which resumed recently has been involuntarily suspended because UoS staff have been unable to provide necessary assistance. Hopefully it will restart within a few weeks. Comments received so far have been encouraging but all follow the same theme; that more straight ASCII data is wanted there in place of the prevailing cycle which transmits large quantities of binary data. Of course, the users of the binary data probably have different ideas but they haven't said so. Consequently, users of all types of data transmitted by UO-11 are invited to comment, to G3RWL.

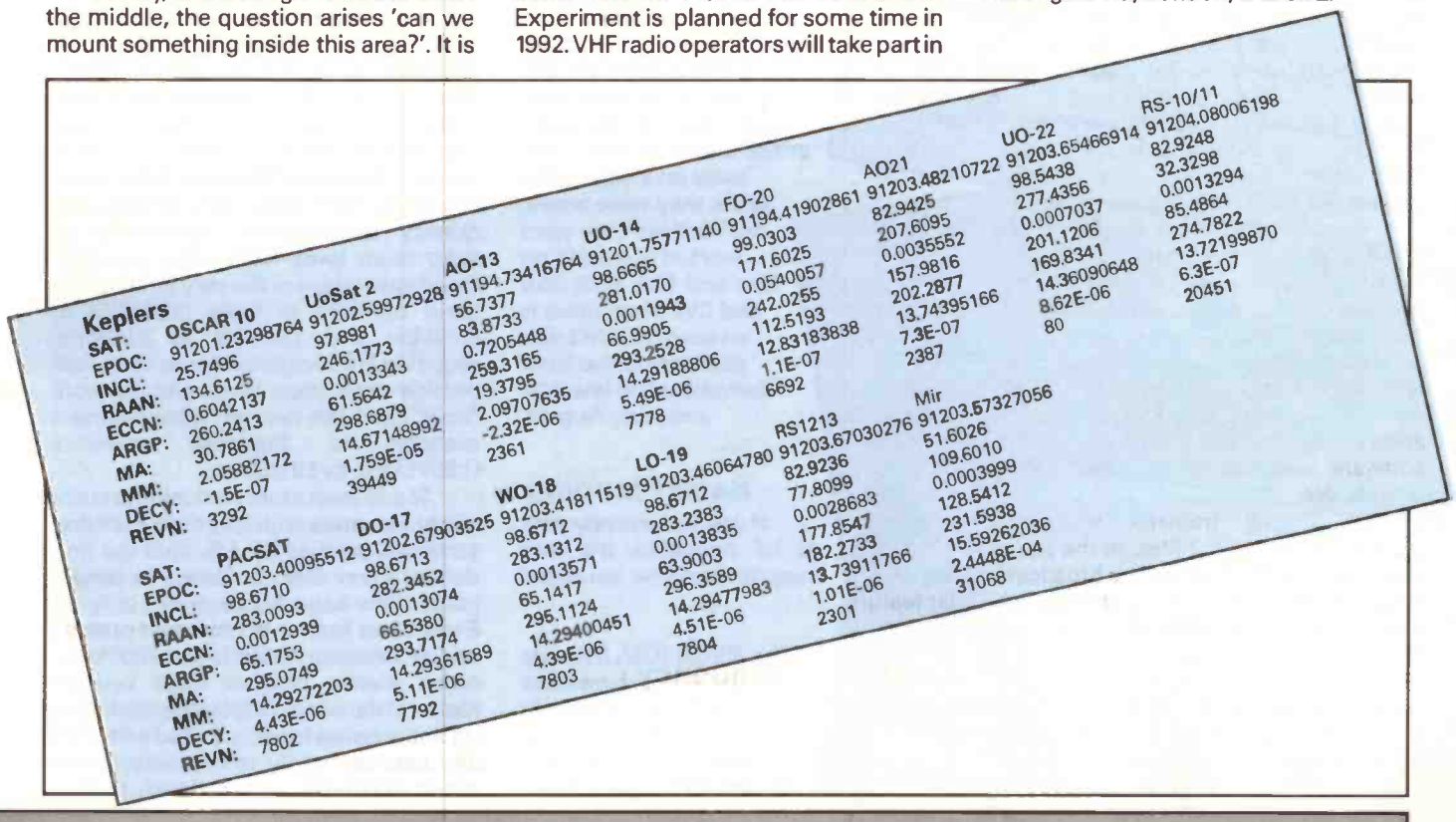
Soviet VHF Experiment; An International Plasma Plume Characterisation Experiment is planned for some time in 1992. VHF radio operators will take part in this experiment in order to map the plume of a Cesium Hall rocket thruster by correlating the strength of a satellite signal at known locations on the ground. The plume of such a thruster is highly ionised, so it is opaque to radio waves below the plasma cut-off frequency. The specific frequency varies with the local free electron density. A reasonably dense plume has a cut-off frequency in the VHF range. More info when available.

AMSAT-UK News

If you didn't make it to the AMSAT-UK Colloquium this year then please note next year's dates in your diary; 30th July until 2nd August 1992. This year about 150 people were present from at least 21 countries, G3ZCZ commented that the list of lecturers looked more like a who's who of the amateur satellite world! Unfortunately the British Cosmonaut, Helen Sharman, was unable to be present but hopes to come next year.

Much information is available from the 'Proceedings' if you'd like to catch up on some of what you missed, available from AMSAT-UK. The group now also have available copies of the ARRL PacSat/MicroSat telemetry handbook, together with PC software on a 5.25in disk, they also have the Amsat-NA book about decoding telemetry, and the papers from the ARRL 9th telecomputing conference.

For further information about AMSAT-UK send a large SAE to: AMSAT-UK, c/o Ron Broadbent, G3AAJ, 94 Herongate Rd, London, E12 5EQ.



Keplers	OSCAR 10	UoSat 2	AO-13	UO-14	FO-20	AO21	UO-22	RS-10/11
SAT:	91201.23298764	91202.59972928	91194.73416764	91201.75771140	91194.41902861	91203.48210722	91203.65466914	91204.08006198
EPOC:	25.7496	97.8981	56.7377	98.6665	99.0303	82.9425	98.5438	82.9248
INCL:	134.6125	246.1773	83.8733	281.0170	171.6025	207.6095	277.4356	32.3298
RAAN:	0.6042137	0.0013343	0.7205448	0.0011943	0.0540057	0.0035552	0.0007037	0.0013294
ECCN:	260.2413	61.5642	259.3165	66.9905	242.0255	157.9816	201.1206	85.4864
ARGP:	30.7861	298.6879	19.3795	293.2528	112.5193	202.2877	169.8341	274.7822
MA:	2.05882172	14.67148992	2.09707635	14.29188806	12.83183838	13.74395166	14.36090648	13.72199870
MM:	-1.5E-07	1.759E-05	-2.32E-06	5.49E-06	1.1E-07	7.3E-07	8.62E-06	6.3E-07
DECY:	3292	39449	2361	7778	6692	2387	80	20451
REVN:								

	PACSAT	DO-17	WO-18	LO-19	RS1213	Mir
SAT:	91203.40095512	91202.67903525	91203.41811519	91203.46064780	91203.67030276	91203.57327056
EPOC:	98.6710	98.6713	98.6712	98.6712	82.9236	51.6026
INCL:	283.0093	282.3452	283.1312	283.2383	77.8099	109.6010
RAAN:	0.0012939	0.0013074	0.0013571	0.0013835	0.0028683	0.0003999
ECCN:	65.1753	66.5380	65.1417	63.9003	177.8547	128.5412
ARGP:	295.0749	293.7174	295.1124	296.3589	182.2733	231.5938
MA:	14.29272203	14.29361589	14.29400451	14.29477983	13.73911766	15.59262036
MM:	4.43E-06	5.11E-06	4.39E-06	4.51E-06	1.01E-06	2.4448E-04
DECY:	7802	7792	7803	7804	2301	31068
REVN:						

HF HAPPENINGS

Don Field G3XTT asks 'why shouldn't we support DXpeditions?'

Soon after I had finished my October column and mailed it to the Editor, band conditions picked up considerably. From hearing very little on the bands, suddenly they were full of loud DX signals! For example, stations from the Far East and Hawaii were booming through on 15m in the evenings, with the occasional very rare one turning up. KH6LW/KH7 in Kure Island, worked in the UK on 17m, and KH3AE on 12m, must rate as two of the best, but there were plenty more in a similar vein. We can only hope that there will be some more good propagation in the offing for this autumn's contests. Not all was quite as rosy, though. The Italian group which operated as T6AS from Afghanistan started up slightly behind schedule and seemed to be doing a good job, but appear to be have been closed down by the authorities ahead of time. I was away on a sailing trip while they were active, but I believe they were worked in the UK on 20m and 15m, both SSB and CW. More news is awaited. XU1NQ was also very active from Kampuchea in late July and early August.

Band Planning

If you're relatively new to HF operation, it's very easy to become confused about HF band plans. This is especially true because band plans vary from country to country and between regions of the world. UK amateurs follow band plans voluntarily (while in the US, for example, band plans are mandatory, and offenders can receive a ticket from the FCC). It is, of course, good practice to stick to the voluntarily agreed band plans, and to also know what the band plans are for other parts of the world.

Band planning is coordinated by the International Amateur Radio Union (IARU), which takes into account the views of IARU member societies and the frequency bands which are available country by country. For example, Region 1 amateurs are unable to operate above 7.1MHz as this band is used in Region 1 for broadcasting.

At the simplest level, the IARU has assigned CW to the lower end of the bands and SSB operation to the higher end of each band. RTTY (including AMTOR and Packet) is slotted in towards the top end of the CW segments, and there are preferred meeting frequencies for specialist modes such as SSTV. The normal practice with these would be to meet up and then move to a clear frequency to carry out a QSO. There are several other specialist allocations, for example those for beacons, FM and satellite operation on 10m.

An added complication is that, while several of the HF amateur bands are exclusive to amateurs, others (160m, 80m, and 30m for example) are shared with other services, and amateurs must take care to avoid interference to other users. In the case of 80m and 160m some countries have only very limited frequency assignments, specifically to keep them away from other services. Good examples are the very limited SSB band on 80m in India (3.65MHz to 3.70MHz and 3.89MHz to 3.90MHz, requiring European stations to listen well outside their own band and to work "split") and the narrow 160m segment available to Japanese amateurs (1.9075MHz to 1.9125MHz).

To add even more confusion, a number of countries with incentive licensing schemes, such as the US, limit the holders of lower licence classes to certain parts of the band. For example, only US Extra Class licence holders can operate on CW between 7.00MHz and 7.025MHz, other licence holders must operate higher in the band. This can be confusing if you are trying to set up a sked with a US amateur, especially as, nowadays, it is not always possible to tell their licence

The RSGB IOTA (Islands on the Air) programme continues to gain in popularity. These cards represent a variety of recent IOTA operations.

class by their callsign!

So how can you find your way through this jungle of rules and gentlemen's agreements? A good starting point is the IARU recommendations on band planning, you will find these detailed in the RSGB callbook and a number of operating handbooks. As for country by country restrictions, these appear in all sorts of different places and you will have to keep your eyes and ears open, especially as the situation is changing all the time. For example, the 160m allocations available within Europe have changed drastically within the past ten years, with more countries getting 160m allocations, or being allocated a greater range of frequencies within the band.

DX News

As I write this, the possibility of an operation from Myanmar (Burma) is increasing all the time. Romeo, 3W3RR, recently toured the US promoting the operation and received pledges of money and equipment. He appears to have the necessary documentation, so hopefully it will be 'all systems go'. Indeed, if everything goes according to plan the operation should be history by the time this appears in print, as late August or early September looked favourite for the venture. A fund-raising effort by the DX News Sheet raised over £1200, mainly from UK amateurs, and the Chiltern DX Club had also pledged $500, so it seems to show that UK amateurs can rise to the occasion when the effort is aimed at an especially rare one. Interestingly, support from the rest of Europe was rather thin, though as usual the Japanese and Americans have made up the bulk of the funds.

The fund-raising effort did, in fact, raise a handful of protests from the DX community about the 'commercialisation' of amateur radio, even though the sums involved are somewhat less than for earlier operations such as Bouvet Island and Heard Island. Everybody will have their own views on this, though sponsorship of one sort or another seems to be an accepted part of every sport and pastime these days. From my own point of view, I see no reason why DXers should be asked to sponsor the typical 'holiday' type of DXpedition that happens all the time, to the Caribbean for example. However, the Myanmar operation and others like it are rather different. Many DXpedition destinations are off the beaten track, and require specialist transport and equipment (for Myanmar there was even talk of weapons for self- protection). Those who are able to get permission to operate and who are willing to endure the hardships involved, are not always those who have the money. I therefore see no fundamental problem, though it would be nice to see a set of accounts produced after the event to show that the donations had been used wisely. While I wouldn't necessarily go as far as the DXer who recently said he wouldn't mind if Romeo ended up with a Turbo Rolls Royce provided he got his XZ contact, I don't see why Romeo should be out of pocket in order to give the rest of us such a rare one and all the fun of chasing it.

While talking about rare ones, I recently received a long letter from Steve, G4JVG, who used to write this column and is now active as P29DX from Papua New Guinea. Steve together with Eva his wife, have finally moved into their own house although space for aerials here is limited. He is able to use the very much better facilities at his work QTH and may well do so for the major contests. He also advises me that the special event prefix P20 is now available for contests etc. Steve has also made friends with someone who flies light aircraft, and is planning a series of, literally, flying visits to some of the outlying islands of Papua New Guinea to put them on the air for island chasers. Check the IOTA frequencies of 14.260MHz and 21.260MHz for these operations.

DXCC News

The ARRL has now confirmed (see last month's column) that North Korea will be added to the DXCC countries list as and when a bona fide operation takes place. The existing DXCC country of Korea will become known as South Korea.

Congratulations to the following UK amateurs who have recently received DXCC awards:
Mixed Mode; **G4HVC, G4RTO, G0DTC, and GW3WWN.**
CW; **G4ZVS.**

Contests

Finally, contests for November. I have to admit an element of prejudice here. My favourite contest of the year is the CQ Worldwide CW Contest on the last full weekend of the month (23/24th November this year). To my mind this is a must if you are at all interested in CW operation. There will be plenty of contest DXpeditions (G4UOL has already announced he will be back in the Isle of Man, N6TJ will be in ZD8 or D4, and many operators will be going even farther afield), and the bands will be full of good CW operators with whom you can hone your operating skills. What's more, with CW being a power-efficient mode, a QRP (low power) entry in the contest can be very satisfying. On the other hand, for those who aspire to a big signal, this is the first year in which UK operators will be able to compete on equal terms with the rest of Europe, now that our CW power limit has been raised to a level broadly similar to that of other countries.

The other main contests to fall in November are the OK DX Contest (24 hour, mixed mode, from 1200z on 9th November) and the RSGB 1.8MHz CW Contest (4 hours from 2100z on the 16th). If RTTY appeals to you, then look out for the Worked All Europe RTTY Contest (36 hours, starting at 1200z on the 9th).

And as a final final (as they say on the bands!), I have just received my copy of N6AW's biography of the late Don Wallace, W6AM, probably the greatest DXer of all time, and an absolutely fascinating person. I had the privilege of meeting Don at the 1982 Visalia DX Convention. His legendary rhombic farm extended to 120 acres at one stage, and Don was the 1923 winner of the Hoover Cup for the Best Home-Built Amateur Radio Station in the USA. Don's busy life also included a spell as chief radio officer for President Wilson during the sea voyage to the 1919 Versailles Peace Conference. The book is beautifully produced in hardback, with black and white photos dating back to the early days of amateur radio, and makes an absolutely fascinating read. The price is $29.95 (plus $5 handling and shipping outside the US), from Wallace and Wallace, 11823 E. Slauson Ave, Suite 38, Santa Fe Springs, CA 90670, USA.

SM6CAS operating from one of the Swedish Islands

An SM6CAS Island QTH

Packet Radio Roundup

Chris Lorek G4HCL details the effects of receiver economisers on packet performance

Many amateurs use a 'secondary' rig for packet operation rather than the main VHF/UHF base station, and this is often a 2m or 70cm portable rig. Here's where many amateurs encounter a problem — whereas the TNC/computer arrangement previously worked fine with the 'main rig', when connected to the portable rig a large number of packet retries occur regardless of audio level changes on both the RX and TX side. From comments heard at packet meetings and the like, many amateurs are unaware that the cause may be very simply explained.

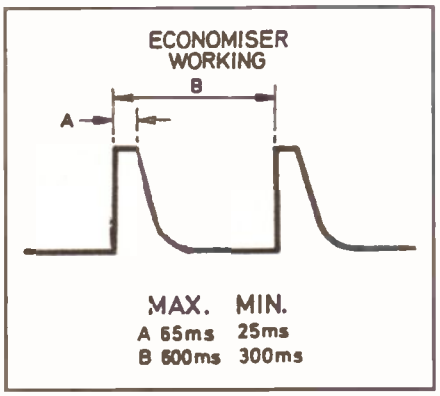
Economiser Action

On many portables, an 'economiser' is used to extend the battery life during receive periods of no activity. It works like this; when no signal is received and the receiver squelch is closed, the receiver circuits are switched, or 'pulsed', on and off in a cyclic fashion, the 'off' period normally being substantially longer than the 'on' period. As soon as a carrier is detected and the squelch raises during one of the 'on' periods, the pulsing ceases and the receiver circuits are energised continually until the squelch closes, then usually after a short time interval the switching cycle resumes. As the current drain during 'off' periods is normally very small, the end result is extended battery life with the disadvantage of possibly missing the first few hundred milliseconds or so of a received signal.

In normal voice communication this is often tolerable in view of the advantages of greater battery life, but in packet operation it can cause rather a problem! If the economiser is cycling and the beginning of a received packet signal is lost before the receiver audio circuits spring into life, the TNC only gets a fraction of the packet, missing the first few frames and thus rejecting it as invalid data. Only if the economiser is already disabled will the TNC see the complete packet. Alternatively if an extraordinarily long TXDelay is used at the distant transmitter this will overcome the limitation, but this is not the thing to do on a busy channel!

The Answer

The simple answer, of course, is to switch the economiser off for packet operation. Many commercial transceivers have this facility (read your instruction book), but users of the Pocketfone 70 range of ex-PMR sets have found this is an in-built feature, with circuit modifications needed. Well here's how to do it;



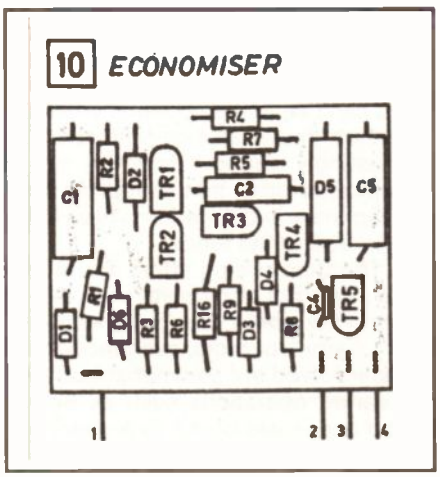
Typical receiver economiser operation

Pocketfone 70 Modification

A detector/clamp and multivibrator are used for the economiser, as shown. The easiest way to 'defeat' this is to apply a short circuit across the collector-emitter junction of TR1 on the economiser board. To do this, open up the set and locate the vertically mounted economiser board. Then carefully solder a short length of insulated wire linking the long vertical 0V track at one end of the PCB (beneath C5, the 3.3uF capacitor) and the track at the opposite side of the PCB, beneath C1 the 10uF capacitor. Reassemble the set, and that's it. Simple eh? This modification applies to all the FM Pocketfone 70 sets, whether VHF or UHF, handheld or bodyworn versions, due to similarities of circuitry. My thanks go to the publications division of Philips RCS for their permission to reproduce the circuit extracts from their manual.

Packet Groups

The latest issue of Digicom, the quarterly magazine from *Maxpak* the Midlands AX25 packet group, recently arrived on my doorstep. As usual it's filled with packet information and ideas,



Link the R9/D6 junction to 0V to defeat the economiser

this issue continues with the second part of their 'Beginner's Guide to Packet Radio', together with details on the modification of the MkII TNC-2DL to the latest MkIV version. Their membership secretary is Richard Nichol G1NZZ, at 37 Thicknall Drive, Stourbridge, Wheaton Aston, Stafford, ST19 9NG, and I'm sure an SAE sent there will bring back details on this very active group.

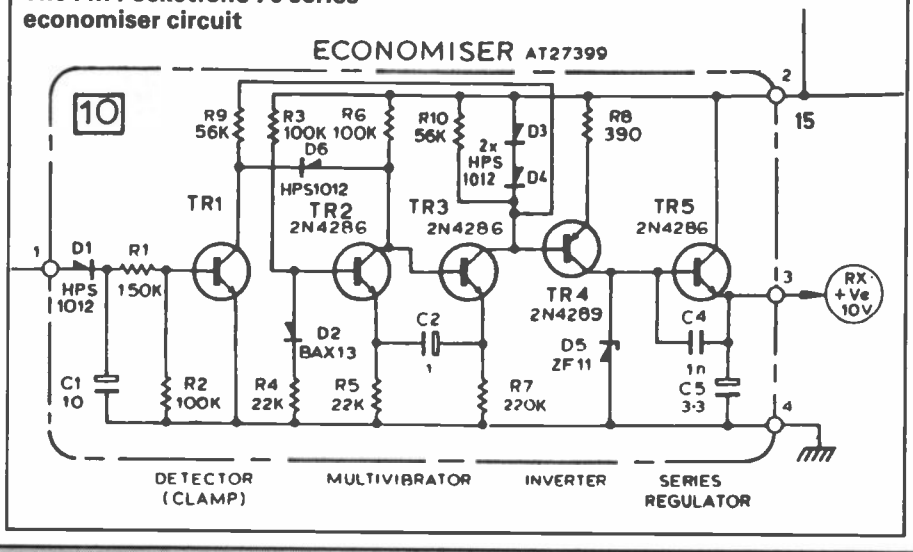
A regular sight at virtually every rally in the central south coast area is the

SUNPAC group stand, this being the recently formalised Southern Users packet group. As well as T-shirt transfers and node/BBS maps for the area, they have on offer several useful packet radio guides as well as PC based software for packet. Their annual subscription is £5, and you can contact their secretary Paul Martin G0AFF c/o SUNPAC, P.O. Box 73, Eastleigh, Hants. SO5 5WG.

VITA

Readers of last month's *CQ de G8IYA* Editorial will remember Eric Rosenberg WD3Q of VITA (Volunteers In Technical Assistance), and the work they are doing. This group is a non-profit organisation who are currently using packet to set up communications links around the world for medical information. Eric has been in touch to say he'll soon be off to Djibouti and Somalia to set up VITA stations, with other upcoming installations planned for Niger, Mali, Guatemala, Cuba and Pakistan, amongst others. Eric tells us that VITA are dependent upon volunteers and they are looking for amateur radio operators with terrestrial packet radio and/or UO-14 packet satellite experience to help them install these and other systems. If you feel you can help, you can get in touch with them directly at 1815 North Lynn Street, Suite 200, P.O. Box 12438, Arlington, Virginia 22209-8438, USA, tel. (703) 276-1800, fax (703) 243 1865, or alternatively we at HRT will be pleased to fax on any offers of assistance to Eric. If you'd like more information on their work, a large SAE to the HRT Editorial address will bring you a bumper photocopied bundle. Eric has sent us a comprehensive pack of information on their work, look out for a forthcoming feature on this in HRT.

The FM Pocketfone 70 series economiser circuit



CTRL-Z, End of Message

That rounds it up for another month, please keep the packet messages coming to G4HCL @ GB7XJZ, and you can normally contact me evenings/weekends on the HRT editorial direct line. 73 de Chris G4HCL @ GB7XJZ.

Club News

Acton, Brentford & Chiswick ARC meet at 7.30pm on the 3rd Tuesday of each month at the Chiswick Town Hall, Turnham Green, Chiswick, London W4. A date for your diary;
Oct. 15th My favorite Key — discussion.
Further details from Paul Truitt G4WQO, Tel. 071 938 2561

Bedford and District ARC meet every Tuesday at the Allens Club, Hurst Grove, Bedford at 7.30pm for 8.00pm. Most meetings are social evenings, other club events include;
Oct. 15th AGM.
Further details from their secretary Glenn G0GBI, 81 Duchess Rd, Bedford. Tel. 0234 266443

Braintree and District ARC meet at the Community Centre, Victoria Street, Braintree at 8pm on the 1st and 3rd Mondays of each month (except bank holidays). Club events;
Oct. 21st Computers in amateur radio — Dave G0DEC.
Nov. 4th QTH reports and social evening.
Nov. 18th Keeping your station legal.
Details from M. J. Andrews, 22 Arnhem Grove, Braintree, Essex CM7 5UQ. Tel. 0376 27431

Bromley and District ARC meet on the 3rd Tuesday of each month, 7.30 for 8.00pm at the Victory Social Club, Kechill Gardens, Hayes, Kent. Club events include;
Oct. 15th Junk sale.
Nov. 19th Stereoscopic slides — G0ILW.
Further details from Mr. Geoffrey Milne G3UMI, 142 Hayes Lane, Hayes, Kent BR2 9EL Tel. 081 462 2689.

Conwy Valley RC meet on the first Thursday of each month at The Studio, Penrhos Road, Colwyn Bay, Clwyd at 7.15pm. Dates for your diary;
Nov. 7th Junk sale.
Dec. 5th Satellite communications — Rodger GW1VCN.
Further details from Merfyn Jones GW4NNL, 72b Princes Drive, Colwyn Bay, Clwyd LL29 8PW, Tel. 0492 530725 or Ray Jones GW3MDK.

Dorking and District RS meet on the 2nd and 4th Tuesdays at 7.45pm at various venues, details from John Greenwell G3AEZ, Tel. 0306 77236. Dates, other than the informal gatherings, are;
Oct. 22nd Satellites.
Nov. 26th Marine Radio Communication.

Eastleigh ARS will meet on Southampton Common at 7.30pm. A date not to be missed;
Nov. 5th Sky diving and Paracending along with a demonstration on how to erect a top band aerial for short QSOs using rockets.

Echelford ARS meet in the Community Hall, St Martin's Court, Kingston Crescent, Ashford, Middlesex at 7.30 for 8pm. Dates for your diary;
Oct. 14th Basic test equipment for construction.
Further details from P. Townshend G6PMT, Tel. 0344 843472

Edgware & District RS meet at the Watling Community Centre, 145 Orange Hill Road, Burnt Oak. Events include;
Oct. 24th Simply simple aerials, discussion led by G3SJE.
Nov. 28th Novice licence and club participation — discussion.
Further details from Hank Kay G0FAB, Tel. 081 205 1023 or Howard Drury G4HMD, Tel. 09274 22776

Exeter Amateur Radio Society meet on the 2nd and 3rd Monday of each month at the Community Centre, St David's Hill, Exeter at 7.30pm. Every third Monday is a social gathering in the bar.
Oct. 14th AGM.
Further details can be obtained from Ray Donno G3YBK Tel. 0392 78710

Fareham and District ARC meet on Wednesdays at 7.30pm in Portchester Community Centre, Westlands Grove, Portchester, Fareham, Hants. Club events include;
Oct. 23rd The world above 1GHz — Bob G8VOI.
Nov. 6th Coding — Peter G0FIM.
Nov. 20th Talk by Chris G8JFJ.
Further details from club chairman Ron Smith G0ERS, Tel. 0705 373572

North Ferriby United ARS meet at North Ferriby Football Club Social room, Church Road, North Ferriby at 8pm. Meeting details as follows;
Oct. 11th RSGB video.
Oct. 18th Night on the air.
Oct. 25th Basic test gear — Tony G3TEU.
Nov. 1st Satellites (Part 2) — Frank G3EFR.
Nov. 8th Night on the air.
Nov. 15th RFI forum — David G0MXI.
Nov. 22nd Amateur TV — Richard G4YTV.
Nov. 29th RSGB video — Frank G3YCC.
Further details from F. W. Lee G3YCC, Tel. 0482 650410

Harrow RS meet every Friday at 8.00PM in The Harrow Arts Centre, Uxbridge Road, Hatch End. Licensed bar on prmises with a family area. New members especially welcome. Club activities include;
Oct. 11th Activity evening.
Oct. 18th Project evening.
Oct. 25th DF hunting — talk by Peter G3YXZ.
Further details from Chris Friel G4AUF, Tel. 0895 621310

Hambleton ARS meet in room A5, Northallerton Grammar School at 7.30pm. Club events;
Oct. 28th Electronics production — Pieter G0LIY
Nov. 4th RAE.
Nov. 11th My first project — Rodney Richardson.
Nov. 18th RAE.
Nov. 25th Radio astronomy — G1XLZ
Further details from Nigel Robertshaw G0NHM, Tel. 0609 776608

Hastings ERC meet on the third Wednesday of each month for their main meetings, at the West Hill Community Centre, Croft Rd, Hastings, at 7.45pm. They also meet every Friday at Ashdown Farm Clubroom, Downey Close, Hastings at 8.30pm, for a social evening. Dates for your diary;
Oct. 16th Junk sale.
Oct. 29th Practical evening.
Nov. 20th Infra-Red imagery and reconnaissance.
Further details from Ken Homewood G4UBP, Tel. Hastings 444952 or Secretary Reg Kemp G3YYF.

Keighley ARS meet at the Cricket Club, Ingrow, near Keighley every Thursday at 8.00pm. Most club meetings are 'Natter nights' other events include;
Nov. 14th Films
Nov. 28th The ionosphere — L. M. Dougherty.
Further details from Kathy Conlon G1IGH on 0274 496222

Kettering ARS meet every Thursday at 7.30pm at The Electricity Sports and Social Club, Eksdale St, Kettering. Dates for your diary;
Oct. 22nd 1990 expedition to Ben Nevis, by John G3WGV.
Nov. 19th Dealer's view of radio.
Further details from Len G7EMM, Tel. 0536 514544

Lothians RS meet in the Orwell Lodge Hotel, Polwarth Terrace, Edinburgh at 7.30pm on the second and fourth Wednesdays of each month. Dates for you diary;
Oct. 23rd Practicalities, by Mel GM6JAG.
Nov. 13th Junk sale.
Further details about the club and also details on table space for flea market, can be obtained from Mel Evans, 56 Southhouse Road, Edinburgh EH17 8EU, Tel. 031 664 5403

Loughton and District ARS meet in room 14, Loughton Hall on alternate Fridays and start at 7.45pm. Events include;
Oct. 18th Audio visual night.
Nov. 1st Home brew beer, with samples by Mike G4KCK.
Nov. 15th The sinking of the Titanic.
Nov. 29th Inter-club Trivia quiz.

Further details from Mike Pilsbury G4KCK, Tel. 081 504 4581

Norfolk ARS meet at 'The Norfolk Dumpling', The Livestock Market, Harford, Norwich every Wednesday at 7.30pm for 8pm start. Dates to remember;
Oct. 16th Vintage radio, hear it like it was.
Oct. 23rd Informal.
Oct. 26th Club outing to Leicester show.
Oct. 30th Introduction to microwaves.
Nov. 6th Real radio evening.
Nov. 13th Satellite TV — Steve G4VCE.
Nov. 17th Surplus equipment auction, starts 10am.
Nov. 20th Raynet — Pat G0IYD.
Nov. 27th Informal and committee meeting.
For further details contact Jack Simpson G3NJQ Tel. 0603 747992

Northern Heights ARES meet on the first and third Wednesdays each month at the Bradshaw Tavern, Nr. Queensbury, Bradford, W. Yorkshire at 8.15pm. Events include;
Oct. 16th Visit to fire service.
Nov. 6th Club Project — up date.
Nov. 20th Easier ways to build circuits.
For details contact Stan Catton G0IYR on 0274 673116

Nottingham ARC meet every Thursday at the Sherwood Community Centre, Mansfield Road, Nottingham at 7.30pm. Forthcoming events include;
Oct. 10th Kit construction — Derek G3ZOM of Jandek.
Oct. 17th 70cm Foxhunt on foot.
Oct. 24th Club talk.
Oct. 31st Activity and construction evening.
Further details can be obtained from Rex G1LRI, Tel. 0602 733740

Porthmadoc and District ARS meet at the Harbour Cafe, The Ffestiniog Railway, Porthmadoc. Meeting details as follows;
Oct. 17th Talk on gold mining by Mr. J. Collins.
Nov. 21st AGM.
Further details from Ralph Taylor GW2HCJ, Tel. 0766 770637

Reading and District ARC meet at the Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading on 2nd and 4th Thursdays at 8pm. Forthcoming events include;
Oct. 10th RSGB evening.
Oct. 24th Satellite Communications, Brian G3AKF.
Nov. 28th Construction contest/alignment evening.
Further details from Vin Robinson G4JTR, Tel. 0734 476873

Salisbury RES meet at 7.30pm in Grosvenor House, Churchfields Road, Salisbury. They have Morse classes every Tuesday starting at 7.30pm with Evan G5YN, and RAE classes every Tuesday at 8pm with Frank Mitchell G8PCB, who has also recently been accepted as a Novice instructor. Club events include;
Oct. 15th Committee meeting.
Oct. 22nd How to use simple test equipment.
Further details from A. Newman G2FIX, Tel. 0722 743837 or David Kennedy G7GWF, Tel. 0722 330971

Stourbridge & District ARS meet every first and third Monday each month (except August), at the Robin Woods Community Centre, Scotts Road, Stourbridge, commencing at 8.00pm. Events include;
Oct. 21st American adventure — G3CAQ.
Nov. 4th On air and discussion evening.
Nov. 18th Anual surplus sale.
For further details contact Dennis Body G0HTJ, 53 Grove Road, Wollescote, Stourbridge, W. Midlands DY9 9AE.

Stratford upon Avon & District RS meet at the Baptist Church, Payton Street, Stratford upon Avon, at 7.30pm. Club dates include;
Oct. 14th Jandek Kits, Derek G3ZOM.
Oct. 28th Oscilloscopes for the beginner, Terry G3MXH.
Nov. 11th Amateur Radio Observation Service — G3STG.
Nov. 25th AMTOR demonstration — Peter G3WHO
Details from A. Beasley G0CXJ, Tel. 060 882 495.

Sutton and Cheam RS meet on the 3rd Thursdays each month, 7.30 for 8pm at Downs Lawn Tennis Club, Holland Ave, Cheam, Surrey. Natter nights are on the first Monday of each month in the Downs Bar. A date for your diary;
Oct. 17th Junk sale.
For further details, Tel. 081 644 9945

Three Counties RC meets every other Wednesday at the Railway Hotel, Liphook, Hampshire at 7.30 for 8.00pm. Club events include;
Oct. 23rd Development of British windmills.
Nov. 6th Best buys in amateur radio equipment — SMC Ltd.
Nov. 20th Night on the air HF & VHF.
For further details contact Dave G4VKC.

Todmorden and District ARS will meet at the Queen Hotel, Todmorden at 8pm on the following dates, all are welcome.
Oct. 21st International evening.
Nov. 4th Drink driving, talk by G1DWA.
Nov. 18th Aerials, informal discussion.
Further details from Esde G0AEC, Tel. Halifax 882038

Torbay ARS hold a club night every Friday at the ECC Social Club, Highweek, Newton Abbot, commencing at 7.30pm. They have a main meeting once a month details as follows;
Oct. 18th Solomon Islands DXpedition — talk.
Nov. 22nd Communications in British Gas — talk.
Further details from Walt G3HTX, Tel. 0803 526762 or Andy G4VPM, Tel. 0803 329055

Wakefield and District RS meet every Tuesday at 8pm on the first floor rooms, Ossett Community Centre, Prospect Road, Ossett. Club events include;
Oct. 22nd Construction project.
Nov. 5th Pie and pea supper.
Further details about the club from John G0MVA, Tel. 0924 260048

Wimbledon and District ARS meet on the second and last Fridays of each month in St. Andrews Church Hall, Herbert Road, Wimbledon, London SW19. Dates for your diary;
Oct. 11th Radio in modern aircraft, by Chris G0IPD.
Oct. 25th AGM.
Nov. 8th Desert island radio.
Nov. 29th Meet the committee evening.
Further details from Chris Frost G0KEB, Tel. 081 397 0427

Wirral ARS meet every first and third Wednesdays at Ivy Farm, Arrowe Park Road, Birkenhead, Wirral L49 5LW at 7.45 for 8pm. Informal meetings take place every Tuesday night, 7.30pm onwards, new members and visitors most welcome. Dates for your diary;
Oct. 16th Open forum/problems night.
Nov. 6th Chairmans night, guest speaker JY8SE.
Nov. 20th Packet Radio Cluster — G0CMM.
Further details from Mr. A. Seed G3FOO, 31 Withert Avenue, Bebington, Wirral L63 5NE

National and International

G-QRP Club publish a quarterly magazine devoted to low power communication, and hold regular get-togethers. Their secretary is Rev. G. Dobbs, St. Aiden's Vicarage, 498 Manchester Road, Rochdale. Lancs. OL11 3HE. Tel. 0706 31812.

International Short Wave League who as well as running an International QSL bureau for amateurs and SWLs, have a monthly newsletter and regular get-togethers at their rally stands. Details from ISWL HQ, 10 Clyde Crescent, Wharton, Winaford, Cheshire. CW7 3LA

The Irish Radio Transmitters Society send out regular newsletters giving details of local activities, the contact man for this is Dave Moore EI4BZ, 12 Castle Ave, Carrigtwohill, Co Cork. Tel. (Eire) 021 883555

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Yaesu FT-757GX with FC-757 automatic ATU and FP-757 HD power supply, £850. Also Icom 271E 2m with muTek front end, £400. Both in mint condition. Contact T. Wilcox (Pontypool), Tel. 0495 757319

Pye Vanguard, tuned and FMed for 4m, less crystals, £20, buyer collects. 2m converter to 10m IF, £10. Data wanted and working voltage for Nombrex signal generator 31. Contact G8BSK, 290 Priory Rd, Southampton SO2 1LS, Tel. 0703 552247

2m SSB Belcom Liner 2, with mods, i.e. extended freq coverage, improved front end, CW, 4 pin microphone, GWO will sell for £75 ovno, or exchange for any 2m FM TX/RX crystalled WHY, hand helds considered, anything FM for 2m. Contact Derek McCorkell GI7CNO, 27 Dalriada Walk, Ballymena, County Antrim, N. Ireland BT42 4DY

Two modified multi-mode sets, EPROM converted for 10 and 6m use, will sell for £100 each, or part exchange for Uniden 2830, WHY. Contact John May (Preston, Lancs), Tel. 0772 726378 or 30336

Trio TS-130S HF transceiver, 100W output with remote VFO 120, speaker SP-120, microphone and CW key, all in excellent condition and boxed, sale due to house purchase, £400. Contact Luke Gomer (Poole, Dorset), Tel. 0202 678014 evenings.

Rotator and control unit, £30. 6m HB9CV, £15. 2m 9 ele Tonna, £20. Pye Europa M band, £15. Howes speech processor, unfinished project! £15. Also home made loop and V-cap, unfinished, offers. Contact Andy Elford (Lymington, Hants), Tel. 0590 673476

JRC NRD-525 receiver, mint, boxed, manual, £625 ono. Also Racal RA1218 receiver, 0-30MHz, 5 IF filters, 7 digit electronic readout, CW, operators and maintenance manuals, VGC, £350 ono. Contact Mr. W. Gillott (Barnsley, W.Yorkshire), Tel. 0226 285643

Zetagi B550P HF amplifier, £170 or exchange for 2m, 70cms amplifier or 70cms hand held/mobile. Contact Phill Hills (Haywards Heath), Tel. 0444 456163 evenings after 8pm.

Icom IC-4E thumbwheel type complete with BC30 battery charger, £130. Contact Reg Lever (York), Tel. 0904 768545

OS2 3MHz bandwidth oscilloscope, recently re-valved, complete with manuals. Data Dynamics ASCII printer. Sykes Comstore 8.5in twin disk drive. Last two items recently removed from service. Ring and haggle! Contact Bernard (Burton-on-Trent), Tel. 0543 472054

Yaesu FRG-9600 VHF/UHF receiver, 60-905MHz, £250. Contact Darren Stephen (Grimsby, S. Humberside), Tel. 0472 340703 24hrs.

FRG-7700 radio, FRA ATU, FRV VHF converter, with manual. Eddystone 940 receiver, overhauled with manual, £400 ono. Contact Mr. W. Billington (London area), Tel. 081 699 4413 after 6pm

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MM transverter, 28MHz in 144MHz out, 10W, recent service, leads, instructions, good condition, £50. Contact Mr. R. Pelling G0BUJ (Barnstaple), Tel. 0271 850282

Commodore C64C computer, with cassette recorder, light gun, power supply, games, Digicom 'Expert' packet modem and Datel C118N disk drive, £265. Will split or WHY. Contact James Grant (Sheffield), Tel. 0742 664991

FRG-7700 communications receiver, 150kHz-30MHz, CW/SSB/AM/FM, as new, £225. Contact Mr. J. Beevis (Madstone), Tel. 0622 676204

Sony ICF-2001D receiver, £200. Sommerkamp (Yaesu) FT-690R 6m multimode transceiver, complete with MMB10 mounting bracket, £250. Contact Steve Mitchell (Whitchurch, Shropshire), Tel. 0948 6016

Two M band Pye Westminsters ready for conversion to 2m, £20 each. two Pye PF5012, UHF, nicads, helicals, £10 each. Sharp SSB/FM IOM, £30. Pye Westminster low band FM, £20. Write to; Steve Davies, 73 Royden Rd, Upton, Wirral, Merseyside L49 4LU

Fluke digitalmultimeter 2022, £60. HV probe, £12. Small AVO, £20. Contact S. Petell on 081 554 2913, 6-8pm.

BBC B issue 7, plus 40/80 drive and games, £165. Yaesu FT-690 MkII, plus lin and nicads, £365. Yaesu FT-707S, FM fitted plus 150W linear, £350. Yaesu FT-207 hand held, plus speaker mic and case, £85. Realistic PRO30 scanner, £70. I require items to complete FT-77 line up, ATU, transverter, WHY. Contact Dennis Powell (Weybridge), Tel. 0932 872825 (neighbours' phone)

Eddystone EA12 receiver, VGC, prestige S/N 00002, manual and complete set of spare valves, offers around £260. Contact R. James (York), Tel. 0904 799043

Datong D70 Morse tutor, a must for success, £50. Contact Philip Elwood (Lincoln), Tel. 0522 751323

Trio R600 receiver, 150kHz-30MHz, AM, USB, LSW/CW, excellent condition, boxed with manual, £215 ono. Contact Mr. D. Leyland (Blackpool area), Tel. 0253 727279

WW2 USA plugs, PL152, PL148, PL192. AM ZA1837 10H 2107 RXR216 for spares. Free if collected. Contact John Tye, G4BYV (Norfolk), Tel. 0362 638142

National Panasonic RF8000 world band receiver, well made, was sold at £2000, bargin at £600. This receiver is similar to RF9000 Amilog. Please write to Mr. R. Hussian, 73 Wenthworth Rd, Southall, Middx.

Taylor mutimeter 105A 20,000 ohms per volt, mint cond, handbook, leather case, bargain at £65. Two 807s, £30 each. Japanese semi- automatic (bug) key, brand new and unused, £35. AM type 'D' brass straight Morse key, £25. Contact K. Bold G3DYA (Sedgley, W. Midlands), Tel. 0902 678596

Tait 196 UHF 6 channel FM transceiver, one channel crystalled on RB2, 25W output, comes with mic etc. £60 ono. Pye PF9 UHF FM hand helds on RB2, come with nicads, some spares, £25 ono pair. All items buyer inspects and collects. Contact B. Thompson (Corby), Tel. 0536 60598

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Yaesu FT-747GX, Econo tuner model ET1, still in boxes, £400. Contact Mr. W. Cross, 8 Boscombe Ave, Grays, Essex RM17 6AF

AR-1000 scanner, as new, boxed, £175. 2m hand held TX/RX, search, scan, store etc. 4W/2W, digital display, £79. Contact M. Worvill (Broadstairs, Staffs), Tel. 0843 294446

Trio 2200GX 2m TX/RX, £70. Yaesu FT-202R, £60. Pye PF2UB IIC, £40. All in excellent condition with charger and new nicads. Contact Mick York (Corby), Tel. 0536 60189 after 6pm.

AEA PK232, all software and manual included, fax program all cables, excellent condition, software issue 1987, £160 ono. Microwave Modules 70cm to 10m transverter, good condition, £45 ono. Contact Peter Roe (Sutton-in-Ashfield), Tel. 0623 513573

ICS Fax1 weather system, power unit, printer, paper etc. very good condition, £270. Trio TH-205E 2m hand held transceiver, with charger etc. little used, £150. Kenwood R-1000, as new, little used, £260. Contact Richard (Clwyd), Tel. 0244 816435

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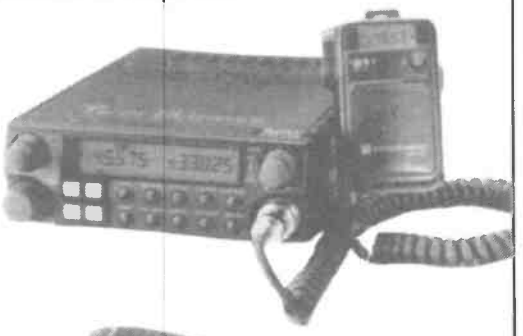

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And to custom design your FT-736R station, choose from these popular optional accessories: Iambic keyer module. FTS-8 CTCSS encode/decode unit. FVS-1 voice synthesizer. FMP-1 AQS digital message display unit. 1.2-GHz ATV module. MD-1B8 desk microphone. E-736 DC cable. And CAT (Computer Aided Transceiver) system software.

Discover the FT-736R at your Yaesu dealer today. But first make plenty of room for exotic QSL cards. Because you *never* know who's listening.

YAESU

*CW narrow optional

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Prices and specifications subject to change without notice. FT-736R shown with 220-MHz option installed.