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JULY 1988 £1.30

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Features

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- ★ CW with Sidetone
- ★ FM bandwidth compatible with VHF/UHF
- ★ 10Watts continuously variable o/p AM and FM
- ★ Scanning feature, up and down steps on mic.
- ★ Selectable frequency steps, 10kHz, 1kHz, 100Hz.
- ★ Ten metre band selectable in 500kHz steps
- ★ Build-in VSWR meter and protection circuit
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Just TEN of the many reasons for choosing the UNIDEN 2830



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10 metre band amateur transceiver

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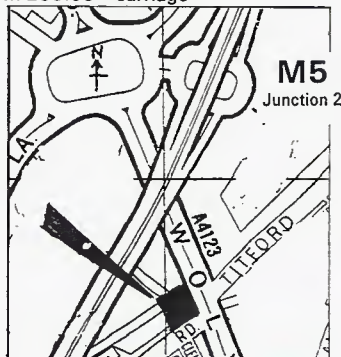


UBC 175XL



UBC 100XL

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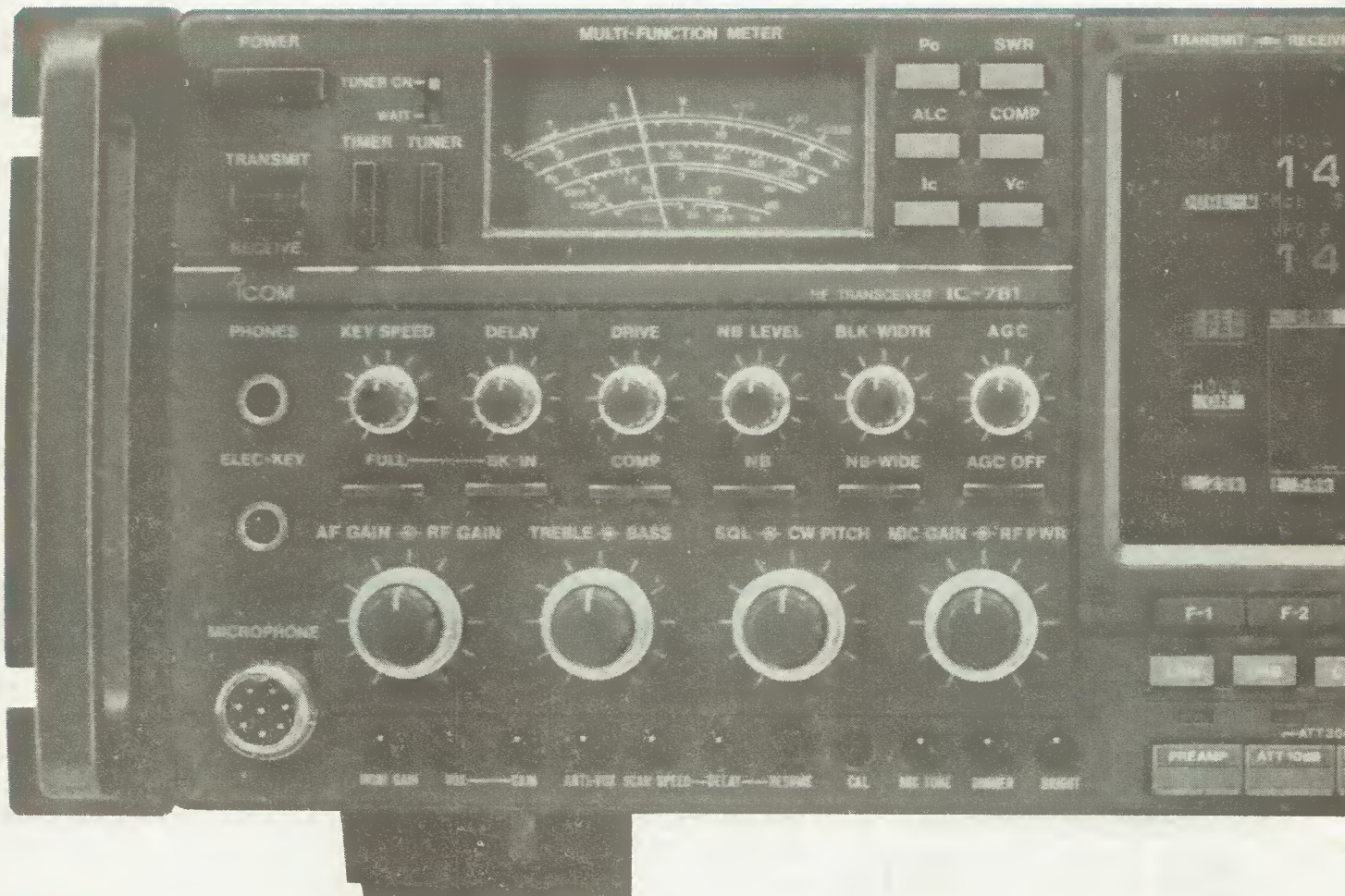
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Features:

- AC power supply
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- Multi function CRT display
- Twin passband tuning
- Dual-watch
- 99 memories

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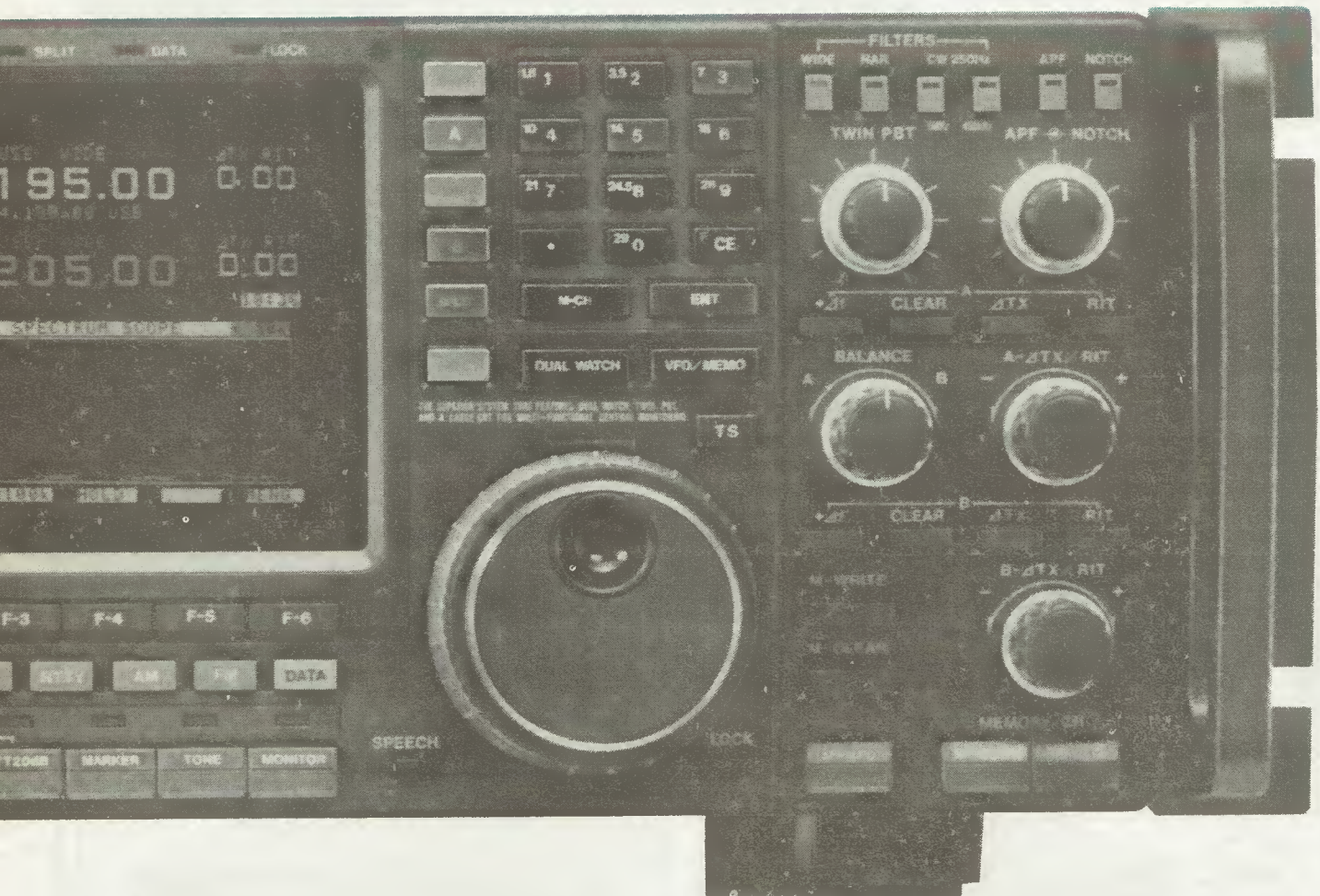
The PAN display continuously indicates all signal activities and pile-ups with your operating frequency in the centre. Selectable frequency spans of 50kHz, 100kHz and 200kHz. Vertical range indicates relative signal strength. Twin passband tuning with separate controls for second and third IF stages increases selectivity and narrows bandwidth, independently varies low and high frequency response or functions as a IF shift.

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HF TRANSCEIVER IC-781



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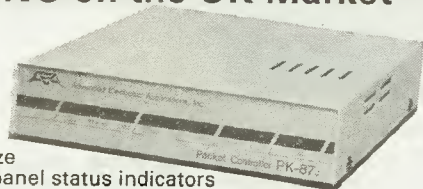
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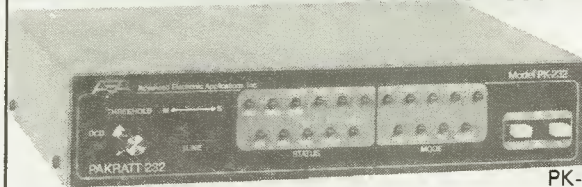
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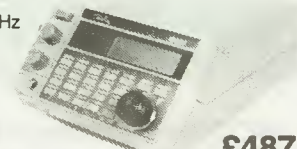
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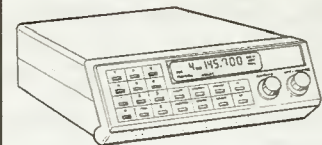
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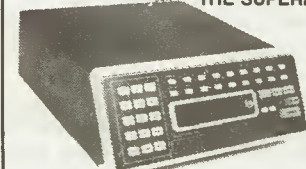
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LETTERS

Are OT's going OTT on Two?

Dear HRT, During the last two years, I have listened to many 'old timers' G2's and G3's bemoan the number of new call signs coming onto the HF bands without having served their apprenticeship - ie. been an SWL for umpteen years. Instead of trying to assist and educate newcomers, many are content to just criticise and ridicule the operating procedures of obviously nervous G0's still feeling their way around the bands.

While I would agree with many of the old hands regarding listening before venturing onto the air, I have discovered on many occasions during the last two years that the shoe is often on the other foot. With the HF bands being in generally poor condition, quite a number of these 'old timers' have ventured onto two metres - some for the first time in their operating lives. They get hold of a black bow, power it up, and off they go - usually on S20.

They regale all and sundry with tales of how they have never been on the 'B class band' before, and launch into 20 minute overs - waffling on and on - still on S20. When someone eventually gets in between them to advise on the etiquette of QSYing off the calling frequency, the stock answer is usually: "Very sorry old

man. Its the first time I've used two metres." They are patently guilty of the very mistake they blame newcomers on HF of making - not listening before operating.

While on the subject of occupying 145.500MHz other than putting out a call, in some quieter areas of the UK, some people insist on staying on S20 saying: "No need to QSY old man. I've been calling for ages and there's no-one about." On the contrary, there are many people about, some waiting for a specific call on the calling frequency, one which won't be heard if two stations carry on with a QSO regardless. While I appreciate many hand-held rigs have limited frequencies, to sit and chat on the calling frequency is nothing short of bad manners. Anyone interested enough in what is about to be discussed will follow to a different frequency. There is nothing more irritating than listening to non-stop chatter on S20, especially if you are expecting someone to call you.

I accept that band plans are operable only by the grace and favour of the people who use the bands, but courtesy costs nothing. So, to the 'old timers', I say practise on two metres what you preach on HF; and to the stations who insist on monopolising S20 I say please QSY - it only takes a second.

Bob Low GM0ECU

NOT the Letter of the Month!

Dear HRT, I wonder if any of your readers have lost their memories? I kept losing mine quite regularly - once or twice a week - and it was a real bind having to re-learn everything from the start again; especially as non-sequential numbers were involved.

Now, before you horrid spotty urchins move on to the next letter whining. "Silly old senile twit!", I'm talking about my ten memory telephone. It's one of the most common PBT 200 series and it took me about eight weeks to solve the mystery of the intermittent memory.

Then one day, after a delightful dose of DX on 20m, I discovered my memory'd gone again - and it had been all right just before the DX

session. The penny dropped, and a few experiments soon showed that given even a small sniff of RF on anything above about 10MHz that phone went gaga.

Beating up the supplier made me feel better, but the phone still kept losing its memory, so I turned to theory. The line cord attaches to the PCB by a plug. The reverse side of the socket is easily accessible and there's bags of room. I took three .0047mfd ceramic capacitors, 100V working (RS 125-761) and soldered one each between pins 1 & 2, 2 & 3 and 3 & 4. The result? Perfect, solid memories regardless of kW's!

I'd advise all HRT readers to follow my excellent example against the manufacturers of any gear unprotected against RF.

Now give us the ten quid - quick!
John Mayall G3VPH.

Well you blew your chances of the £10 didn't you? In fact as your letter is NOT the letter of the month we reckon that you owe us ten quid! Joking aside, we had heard of this problem before - unfortunately BT may not take too kindly to people curing RFI themselves by bodging the socket . . . do so at your peril. - G4IRQ.

Youngsters priced out of hobby

Dear HRT, After reading through this months fine offerings of articles, adverts and letters, I feel it is time to put finger on key. As most people will know looking through the adverts, amateur radio has become a hobby for your bank manager, and I feel the cost of equipment and the fear of the bank manager who likes to say "No" is one of the main reasons deterring the younger people from joining this fascinating hobby.

I believe it is now time for fine publications like yourself to stand back and take a look at what the newly licenced operator requires. I will now pose a few points to help you. Does our hard working young amateur want to see the bank manager so he can buy an all-singing all-dancing radio costing more than a subscription of his favourite magazine? I feel not. Does he want to save up for over 12 months only to find the exchange rate has changed so he has to save up even longer? I feel not.

What a newly licenced amateur wants is to use his licence, talk to people, make new friends and feel all the hard work has been worth it. To do this he needs a transceiver. What he needs is a transceiver which is designed for 10 metres, then he can transvert to the VHF, UHF bands; then after long nights studying for the morse test, he can build HF transverters to cover the whole HF spectrum.

This transceiver should have USB, LSB and CW as standard and the option of AM or FM so that the operator can build to suit himself, also a digital frequency scale would be useful.

I feel an output in the region of 15-20W pep would be nice so that the transceiver can operate as a stand alone 10m unit, separate switchable attenuated outputs for the transverters thus preventing the constant

connecting and disconnecting of leads is a must. Finally a top price of two hundred pounds would make this project attractive to almost everyone.
Philip Tucker

Novice licence

Dear HRT, I enclose part of the text of a letter that I have sent to the RSGB regarding their Novice licence proposal.

As you know I have been proposing a novice licence for the U.K. for some 15 years. Unfortunately from what I understand of the the RSGB novice licence proposal, I am afraid I have great doubts about it.

My information is that the proposal is for a no age limit licence aimed at 11 to 14 years old. There will be a bank of about 1000 published exam questions (as per novice exam USA). The exam will be set by the RSGB. (I agree with all that). The licence would be in two parts.

Part one: regulations and theory exam.

Part two: morse exam at 5 w.p.m.

A pass in only part one would give access to bands above 30MHz. A pass in both parts would give access to all bands on the schedule.

The Schedule (frequency allocation yet to be decided).

1.8	CW SSB DSB AM	5 watts
3.5	CW	5 watts
10	CW	5 watts
21	CW	5 watts
28	ALL MODES	5 watts
50	DATA FM SSB	1 watt
432	FM DATA	5 watts
1.3	ALL 5 watts	2 watts
10	TV FM DATA	2 watts

With 432MHz 1.8MHz and 3.5MHz being shared bands I would have thought that the authorities would not have initially permitted 'novices' on these bands, knowing how cautious they are. My proposal for 28MHz only did take into account that it is an exclusive Amateur band.

I am very alarmed about the proposed use of phone. I believe that in these present times the best thrust would have been the 'self achievement' and the real learning about basic electronics which home brew provides. I know there is room for this in the RSGB proposal but it is a question of emphasis. I do not want the novice licence just to create a market which the Japanese rush to respond to, if the novice is to use commercial equipment this could well be the case.

I think that today to give young people speech, with all the problems that CB has, could well be a disaster. If the whole novice licence becomes unmanageable through young people abusing the amateur service then the

'old guard' will have a field day in recrimination.

Getting back to the novice licence I pose the following questions:

1. Will the equipment for the novice licence be inexpensive under £30? If not it will limited those who can afford to get on. Sadly, there are some five million people now living below the poverty line in this country on Supplementary Benefit.
2. Is it CW only? Young people, with no sense of history of amateur radio, when talking among themselves could well have conversations which are irresponsible and therefore detrimental to the hobby. The use of CW only eliminates the problems of speech. It is much more a discipline. CW could also be put to young people as the original and the most basic form of communication. First invented by Samuel Morse over 100 years ago and since used by spies etc. The whole concept of the novice licence needs marketing and selling properly. Does the RSGB have a youth liason officer?

3. Will it be easy for a novice to get equipment to get on the air from home?

If the equipment to be used by the novice is not home-brew then any commercial 'black box' equipment produced is bound to be expensive by comparison to it having been built by the user.

4. If we encourage young people to go to radio clubs is there anything specific for them to do once there and will the older members make them welcome?

The idea of a novice, attending a club to be helped to build their project is a good one. It gives the visit to a club a sense of purpose. I would hope that the RSGB would market a standard kit transceiver as part of the 'novice licence package'. The package would also include morse tapes, and other learning material, all that would be required to pass the exam and get on the air, right down to the morse key.

It is also of course important to state that although the novice licence is being aimed, by RSGB, at young people, anyone of any age will be able

to take the novice exam. That said, looking at the figures given for younger associate (SWL) members of RSGB they do not make good reading. 179 under 18 means less than 0.05 per cent (about the same number that attend the AGM). 451 between 18 and 25, $179+451 = 630$ (less than two per cent of the membership). In other words 98% of the RSGB associate members (ie. not yet licensed) are over 25. The question that could be asked is why has this trend not been checked sooner. I wonder over the last 20 years how the percentage of young members figure has changed.

Ian Abel G3ZHI

Student or Novice?

Dear HRT, If the Secretary's letter in April's *RadCom* is anything to go by, amateur radio will soon have 'Student Licences' issued. From this letter it would seem that the RSGB is aiming at the 11-16 year old age group. Why? What's wrong with the rest of the UK citizens? Is it youth only that will be interested or is it because the RSGB Council fear that the adult population will, if they join the RSGB, demand a more democratic society.

Whilst I wholeheartedly support a 'Novice Licence' that is available to all prior to the RAE, the suggestion of this 'Student Licence' is not one that I would support. Most major nations in the IARU have a 'Novice Licence' and I feel that our RSGB Council is only being pedantic over the title and are using a different title in order to appear to be giving something new that no-one else has. Whilst in reality it is over 30 years since the idea was first promulgated in the UK and that is pressure from outside the UK as well as some from within that has forced their hand.

J D Bolton G4XPP

I think it is self-evident why the RSGB is looking for younger recruits, no new blood translates into a dwindling population of hams in years to come. As for whether the licence is eventually called 'novice' or 'student' matters not a jot as far as I can see, what we all need is a larger user base for the hobby. Again the fact that the issue may or may not have been discussed years ago is not relevant - let's get on with providing the facility now!

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Radio Propagation and The Sun Part 1

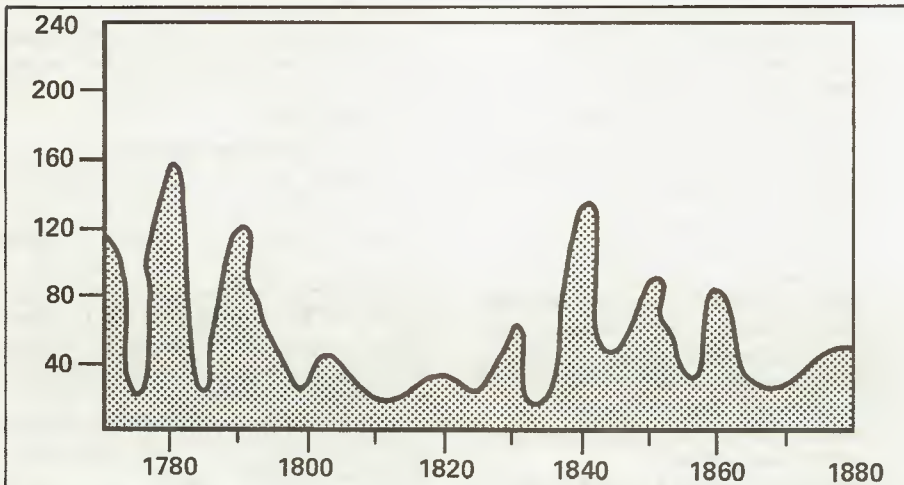


Fig. 1 Recorded sunspot count — 1780 to 1880. The eleven year cycle can be clearly seen, also note the rise and fall times plus the maxima and minima.

Although there are many amateurs who delight in the construction and testing of electronic equipment, I think it's fairly safe to say that at the

end of the day, talking to people is where we're all at. Propagation enables us to do this; and no, this isn't just another boring article on propagation. At least I hope it isn't!

Sporadic E, aurora, HF fade-outs. If you've ever asked yourself why we get them you'll find the answer in the first part of this series. Kevin Fox, G4MDQ, explains the solar mechanisms behind the phenomena

Having studied the theory and practice of propagation over the years, I thought, 'Yeah, well I understand that;' but what about the prime mover, the sun? We always seem to look at propagation from the perspective of the earth. I thought it might be interesting to switch this around, and view propagation from the position of the Sun. So, I began to study the Sun. Not the cheap toilet paper, the ball of gas in the sky, and a fascinating business it turned out to be.

As an amateur, you'll have heard of sunspots, and the eleven year sunspot cycle (see Fig. 1). But,

exactly what is a sunspot, what creates and maintains it? And have you any idea what happens during the twenty-two year 'magnetic

cycle'? Why does energy created in the sun's core take a million years to reach the surface?

What's the link between HF

Warning

The sun emits radiation at all frequencies, including sound and X-Ray. Quite a lot of this is, at minimum injurious and at worst lethal! Never, ever, look directly at the sun without some form of protection. If you want to observe sunspots by the naked eye; and it's well worthwhile doing so, then use either at least three layers of completely exposed and processed black and white negative film. Or very dark welder's goggles.

Under no circumstance must you look directly at the sun through any optical aids. Putting a pair of Polaroid sunglasses over your binoculars may darken the sun's image but it will not stop infra red radiation from the sun destroying your retinas! The same applies to those stupid so called 'Sun Filters' supplied with cheap telescopes. Forget them, they're lethal.

The only safe way to observe the sun with optical aid is by projection. Where the image of the sun is focussed onto a piece of white card held behind the eyepiece.

fadeouts, aurora and sporadic E? Why is it possible for an aurora to repeat itself twenty-seven days later? Each week on GB2RS we are bombarded with geomagnetic data, smoothed sunspot numbers, solar flux measurements etc. Do you understand them, more vitally, can you apply them to making your own predictions of propagation? These are questions which fascinated me, if they interest you, then do read on.

What is the sun?

Before we move on to an explanation of a sunspot, we must first understand a little about the sun and its construction. The sun is the closest star to earth, at an average distance of 150,000,000 km. It's also quite large; you could put one hundred and ten earths side by side along the equator of the sun, and fill its volume with another million!

Each and every single day, the sun generates as much power as 100,000,000,000,000,000,000 (that's 100 million, million, million) single bar electric fires. Just think of the quarterly bill! It also has to perform a delicate balancing act. Pressure from radiation within the sun causes it to swell out. Gravity acting on the surface squeezes it all back in.

If the balance swayed too much in either direction, well... we wouldn't know anything about it for eight and a half minutes, (the time taken for light to travel from the sun to earth) and then we'd be beyond caring. Luckily, our sun is very well behaved, it's been shining steadily for 4.6 billion years, and is expected to continue for the next 4.4 billion. Even if it is consuming five million tons of fuel every second!

The sun oscillates, with typical periods of between five minutes and several hours. The five minute oscillations seem to be tidal surface effects only, whilst the fifty minute oscillation is a global affair.

The amplitude of the oscillations is a few kilometres. There is evidence that the sun undergoes much larger oscillations over decades or centuries, and these might be linked to variations in the sunspot cycle.

The Core

The core (Fig. 2) is the engine room. The sun is a huge ball of Hydrogen and Helium, in the ratio of 3:1 plus 1 per cent of heavier elements. Helium was actually first discovered by astronomers in spectra of the sun before it was found on earth. The sun produces its energy by converting Hydrogen into Helium within the core, via proton-proton nuclear fusion chain reactions. This liberates enormous quantities of radiation, mostly light and heat.

Proton-proton reactions require a temperature of at least ten million degrees to begin, so not surprisingly, the temperature within the core is some fifteen million degrees; and that's warm! Surprisingly, the sun contains sixty per cent of its total mass within two per cent of its volume, the 125,000 mile diameter core.

The Radiative Zone

Surrounding the core is an envelope of unused 'fuel', 250,000 miles wide, called the 'Radiative Zone' (see Fig. 2). Pressure and density are so great here that normal convection currents, to transfer heat away from the core, are impossible. Matter is compressed too tightly to allow any movement of the gas particles.

Heat is transported from the

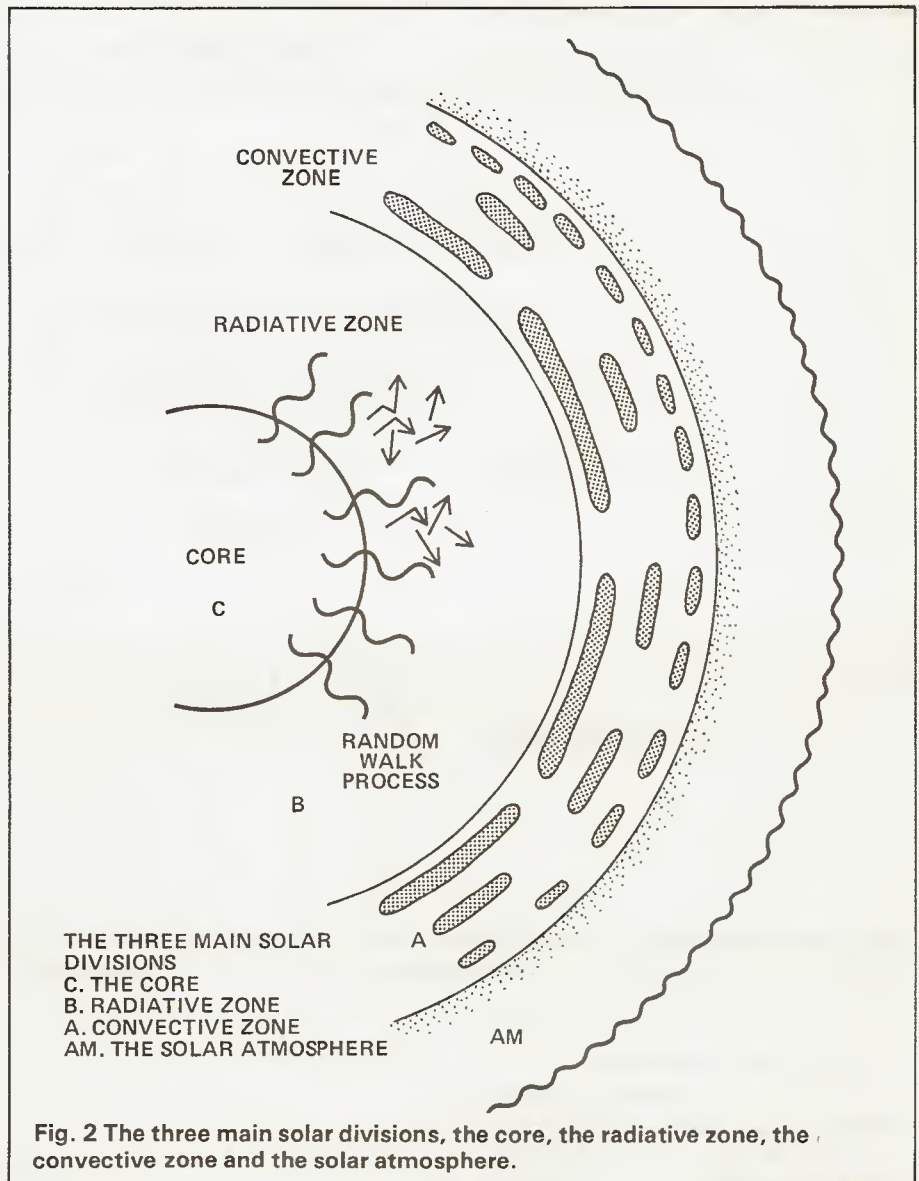


Fig. 2 The three main solar divisions, the core, the radiative zone, the convective zone and the solar atmosphere.

core by radiation. What's known as the 'Random Walk' process, which is a repeated radiation and absorption of the energy, moving outwards. Energy takes over a million years to journey through the 'Radiative Zone'.

The Convective Zone

Sixty thousand miles below the surface of the sun lies the 'Convective Zone' (see Fig. 2) pressure, temperature and density are reduced enough to allow movement of the gas particles relative to each other, and so heat is transported away by convection currents.

Huge granules of viscous matter absorb heat energy from the 'Radiative Zone' and begin their journey to the surface. The granules (Fig. 3) gradually get smaller and cooler as they near the Photo-

sphere. On arriving at the surface the granules cool, (cool matter is more dense than warm matter) and sink back down to the bottom of the 'Convective Zone', ready to re-start the cycle again.

On the Photosphere each granule is about five hundred miles long, and lasts for approximately eight minutes before breaking down and sinking.

The Photosphere

The Photosphere is the surface of the sun, it's the part we see as a disc, and on which sunspots will develop. It represents the boundary between the opaque 'Convective Zone', and the transparent solar atmosphere. The heat and light we receive from the sun is radiated into space from the Photosphere.

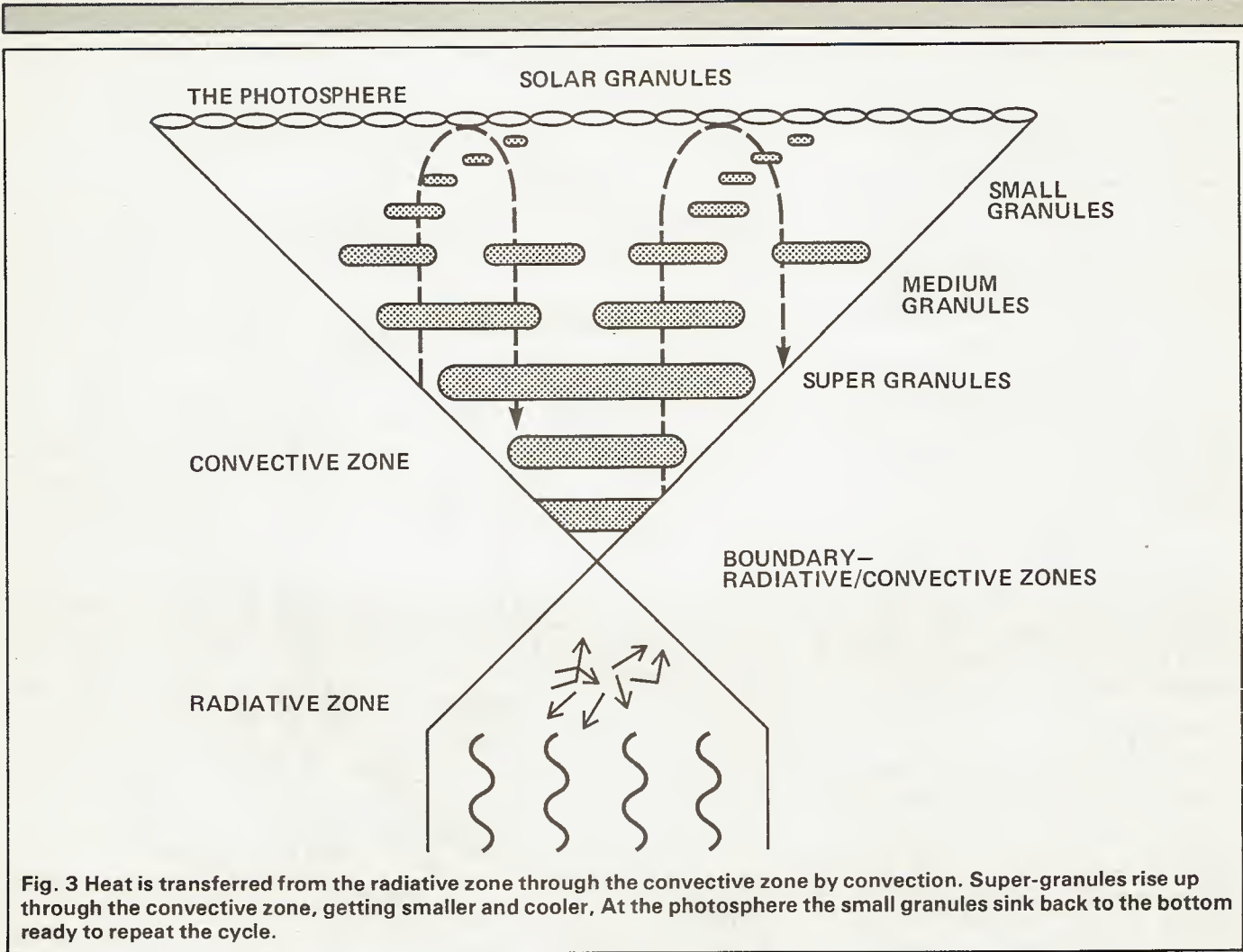


Fig. 3 Heat is transferred from the radiative zone through the convective zone by convection. Super-granules rise up through the convective zone, getting smaller and cooler. At the photosphere the small granules sink back to the bottom ready to repeat the cycle.

Solar Atmosphere

Above the Photosphere lies the Chromosphere, and the outermost and most tenuous part of the sun, the solar Corona. The temperature, which has fallen to 6000°C on the Photosphere, now starts a rapid rise, reaching 5,000,000°C+ in the Corona.

The shape and size of the solar Corona varies according to the state of the current cycle, (see Fig. 6) i.e. maximum or minimum. During sunspot maxima the Corona is tightly contained around the disc of the sun. At minima, it streams away from the equatorial regions. This somehow seems cockeyed to me, working on the assumption that low solar activity would compress the Corona, whilst high activity would blast it out!

This has been a great simplification of a very complex subject. However, it does explain the main processes at work on, and within the sun, and has given you some reference points to follow whilst we discuss the life of a sunspot.

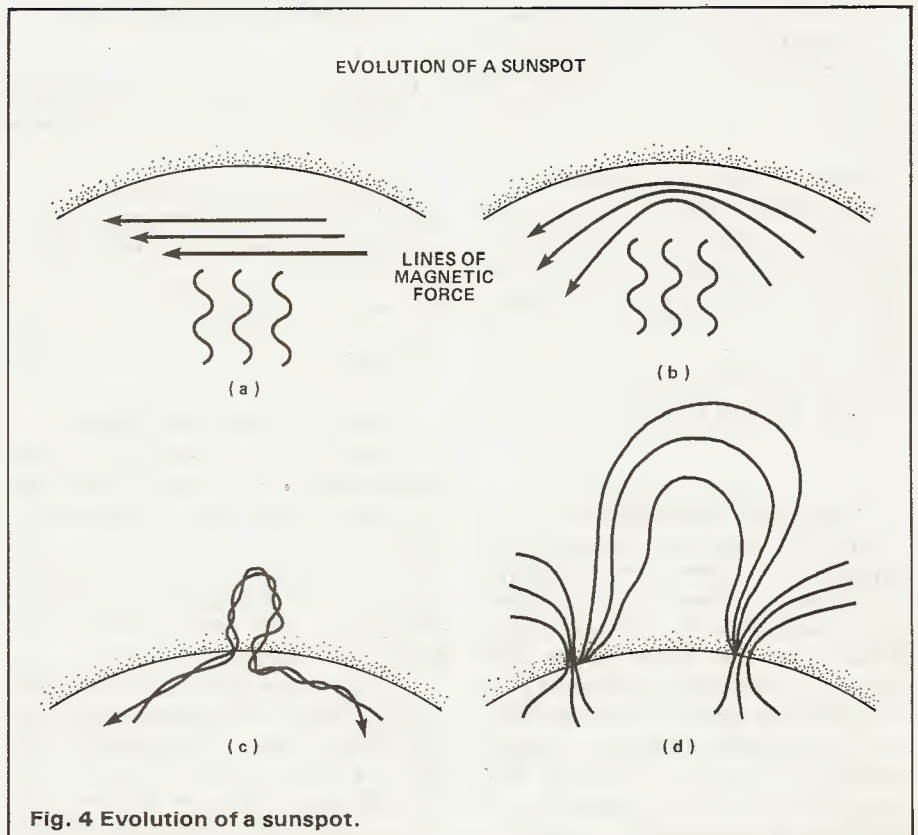


Fig. 4 Evolution of a sunspot.

A brief history of sunspots

During the middle ages it was considered heresy to dare to suggest that anything so perfect as the sun could be blemished with spots! Although many people observed sunspots, they were explained by the clergy as clouds in the upper atmosphere, between the sun and the earth.

In the seventeenth century, detailed records of the observed number of sunspots were recorded regularly. A Danish astronomer named Horrebow, plotted these observations and first proposed the theory of the eleven year cycle.

To bring us up to date, you can see from Fig. 1 the regular eleven year peaks, and that maxima and minima vary from cycle to cycle. Many astronomers believe that the basic eleven year cycle is overlaid with other, longer cycles, affecting max/minimums such as Solar Oscillations etc.

The eleven year sunspot cycle is divided as follows. From minimum to maximum takes 4.5 years; and from maximum back to minimum takes 6.5 years. So, as radio amateurs, we have the shortest time to wait for sunspot max, and then a slow decline to minimum!

The Revolving Universe

We know that the earth revolves on its axis — because it gets dark at night! In fact everything in the universe is revolving around itself and everything else!

The sun also rotates on its axis, although unlike the earth which manages it quite nicely in twenty four hours, the sun takes considerably longer, ('cos it's bigger) doing it in an average of twenty-six days. This is an important point to remember, because it has a bearing on aurorae, and sporadic E, more of which in the next of this series.

The reason for the 'average' is because the sun is a ball of gas, and some parts spin faster than others. Imagine two footballs, one made of leather and the other of jelly. Spin the leather football, as it spins it will retain its shape whilst spinning.

Spinning the football made from jelly will cause the central region of the jelly-football to bulge outwards, and spin faster. At the equator the sun's rotation takes twenty-five

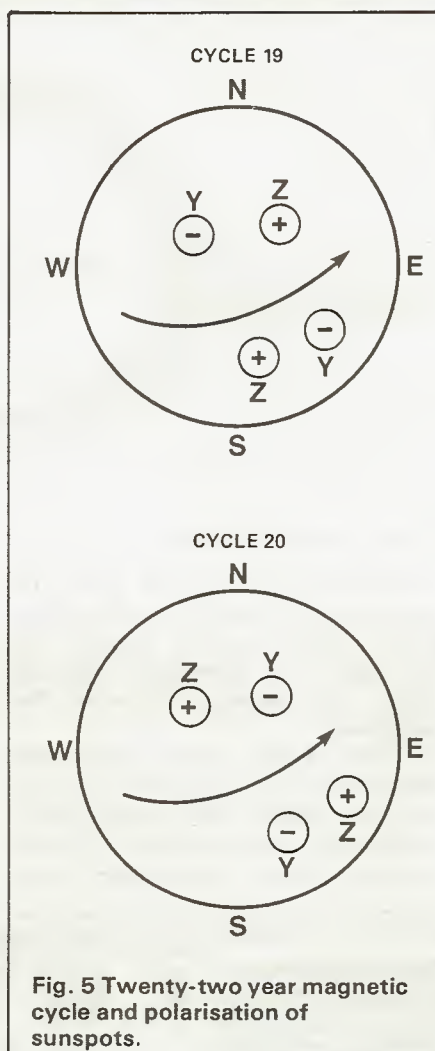


Fig. 5 Twenty-two year magnetic cycle and polarisation of sunspots.

days. At latitudes $\pm 45^\circ$ nearly twenty-eight days, and at latitudes $\pm 75^\circ$ about thirty-three days!

Lines of Magnetic Force

Differential rotation of the sun induces strong magnetic field lines under the surface of the Photosphere, see Fig. 4a. Granules from the 'Convective Zone' continually slam into these field lines, forcing them together, kinking and knotting them as shown in Fig. 4b. On the surface of the Photosphere, Faculae (bright clouds of Hydrogen gas) appear over the place where the spot will shortly form, like cosmic vultures!

Clumping the field lines together builds up tremendously strong magnetic fields which when sufficiently powerful, burst through the surface of the Photosphere, forming a pore, as shown in Fig. 4c and from this pore a pair of sunspots will form as in Fig. 4d.

Sunspots appear dark against the surface of the sun because they

are 1000°C cool than the Photosphere. Yet if they could be seen without the bright background, they would shine far brighter than any arc lamp!

The granules rising from the 'Convective Zone' to the Photosphere, bringing the heat, are blocked by strong vertical magnetic field lines beneath the sunspot group, and are reflected away. This allows local cooling of the surface to take place.

A sunspot consists of two parts: the Umbra, the innermost, darkest part. And the Penumbra, the outermost, lightest part. The spot forms a shallow dish-like depression on the surface of the Photosphere.

Hot gas flows from the outer edge of the Penumbra, following the magnetic field lines up into the Chromosphere, and then falls back into the centre of the Umbra. Spots will remain only as long as this process can be maintained. When the magnetic field lines decay or collapse, the sunspot will fade away.

Life Expectancy

Sunspots are carried around by the sun's rotation — west to east, towards the western limb. (The leading edge of the sun's disc as it moves westward across the sky). A group will take two weeks to move across the disc, assuming it will last that long.

The most Westerly spot in a bipolar group is called the Leader, it will form before the easterly, follower spot(s), and will persist after it/they have disappeared. Not all sunspots form as groups, some form as single, unipolar spots. The elapsed time from the first dot-like appearance of the Leader, to full maturity of the group is typically ten days. Two or three solar rotations could pass before all trace of the group is wiped from the sun's disc. However, not all groups will develop fully, some die out in a matter of days.

As stated earlier, sunspots can only remain while the cyclic emission and absorption of solar particles from the penumbra to the umbra, along the magnetic field lines persists. This appears on average to be approximately fifteen days, although groups have been recorded over many solar rotations.

THE SOLAR CORONA

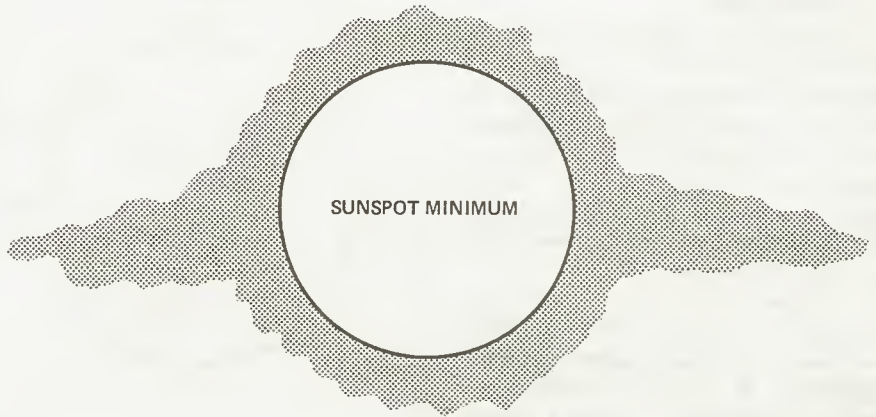
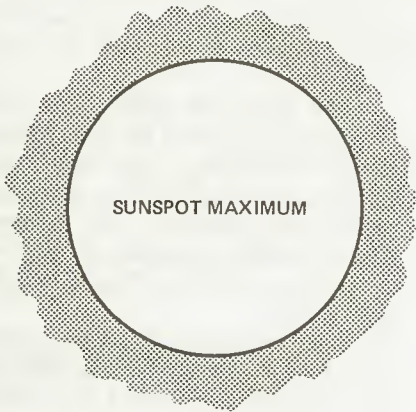


Fig. 6 The solar corona.

And Finally

Sunspots are polarised, and the polarisation pattern of sunspot groups in the southern hemisphere is opposite to the northern groups. If you look at Fig. 5, spots Y & Z are negative and positive respectively.

During the whole of cycle nineteen the negative spots will always lead the positives, in the northern

hemisphere of the sun. And vice versa for the southern hemisphere. When cycle twenty starts, the positions are reversed. Positive spots will always precede the negatives.

This is the twenty-two year 'Magnetic Cycle'. No one is sure yet how this effects radio propagation, but it could explain why some cycles produce better maximums than

others.

During the start of a sunspot cycle, the spots will form in high latitudes, north and south, and gradually migrate down to equatorial regions as the cycle progresses. Next time we'll be looking at flares, prominences and the solar wind. And how they effect the F1, F2, E and D layers. Aurora and sporadic E.

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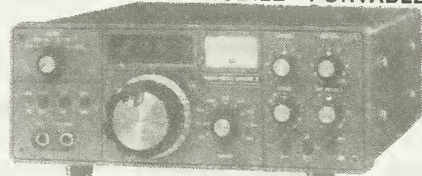


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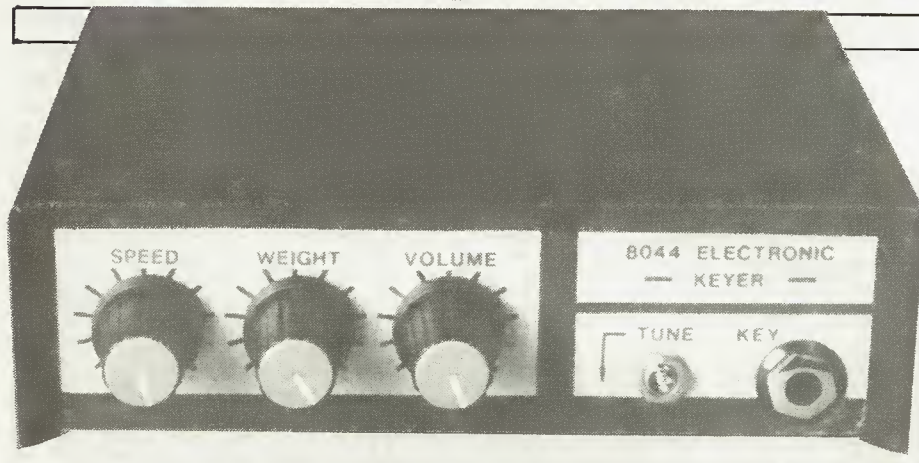
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Electronic Keyer

Project Part 2



Terry Grice, G4PSL, puts the finishing touches to the one chip (and half a dozen transistors!) electronic keyer project

A durable front and rear panel label may be produced by photocopying the front and rear panel legends given in Fig. 11 (see Part 1) onto a sheet of A4 coloured card. This in turn is covered with two pieces of clear protective film cut slightly larger than the overall dimensions of each label. A layer of thin double-sided adhesive tape is then attached to the back of the card (again the area covered should overlap the perimeter of each label by a few millimetres) then place the card on a flat cutting surface and use a metal ruler and a sharp cutting knife to carefully trim the labels to size. If a source of double-sided adhesive tape is not available a proprietary contact adhesive may be used at a later stage.

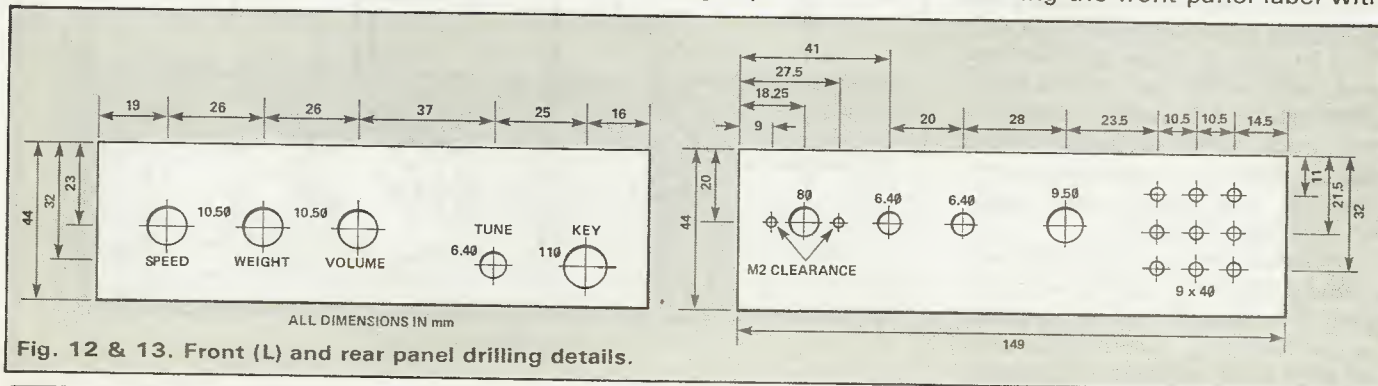
Case Drilling, Assembly and Wiring

Refer to Figs. 12, 13, 14, 15 and 16. The bottom half of the two-part housing constitutes the base, front and rear panels. Commence assembly by drilling and deburring all chassis holes. On completion the previously manufactured front panel label is attached. This is best done by securing the chassis in a vice or some other arrangement so that the unit cannot move about. Remove the label backing (or apply a thin layer of contact adhesive to the front panel) and align the lefthand vertical edge of the label with the lefthand vertical edge of the front panel. Affix the label by working across the front panel from left to right applying finger pressure and

when firmly attached, use a sharp cutting knife to cut out the five component location holes. The rear panel label is aligned and attached near panel holes, b, d, e, and f.

Identify the speaker grille formed by the nine 4mm holes on the rear panel. Apply a few spots of contact adhesive to the inside of the panel between and around the holes. Attach a 43mm square piece of speaker grille cloth, place under slight pressure and allow to set. Carefully apply a thin film of adhesive around the loudspeaker rim but avoid contact with the speaker cone. Situate the loudspeaker on top of the grille cloth so that the speaker solder tags are uppermost and apply light pressure until set. All other chassis mounted components may now be fitted.

SW3 is a 1-pole, 12-way rotary switch incorporating an adjustable limit stop and this must be set to reduce the number of 'ways' to two. Crop off all solder tags with the exception of tags A and two which are used. This allows the pcb to fit comfortably when installed. Reduce the spindle length to 7mm and install with the shakeproof washer in contact with the inside of the chassis. Reduce the spindle length of RV1, RV2 and RV3 to 9mm and install each potentiometer using the nut and shakeproof washer provided but do not overtighten otherwise the clear protective film covering the front panel label with



wrinkle. When installing SK2 use all three fibre washers to ensure a good fit. SK1 is fitted using the two M2 countersunk head screws supplied with the socket. Include the solder tag when installing SK3, SK4 solder tag may be left out.

Attach all four control knobs and check for correct operation. Insert four 12mm M3 countersunk head screws up through the four holes in the base of the case. Place a 1/4 in. M3 plain spacer over each screw, fit the pcb into place over the screws, correct orientation is with T1 towards the case front. Secure the pcb using four M3 nuts and washers. Attach four rubber feet to the case base. Lightly glue a piece of sponge (or similar material) of approximate dimensions 15mm thick x 30mm wide x 60mm long inside the case lid above the area allocated to the battery holder. This will hold the battery pack in place when the lid is on. The single M3 fixing hole is now drilled in the chassis lid, countersink on the outside, debur and scrape away a small amount of lacquer from around the hole on the inside of the case lid. Next insert a 1/4 in. 2.5mm countersunk head screw through the hole. Place a M2.5 solder tag over the screw and secure using a M2.5 lockwasher and nut. The two black selftapping lid fixing screws supplied with the case *must* have their lengths reduced to 4mm to prevent damage to the pcb and battery pack. This completes the mechanical assembly. (M2.5 and M3 hardware may be substituted with 8BA and 6BA fixings respectively).

The unit is wired using insulated multistrand hook-up wire, 7/0.2 being a good choice. General purpose audio twin overall screened cable is used to connect SK2 to the pcb. Observe polarity when soldering the PP3 battery clip to the pcb pins. Connect a 200mm (8in.) length of hook-up wire between SK3 solder tag and the M2.5 solder tag on the case lid, solder at both ends. This ensures that a definite electrical connection exists between the upper and lower halves of the chassis.

IC2 may now be installed. Once removed from its protective packaging this CMOS device requires careful handling. Avoid finger contact with the IC pins when inserting

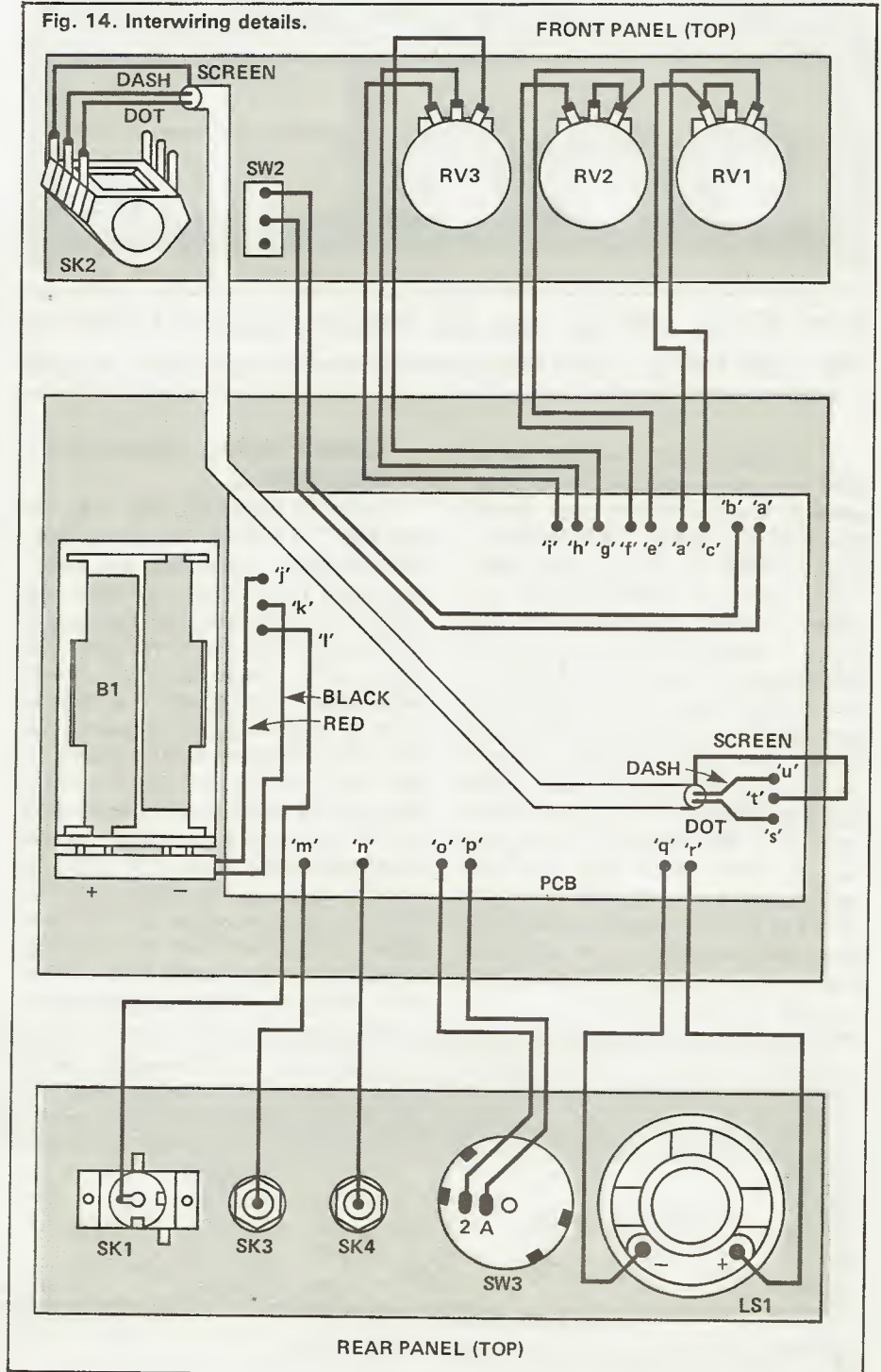
into the IC holder. Check for correct orientation. Load the 6V battery box with four 1.5V AA cells, standard zinc - carbon or alkaline long life cells can be used, the latter being more suited to constant battery operation. Be sure that the four spring contacts which form part of the battery box sit square and do not protrude. Place the battery pack into the space allocated.

Testing

Before connecting the keyer to a

radio transmitter keying line the following test are recommended. Connect a multimeter set to 10V dc fsd (or nearest higher range) across the supply rails. A convenient point for connecting the meter positive lead is the cathode lead of either D1 or D2 (just in front of Q1), OV may be found by connecting the meter negative lead to adjacent resistor R9, clipping onto the component lead learest to the pcb edge. Connect the PP3 battery connector to the battery pack, providing the

Fig. 14. Interwiring details.



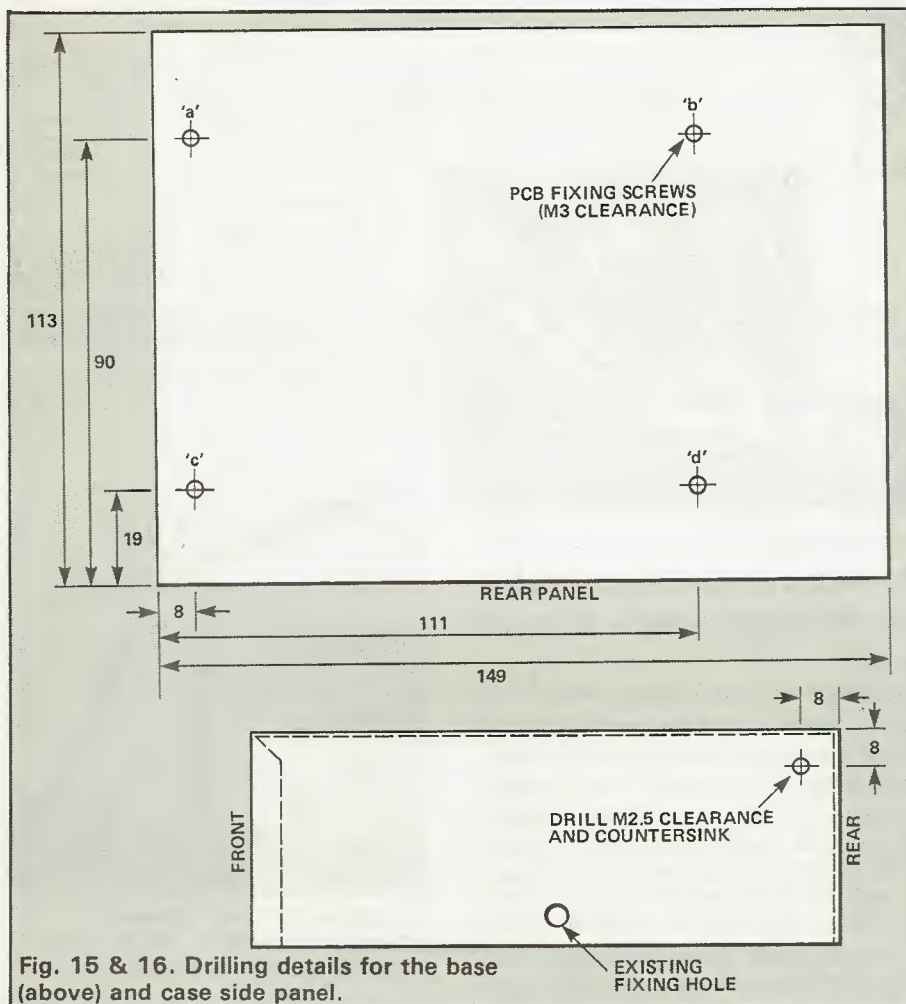


Fig. 15 & 16. Drilling details for the base (above) and case side panel.

batteries are new the meter should read 5V to 5.5V DC. Connect an external power source in the range +12V to +14V DC via SK1. The meter reading should now increase to around 8V DC. Revert to battery operation by removing PL1 from SK1 and disconnect the multimeter. Break the connection between the PP3 battery clip and the positive terminal of the battery pack. Set the multimeter to read a dc current of 50mA fsd or greater and connect the meter positive lead to the positive terminal of the battery pack and the negative lead to the open terminal of the battery connector. With SW2, SW3, SW4a and SW4b closed (or links 8 and 9 installed) and the volume control set fully clockwise a maximum current drain in the order of 30mA dc should register on the multimeter. If R13 is installed this reading will be around 24mA DC. With SK4a open (or link 9 only installed) current drain will fall by about 15mA. If SW4a is closed again and SW4b opened (or link 8 only is installed) current drain will drop by about 2.5mA. The sidetone

oscillator will produce a continuous tone whenever SW2 is closed; use a small screwdriver to adjust RV4 for the most pleasing note. Switch SW2 to the off (up) position. The sidetone should cease and battery current drain should fall to less than 50uA. With such a minute quiescent current a power on/off switch is not justified. The keyer may now be used to key a transmitter bearing in mind the maximum values of keying voltage and current specified earlier.

Using the Keyer

Even the experienced straight key operator will need to devote some time to 'off-air' practice when first learning to use the electronic keyer. As this unit is truly portable this should not pose too great a problem; it may be transported along with a paddle in a briefcase or other small bag allowing the operator to indulge in short but frequent practice sessions, say fifteen to twenty minutes twice per day. When practicing remember to switch SW3 (KEY IN - OUT) to the

'out' position in order to prolong battery life, for the same reason do not set the volume to a higher level than absolutely necessary. The speed control offers a speed range of approximately 8 to 50 wpm, this should cater for all levels of ability. The value of the weight control may not be apparent at speeds below, say, 12 wpm, at higher speeds however some operators find that adding some 'weight' enhances their sending. It can also prove effective when transmitting through heavy interference. The user is advised to use no weighting during initial familiarisation, this means keeping the weight control in the fully counter-clockwise position. Those who have not used an electronic keyer before will have to decide which style of keying they want to adopt. Twin paddle iambic keying tends to be the more popular mode with newcomers.

$$\text{Speed wpm} = \frac{\text{dots/min}}{25}$$

A simple method which gives a close approximation of keying speed is: Speed (wpm) \approx number of dashes sent in a five second period.

In either case the keyer must be adjusted to give the correct dot, dash space ratio (ie. no weighting added).

Finally, the keyer may be used with a straight key by selecting bug mode and connecting the key to the dash and common inputs on SK2.

Buying Guide

The CMOS keyer IC is available from: Curtis Electro Devices, Inc. Box 4090. Mountain View, CA 94040. Tel: (415) 964 3846. Price: approx £12 (\$20). This includes a shipping charge of £3 (\$5). (Visa card orders are accepted).

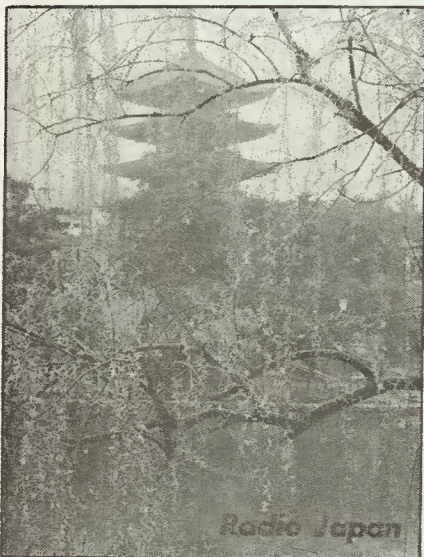
A 8 ohm loudspeaker and a suitable 1kO log pot (volume control) may be obtained from: Electrovalue Ltd., 28 St. Judes Road, Englefield Green, Egham, Surrey. TW20 OHB. Tel: (0784) 33603. Price: 8 ohm loudspeaker, £1.40 (inc. VAT) Order No. 3812. 1kg log pot. £0.50 (inc. VAT) Order No. P20.

All other components required for this project are available from: Maplin Electronic Supplies Ltd. P.O. Box 3. Rayleigh, Essex. SS6 8LR. Tel: (0702) 554155.



Listening On...

Our resident HF mole spills the beans as to where hot DX information can be 'acquired' by the direct route - straight off the air!



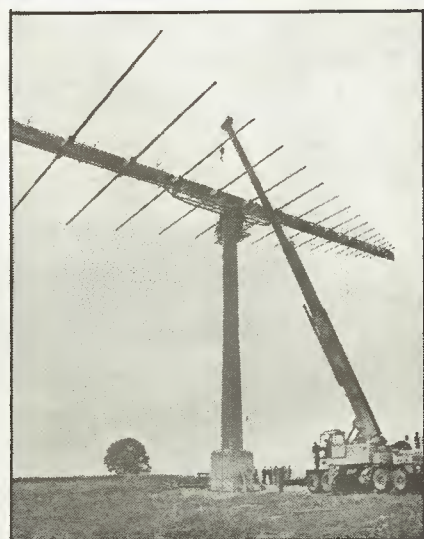
One of Radio Japan's glossy colour QSLs.

There has been a lot of news during the last couple of months of broadcast stations opening new transmitting sites or beginning to use new antennas. The biggest news in this respect is that Radio Japan's transmitting site at Yamata, about 60kms from Tokyo, is now fully operational with new 300kW and 100kW transmitters.

Radio Japan

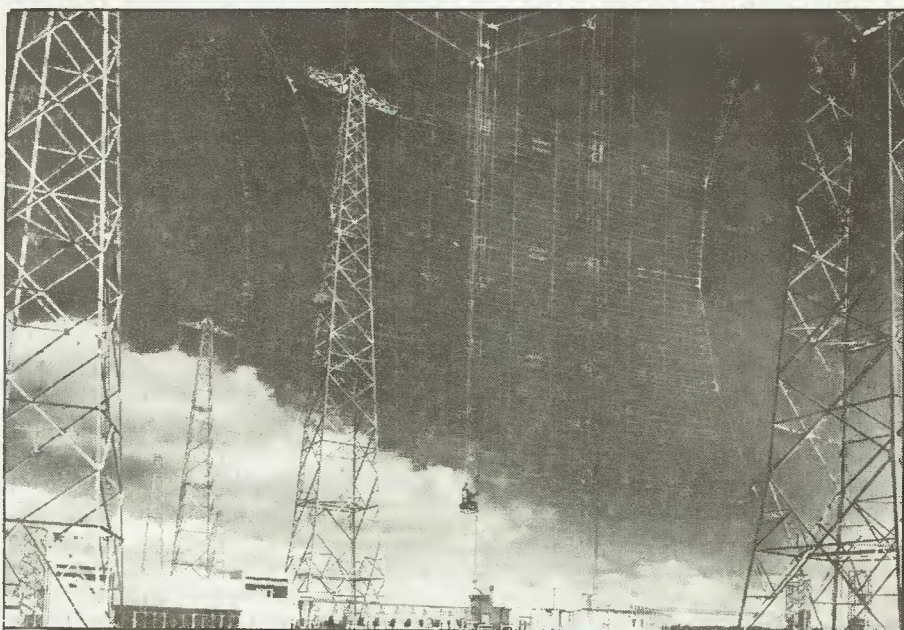
Radio Japan built their short-wave transmitting site at Yamata in 1941, but while other broadcasters around the world have constantly upgraded their facilities and raised their transmitters' power levels, Radio Japan did virtually nothing

until 1984 — ironic considering the role Japan has played in domestic electronic and amateur radio equipment. In 1984, a four-year expansion and updating project commenced at Yamata and this has now been just completed. Radio Japan's 45-year old 50 and 100kW transmitters have been replaced with four 300kW and four 100kW transmitters and new antennas have been built, capable of taking the higher power levels. There are now no fewer than thirteen separate curtain arrays for long-distance broadcasts. Each of these arrays can be reversed, so 26 different



A log-periodic yagi antenna, as recently installed at Radio Japan's Yamata transmitting site.

beam headings can be serviced. In addition, the arrays can be electrically "slewed" by up to $\pm 30^\circ$, albeit at the loss of some gain, so virtually the whole world can be covered from the Yamata site. There are also three new log-periodic yagi arrays



A typical curtain antenna array. There are 13 like this at Yamata!

which, with less gain than the curtain arrays, have been designed for shorter-distance broadcasts (typically the Far East and South East Asia from Yamata) and these are rated at just 100kW.

Sackville Relay

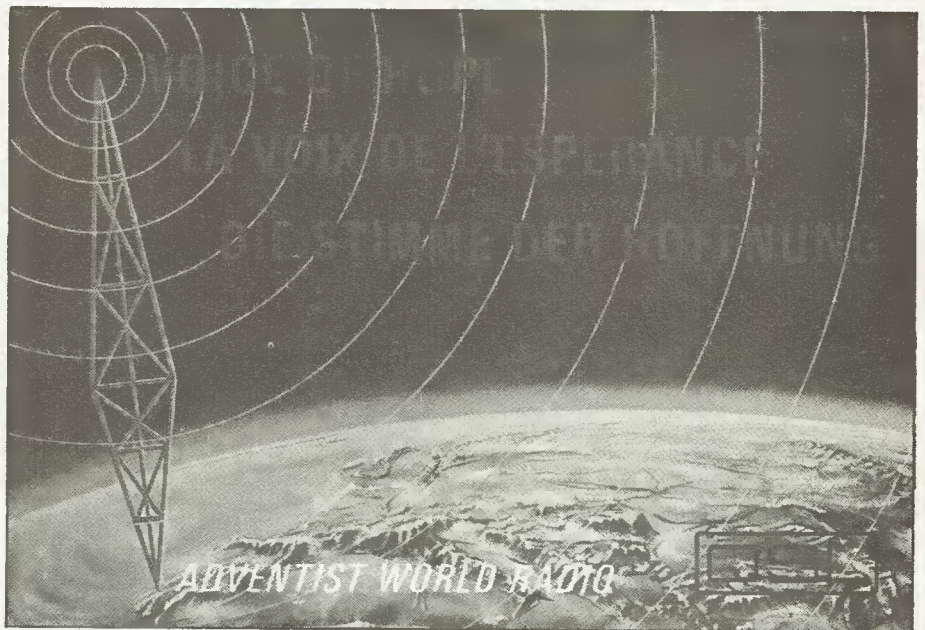
Despite the improvements offered by their own site in Japan, Radio Japan will continue to use the relay facilities offered by Africa No. 1 in Moyabi, Gabon for broadcasts to Europe, the Middle East and Africa, which are difficult to cover "direct" from Japan because the path the signals must take is through the auroral zone. For broadcasts to the eastern part of North America, Radio Japan also uses relay facilities provided by Radio Canada International from their transmitting site at Sackville in New Brunswick. With their improved facilities in Yamata, Radio Japan is now able to offer Radio Canada International relay facilities on a reciprocal basis for the first time, thus improving RCI's coverage of



the Far East tremendously. RCI has now introduced broadcasts in Japanese which are broadcast on shortwave to Japan, from transmitters in Japan! Two of their English-language broadcasts are also relayed from Yamata — these are at 1200-1230 GMT on 15385 and 17710kHz and at 2200-2230 GMT on 11705kHz. Naturally, they are intended for listeners in the Asia-Pacific areas, so they may well not be heard in Europe.

DX Corner

Information on the new Radio Japan facilities at Yamata came from Radio Japan's own DX programme called "DX Corner" which is now broadcast at a much more convenient time for listeners in Europe: at about 1525 GMT (within the 1500-1600 GMT English pro-



Adventist World Radio (AWR) broadcasts from Portugal, Italy and the Island of Guam.

gramme) on Sundays. It is best heard by the afore-mentioned relay station in Gabon, West Africa, on 21700kHz, but for those who want to try to pick up the signal direct from Japan, it is also broadcast on 11815, 9695 and 9505kHz. Other Radio Japan programmes which are well-heard in Europe via the Gabon relay are at 0700-0800 GMT on 21695kHz and at 2300-2400 GMT on 11800kHz, although unfortunately Radio Japan has been having some technical problems on the link between Japan and Gabon recently, as the relay frequencies have been broadcasting music and pre-recorded announcements apologising for the lack of normal programmes. However, by the time this is read, no doubt the problems will have been sorted out.

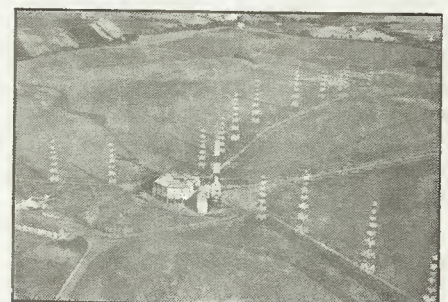
R Finland Expansion

Talking about Japan, I was very surprised to hear an announcement in Japanese from Radio Finland, of all stations, at the beginning of their 0830 GMT broadcast to the Far East on 17795kHz in English. The rest of the English programme made no mention of Radio Finland broadcasting in Japanese, but it is my guess that they will soon start regular programmes in that language. Until a few years ago, Radio Finland broadcast only in Finnish, Swedish and English. Then



AWR Asia's transmitter building and first antenna system on Guam. There are now three more towers.

German was added, at first only at weekends, and then on a daily basis and more recently they have started weekend broadcasts in French, so it does seem as if Radio Japan Finland is going through a period of rapid expansion at present. As regular readers of "Listening On ..." will remember, Radio Finland now have a very powerful medium wave transmitter on 963kHz for broadcasts to Europe and several new 300kW shortwave transmitters at



Santa Maria di Galeria. Just over 1km away is the massive new rotatable curtain array.

Pori in south-western Finland, so they obviously intend using them to great advantage.

More New 'Twigs'!

Several other shortwave broadcasters also have impressive new transmitting antennas now. AWR (Adventist World Radio) Asia broadcasts from the small Pacific Island of Guam and until March this year had only one antenna system consisting of three towers. Now, three further towers, 75, 84 and 93 metres high, have been constructed and these support curtain antenna arrays for the 6-11MHz bands and the 9-17MHz bands. The antennas have been designed to improve reception of AWR Asia in Japan, northern China, Korea and the eastern part of the USSR. Not to be outdone, the Voice of Turkey's new programme schedule, which has just arrived, says that they will be using new 500kW rated antennas, "which can be turned 180 degrees in three minutes." This suggests that the whole antenna rotates, a massive undertaking if it is a curtain array, but it is exactly this that the Vatican Radio has recently put into operation. To quote from Vatican Radio's programme booklet: "A new short-wave 500kW transmitting antenna has been installed at the transmission centre of S. Maria di Galeria. It is a rotating antenna, 106 metres high and joins the other 79 metres high antenna of this kind built in the 1970's. The antenna consists of two wideband dipole curtains (one for 6 to 11MHz, the other for 11 to 21MHz), supported by two towers which rise at the end of a horizontal bridge, about 95 metres long, resting on four bogies. Each bogie is supported by a group of four wheels on a circular monorail about 89 metres in diameter. The orientation of the antenna is controlled from the control room. A complete rotation takes about five minutes. An important aspect of the antenna is its very low take-off angle, ideally suited to long-distance broadcasts."

A series of brilliant colour photographs accompanies the description (which unfortunately cannot be reproduced here) and shows what looks like a massive railway turntable with the two 345 foot towers on opposite sides of the

turntable, with the antenna arrays suspended in between. The antenna is fed by a 1.1km open-wire twin feeder, which looks like high voltage electricity cables!

R France Inter

Another station which has undergone considerable expansion over the last few years is Radio France International. A few years ago, they broadcast only in French except for a one-hour programme in English intended exclusively for listeners in Africa and called appropriately enough, "Paris Calling Africa." That is still broadcast and now can be well-heard in Britain too on 6175kHz, at 1600-1700GMT. In the last few years, Radio France International has introduced broadcasts in several other languages including Russian, Serbo-Croat, Romanian, Portuguese and so on. It is perhaps surprising that until the end of March this year France had not been broadcasting in Arabic, bearing in mind France's links with such countries as Morocco, Tunisia and Algeria. However, Arabic is the latest of languages to be added to RFI's long list: the new programme can be heard at 1100-1200 GMT on 11845 and 21520kHz.

Papua New Guinea

For keen broadcast band DXers (as opposed to programme

listeners), Papua New Guinea has always been one of the most difficult countries to log, from Europe at least. This coming winter, however, that may change. A report from Port Moresby, the Papua New Guinea capital, broadcast on Radio Australia's programme for SWLs and DXers, "Communicator," said that a total of eleven, new 10kW transmitters had been delivered to Papua New Guinea's National Broadcasting Commission (NBC) regional stations. These were to replace old transmitters for which no spare parts were available and which had been either off the air, or running extremely low power, for several years. The lucky stations are: Radio East New Britain, in Rabaul, on 3385kHz; Radio Radio West Sepik, in Vanimo, on 2305kHz; Radio Western Highlands, in Mount Hagen, on 3375kHz; Radio Morobe, in Lae, on 3220kHz; Radio Western, in Daru, on 3305kHz; Radio Enga, in Wabag, on 2410kHz; Radio Simbu, in Kundiawa, on 3355kHz; Radio Medang, in Medang, on 3260kHz; Radio Milne Bay, in Alotau, on 3365kHz; and in Port Moresby, Radio Central on 3290kHz. Aspiring Papua New Guinea DXers should beware that, despite the English-sounding names of these stations, they broadcast mainly in Tok Pisin, otherwise known as Pidgin English,

TéléDiffusion publique

NATIONAL BROADCASTING COMMISSION
PAPUA NEW GUINEA

• Lorengau • Kavieng
• Wewak • Rabaul
• Mount Hagen • Madang
• Kundiawa • Goroka
• Lae

RADIO NEW ZEALAND
SHORT WAVE DIVISION OF THE NEW ZEALAND BROADCASTING CORPORATION

BROADCASTING HOUSE
BOWEN STREET
WELLINGTON
NEW ZEALAND

CABLE : NATBROADCAST

so that Radio West Sepik, for example, identifies itself as "*Maus bilong Sandaun*" literally, the "Voice of the Sundown". The National programme of the NBC can also sometimes be heard on 4890kHz between 1930 and 2230 GMT or just before sign-off at 1400 GMT, though the latter time is only possible during the winter months.

New Zealand

Staying in the same part of the world, another country which has been difficult for European DXers to log, has been New Zealand. Radio New Zealand uses only two 7.5kW transmitters of uncertain age, although it has been known for some time that the New Zealand government has been looking at ways of improving RNZ's audibility, especially in the Pacific area. A lightly unexpected development, though, was also reported by Radio Australia's "*Communicator*" programme recently: one of their correspondents had picked up some rumours that the BBC had been having preliminary talks with Radio New Zealand about the possibility of providing a relay station in New Zealand, which would be used by both the BBC and Radio New Zealand for their broadcasts to the Pacific. It seems as though Radio New Zealand would like to increase

the audibility of their broadcasts in Pacific languages such as Tongan, Tokalaun, Samoan, Maori and Niuean, as well as English and also start broadcasts to Papua New Guinea in Tok Pisin. The sort of situation that was being talked about was either two 500kW or four 250kW transmitters. A few weeks later, however, "*Communicator*" interviewed a BBC representative who, while not denying that talks with Radio New Zealand had taken place, said that nothing specific had been discussed yet. We shall just have to wait and see.

DX programmes

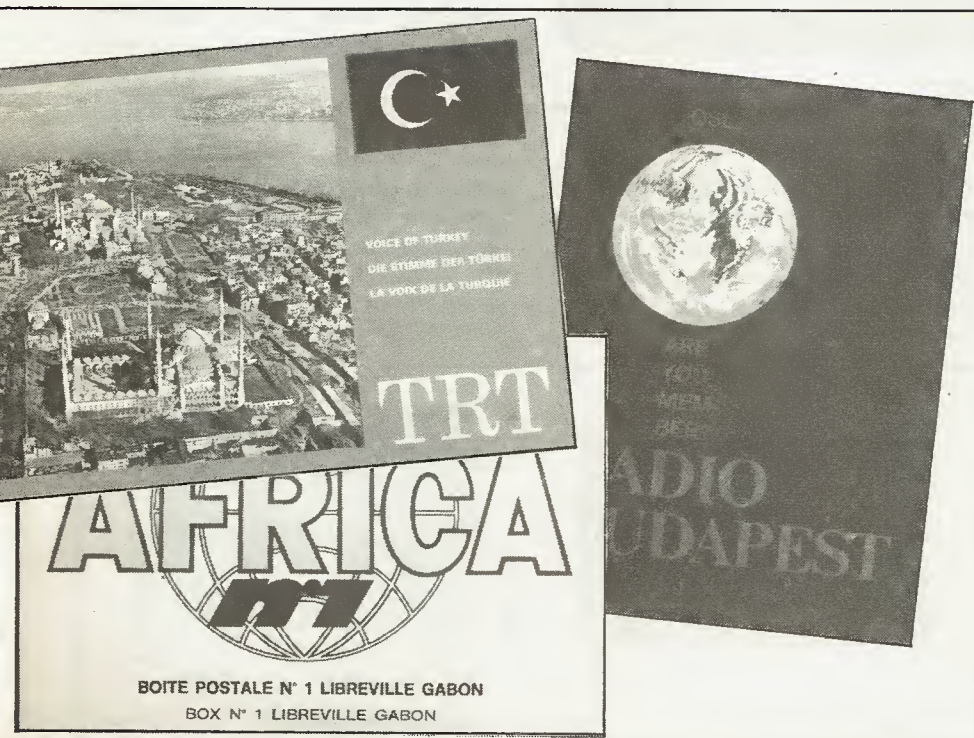
I have mentioned Radio Australia's "*Communicator*" programme several times — it is broadcast on Sundays at 0730-0800 GMT on 9655kHz and is a very good way of keeping up-to-date with broadcasting developments in the Pacific area. Another similar programme is "*Sweden Calling DXers*". This year the programme celebrated its 40th anniversary and Radio Sweden is marking the anniversary with a special QSL card. The oldest programme of its kind on the air, "*Sweden Calling DXers*" was conceived by Arne Skoog, who edited the programme for 30 years. When Arne retired ten

years ago, George Wood (SMOIN) took over the reins. In recent years the programme has added coverage of new technology, such as satellite DXing and computers in the radio shack to the traditional reports on developments on shortwave radio.

At present, "*Sweden Calling DXers*" is broadcast on Tuesdays in the transmissions beginning at 1700 GMT on 1179 and 6065kHz, at 2100 GMT on the same frequencies and at 2300 GMT on medium wave only. It is repeated on Wednesdays at 1100 GMT on 6065 and 9630kHz. In contradiction to their neighbours in Finland, however, Radio Sweden recently announced that their SSB service, transmitted from a single 100kW USB transmitter at Varberg, near Gothenburg, would be closing down on 1st July. This service mainly relays the Swedish home service first programme (presumably for Swedish ships and embassies around the world) but it does also broadcast Radio Sweden's North America programme in English for North America at 0230 GMT on 17840kHz. The reason given for this service closing down was lack of funds. There seems to be no shortage of money in Finland, though, for apart from the possibility of additional languages to be broadcast, as mentioned earlier, Radio Finland has recently started an SSB test transmission at 1000-1100GMT on 15325kHz USB, exactly the sort of service the Swedes are having to close down. This transmission is in Finnish during the week and in German and French at weekends.

More Cutbacks

Radio Sweden is not the only station to be suffering from lack of funds. In eastern Europe, Radio Budapest has announced that as from 2nd May they are having to reduce their overall broadcasts by about 30 per cent. From that date English programmes for Europe would be broadcast at 1830 and repeated at 2000 GMT. No frequencies were mentioned, but Radio Budapest's long-time favourite frequencies are 15220, 15160, 11910, 9835, 7220 and 6025kHz — perm any three from six and you have a fair chance of hearing Radio Budapest!



Uses and abuses of the MONITORSCOPE

In my early days of discovering amateur radio, being a young lad of limited resources, I marvelled at pictures of well-equipped DX stations with their impressive lineups of matched commercial equipment, admittedly often only seen on manufacturers' leaflets! Occa-

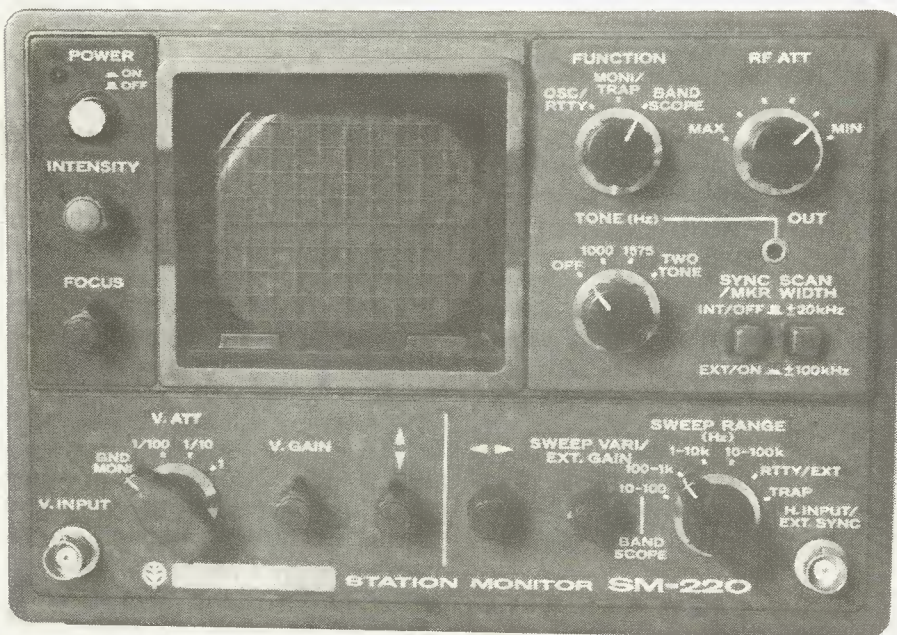
Part 2

still continues to out-perform most of the 'top of the range' transceivers) whilst my aerial system has cost far more than all my radio gear

Testing, testing

The most obvious of a monitor-scope's uses is of course for testing purposes. As a basic oscilloscope, it can be used to check your microphone for audio output level, the result of fitting an add-on speech clipper before putting it 'on-air', and for setting up RTTY and Packet terminal units. Coupled to the receiver audio output you can display off-air received signals - monitoring a repeater is quite remarkable with all the different tone emanations and switching between input and output frequencies instantly shows up any audio processing taking place through the box. You soon get a name for giving accurate audio reports to people when requested!

Using the scope function allows you to see the waveform of your transmitted signal, on SSB your speech 'envelope' is very clearly visible, for example showing if you are 'flat topping' by overdriving your transmitter. If this were happening, other stations on the band would be suffering from your splattering signal, reducing your popularity somewhat! A useful check is that that of the 'two-tone' test, where you need a pair of audio tones into your transmitter mic socket and view the output waveform, a monitorscope sometimes has a pair of oscillators incorporated as standard (the SM220 for instance provides independent switching of 1000Hz and 1575Hz oscillators). By coup-



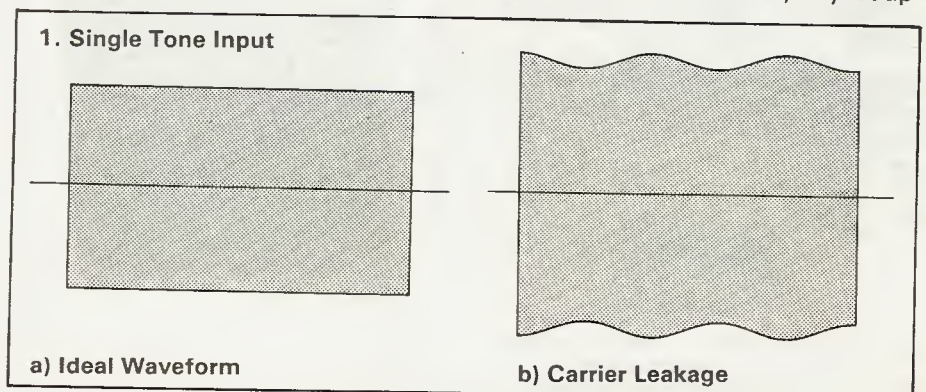
Head-on view of the Monitorscope front panel.

Remember the oscilloscope from your RAE days? Well it can be a good bit more useful if it's a bandscope!

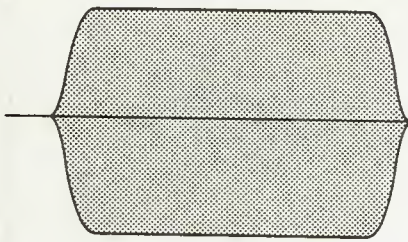
sionally I'd also see what looked like a matching oscilloscope sitting there, very nice I thought, just what the wealthy guy needs to make his shack look even more impressive when visitors drop by. It might even be used for the odd bit of homebrew construction work, checking out newly built bits of gear that somehow never seem to feature in the pictures!

As the years have passed, I didn't collect anything like the contents of all the tempting photographs, but bought what I considered useful for my hobby. The main HF transceiver was purchased second-hand for just £200 (yet it

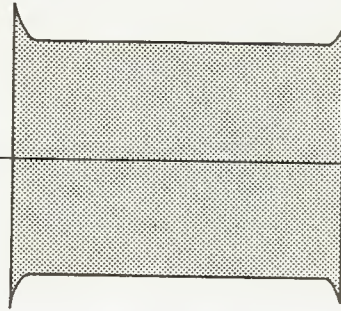
put together. But what's this, an SM220 monitorscope in the 'HCL Shack? Let me tell you why it's there...



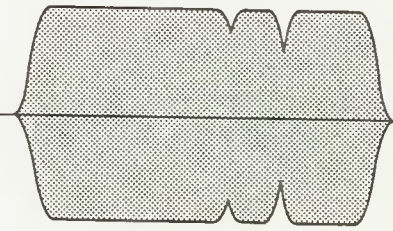
2. CW Keying Waveform



a) Ideal Waveform



b) Key Clicks



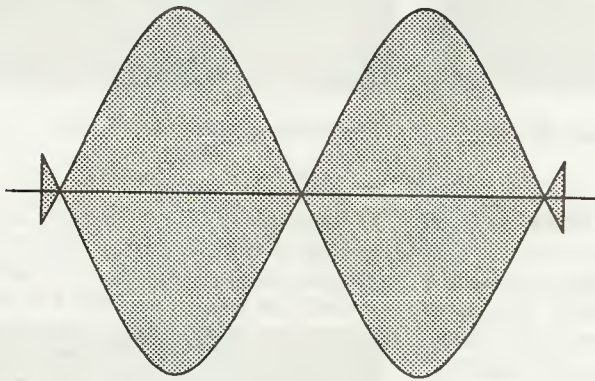
c) Dirty Keying Contacts

ling the scope up between your linear amplifier and your driver transmitter you can display the classic 'trapezoid' patterns, allowing you to instantly set the correct drive power level to prevent flattopping, together with checking

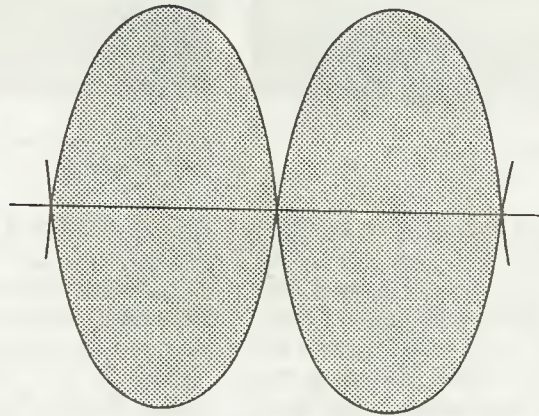
of this from RAE studies and by using the scope you can instantly see your CW keying waveform in 'real life'. You can also see if there is any ripple on the peaks of your waveform under 'key down' conditions, possibly caused by an overs-

you'll know that on the HF bands accurate receiver tuning is vital to achieve good communications, a receive frequency error of only 100Hz for instance will often mean zero reception! This of course is also true when using FSK, as

3. Two-Tone Modulation Envelope



a) Ideal Waveform



b) Defective ALC

that your bias is set at the right level to ensure your amplifier really is linear!

If you're a CW freak you can still splatter of course, due to key clicks and the like, caused by incorrect rise and fall times of your transmitter carrier power. many amateurs have seen pictorial examples

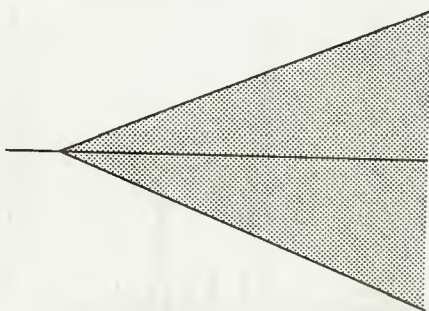
of this from RAE studies and by using the scope you can instantly see your CW keying waveform in 'real life'. You can also see if there is any ripple on the peaks of your waveform under 'key down' conditions, possibly caused by an over-

Data Tuning

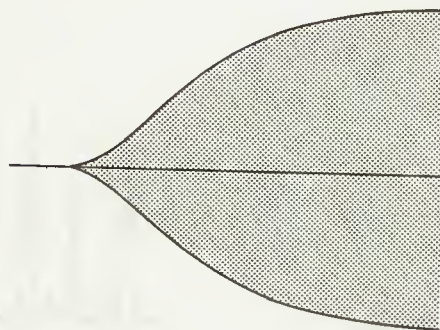
If you're interested in Data Communication, be this RTTY, Amtor, Packet and the like, then

opposed to AFSK, on VHF. LEDs as tuning indicators, particularly those of the bargraph type, are quite useful but if you've never tried using a scope then you're missing out somewhat! By connecting the analogue outputs of the 'mark' and 'space' tone demodulators from your terminal unit to the vertical

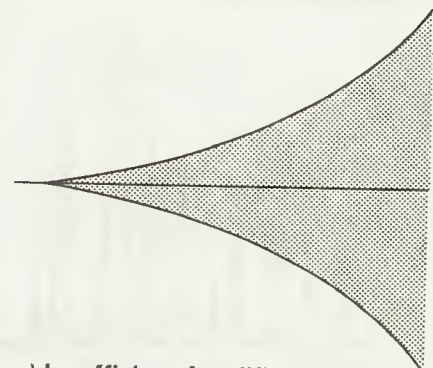
4. Trapezoid Waveforms



a) Ideal Waveform

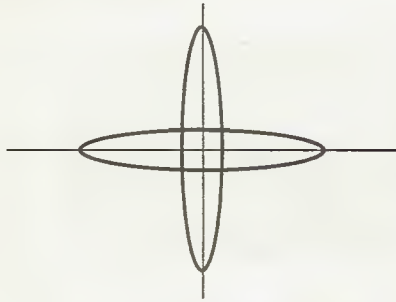


b) Excessive Drive



c) Insufficient Amplifier Grid Bias

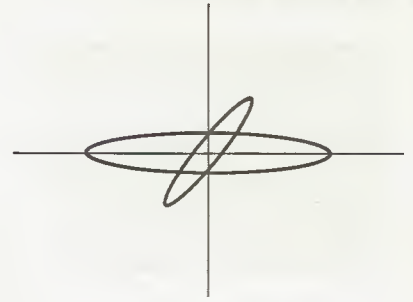
5. RTTY Tuning



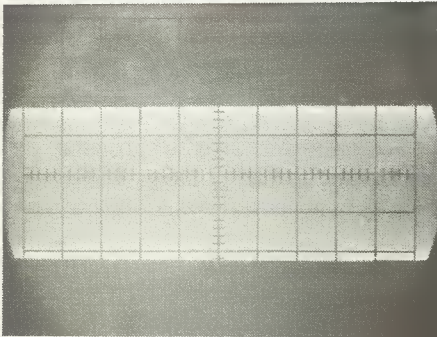
a) Correctly Tuned Signal



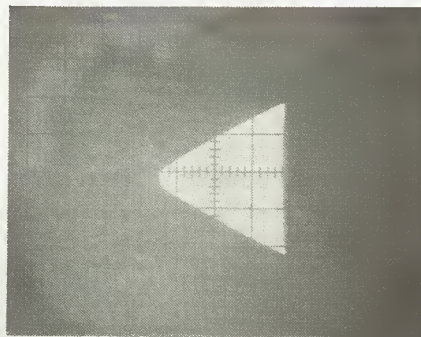
b) Slightly Off-Frequency



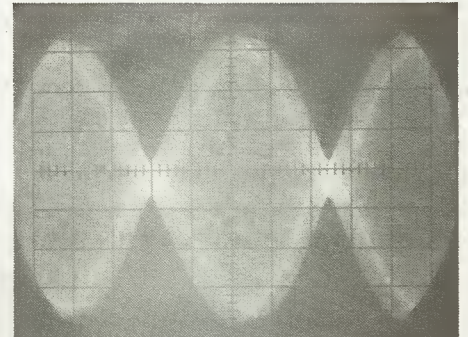
c) Incorrect Received Shift



Steady single-tone display.



Trapezoid display testing for amplifier linearity.



Two-tone test to check ALC.

and horizontal inputs on the scope, you can tune in very quickly by making the two traces form a vertical cross on the display, a sideways 'tilt' in this showing you are off frequency. If you're tuning into commercial data signals (we don't *really* listen to Reuters and Interpol do we?) you often don't know what shift they're using, if the two traces don't cross at right angles then you know it's time to switch shifts rather than frantically tune up and down in frustration.

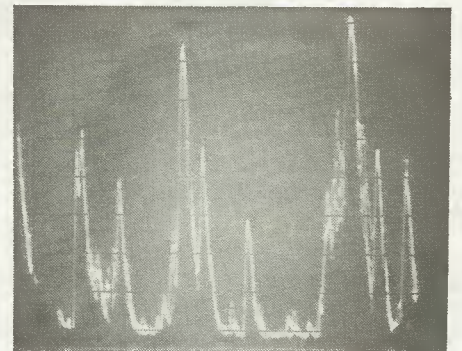
Bandscope

One of the most used facilities of the monitorscope, in my station

at least, is that of the bandscope. In my opinion this is often what distinguishes the monitorscope from a 'glorified' oscilloscope, a bandscope is sometimes available as an option to the standard monitorscope. By coupling the wideband IF (Intermediate Frequency) output of your receiver to the unit, you get an instant panoramic display of signals either side of your tuned frequency. Thus you can instantly see what activity on the band is like without continually tuning back and forth.

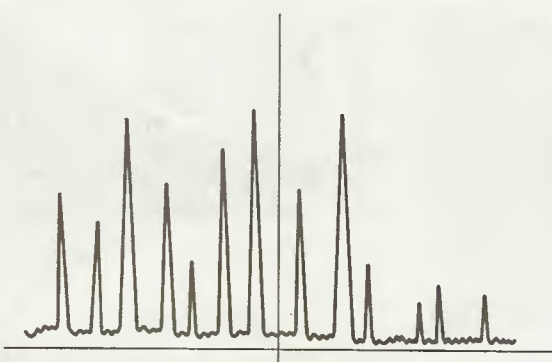
If you're a VHF/UHF operator, the relative strengths of the beacons when tuned to the middle of appropriate sub-band may be seen,

a Sporadic-E lift or even meteor scatter bursts are prominently displayed, telling you that it's time to swing the beam and call CQ while

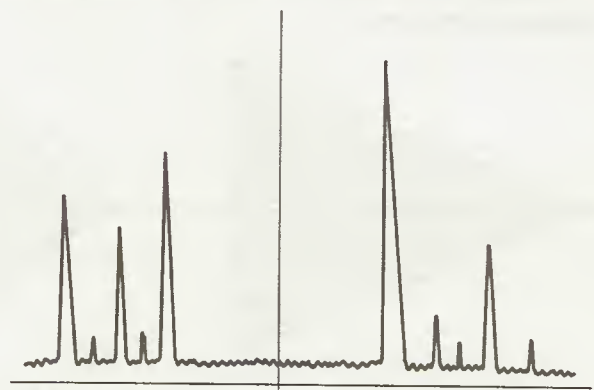


Bandscope display showing a congested 40m band.

6. Bandscope Display



a) Crowded Band Conditions



b) A Quiet 'Gap' to Call CQ

"... HE'S VERY VAIN ...
LOOKS AT HIMSELF
IN THE SCOPE
FOR HOURS..."



the rest of Europe is still quietly sitting there listening away.

On the HF bands you can see when the band 'opens up', and when it starts getting crowded where all the stations are. What's more to the point, it tells you where there's a 'gap' with little or no QRM, enabling you to quickly tune there and put a CQ call out. When operat-

ing as a contest station, a clear frequency can thus easily be found, at other extremes such as SHF contests it can help you find signals quickly.

Impressive Gimmick?

So there were are, whether a monitorscope is a useful tool or a

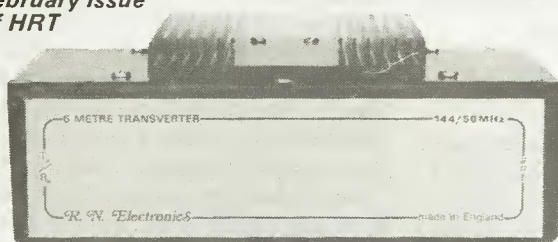
just a luxury depends on your point of view, but you'll find on glancing through the 'small ads' pages in amateur magazines that the number of 'wanted' requests for such vastly outnumber the 'for sale' ads for monitorscopes. Once bought amateurs tend to hang onto them, there must be a reason for doing so . . .

R. N. Electronics

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As reviewed in
February issue
of HRT



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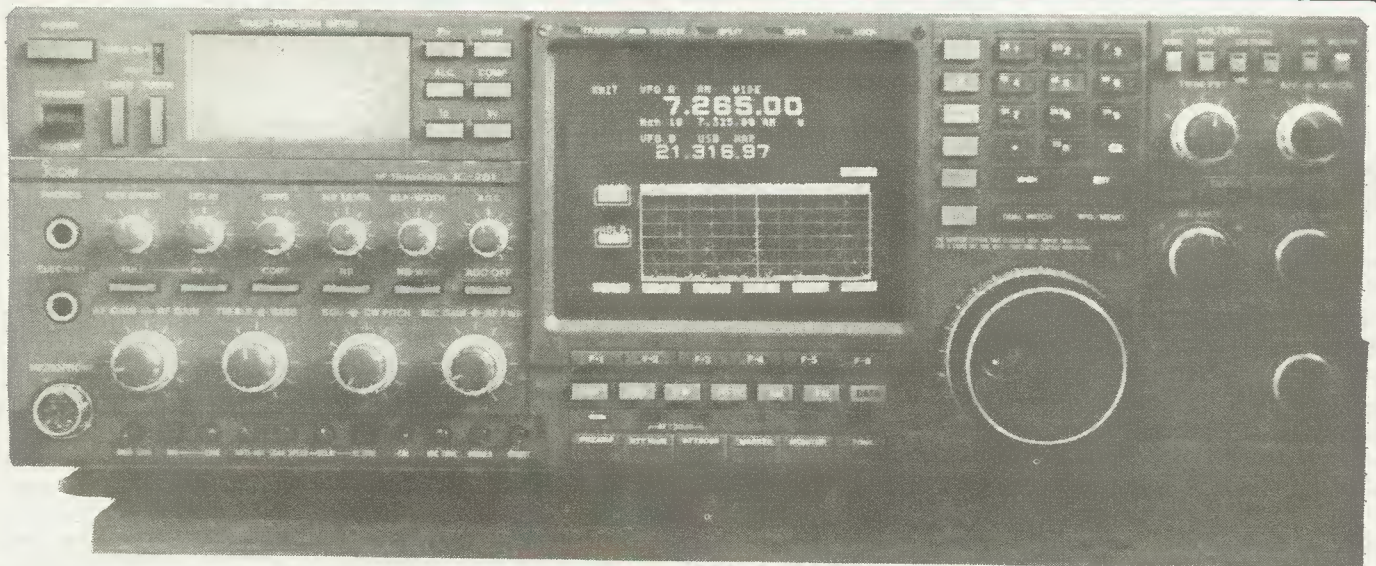
Every week millions of advertisements appear in print, on posters or in the cinema. Most of them comply with the rules contained in the British Code of Advertising Practice.

But some of them break the rules and warrant your complaints. If you're not sure about which ones they are, however, drop us a line and we'll send you an abridged copy of the Advertising Code. Then, if an advertisement bothers you, you'll be justified in bothering us.

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ICOM HF SUPER RIG REVIEW



It started last year as a 'rumour' that Icom were about to produce the 'ultimate' HF transceiver, complete with virtually every imaginable feature built in, including a VDU to act as a comprehensive frequency and

Features

The set covers everything from 100 kHz to 30MHz on receive with CW, LSB, USB, RTTY (FSK and AFSK), FM and AM modes, 150W max. transmit power being provided

The new top-of-the-range Icom super-rig gets the once over from Chris Lorek, G4HCL - who has already written to Santa!

mode display as well as providing a bandscope facility. When the first adverts appeared for the IC-781, we knew it was true, and many amateurs gasped, shook their heads in amazement, and wondered who would buy such a rig. Some amateurs in fact did, and joined the waiting list for the first batch to come into the country. We at HRT were offered the loan of the very first set to land on these shores, and as a complete description with technical report would entirely fill the magazine, we settled for a 'user test' to show you what you're missing. On the other hand, it may whet your appetite!

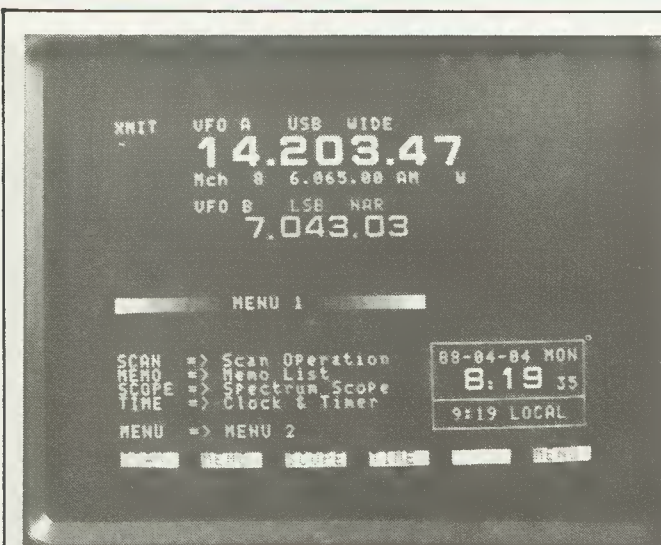
on the amateur band allocations (with 75W max on AM). The majority of the rig's status functions are displayed on the orange VDU (Visual Display Unit) on the front panel which may be switched into several control and display modes to let you know exactly what's going on. The VDU modes are all 'menu' driven, in a similar manner to Prestel or Teletext, which greatly simplifies operation - even I could use it easily! (*Good grief!* - Ed.)

On the receive side, selectable narrow/wide filter widths couple with two IF passband tuning controls for QRM rejection operate on all modes apart from FM, narrow

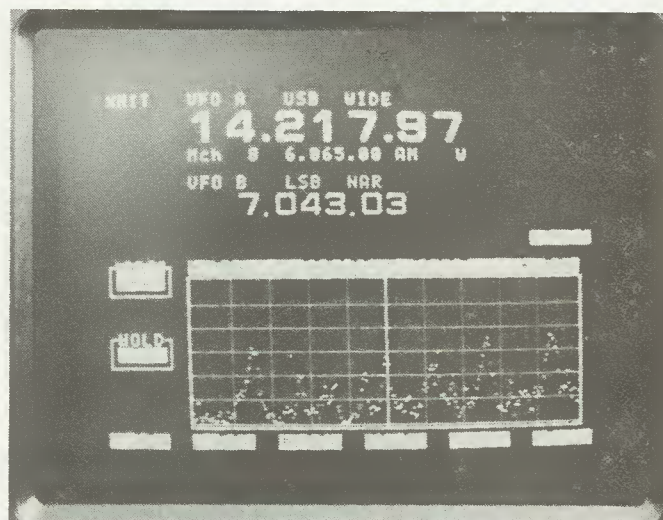
filters are filters are fitted as standard for CW, SSB and AM. In CW and RTTY modes, the 2nd and 3rd IF filter combinations may even be independently selected to give 2.4kHz, 500Hz or 250Hz overall bandwidths. A switchable noise blanker may be continuously varied in blanking level and blanking pulse width to reduce the effects of next door's electric drill as well as Over-The-Horizon radars such as the Australian 'Jindalee' and American 'Pave Paws' systems, and a tunable IF notch copes with the odd annoying heterodyne. The AGC may be switched on/off together with a continuously variable decay time, and the usual RF gain and volume controls are complimented by separate bass and treble tone controls to make the rare DX stations sound just right.

Dual Watch

As would be expected, the set has separate VFOs as well as memory channels galore, 99 in fact, with menu-driven selection from the VDU screen. As well as offering



Menu display on VDU.



Typical bandscope display on VDU.

split frequency operation, a novel feature is that of a 'dual watch' facility on receive, where you can listen to two signals in the same frequency range simultaneously. To use this, you set VFO 'A' to one frequency, VFO 'B' to the other, and press the 'Dual Watch' button, simple eh? Very useful when operating split frequency to save constantly switching between channels, instead a balance control alters the relative levels of the receive signals.

On transmit a whole host of features are also available. CW addicts are catered for with both semi and full break-in operation, a built-in lmbic keyer with variable speed and weight for paddle users as well as the usual jack socket for 'straight key' operators. A variable CW receive tone control (independent of the tuned receive offset) may be set from a front panel control, and a tunable audio peak filter may be switched in to add to the QRM rejection. On SSB a built-in RF speech processor is fitted together with a VOX facility, and as we humans are not all the same a microphone tone control is provided to shift the frequency response of the mic amp to suit the operators vocal chords and a 'Monitor' facility allows you to listen to your demodulated IF transmit signal. FM is of course provided for 10m users and as many 10m repeaters are sub-audible tone operated, a switchable tone generator is fitted to the IC-781 which may be internally linked to operate on any of the standard

sub-tone frequencies. An all-mode receive squelch gives comfortable monitoring of quiet channels.

For the digital communicators a dedicated RTTY mode allows true FSK with internally preset 170Hz, 425Hz or 850Hz shifts, on 170Hz shift either 1275/1445Hz or 2125/2295Hz tones may also be pre-set to suit your RTTY or AMTOR terminal unit AFSK may of course also be used by feeding audio tones into the set for packet radio use whilst a Direct Digital Synthesiser permits very fast transmit/receive changeover times for AMTOR compatibility. A rear panel socket for standard RS-232C input from your external terminal unit is fitted and this allows the set's VDU to be used for text display of received data.

Searching For Someone

Several scanning facilities are fitted to let you search out activity for instance the memory channels may be scanned in a number of groups, each group comprising any selected channels. As well as a search between two preset frequencies, useful for auto-tuning of the band while you're drinking your coffee or writing QSL cards, a 'fine' scan may be selected which searches 2.5, 5, 10, 20 or 50kHz either side of the tuned frequency.

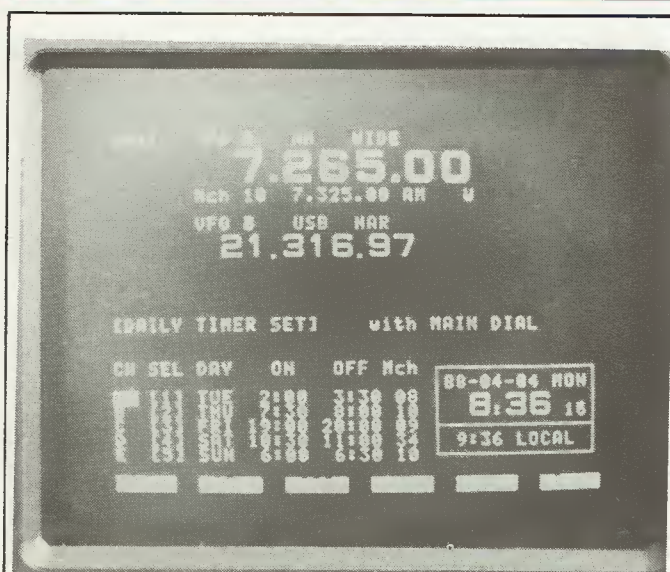
For time-shifted reception, a five-program timer may be programmed to automatically switch the set on up to seven days in advance on the pre-programmed channels; couple a tape recorder up and you've got a method of listening

to broadcast stations which transmit at times when you and I are out at work or fast asleep. As well as this, a 'sleep timer' may be selected to switch the set off after a pre-set period, and if you really want, it may be set to wake you up with an alarm beep just as it switches off!

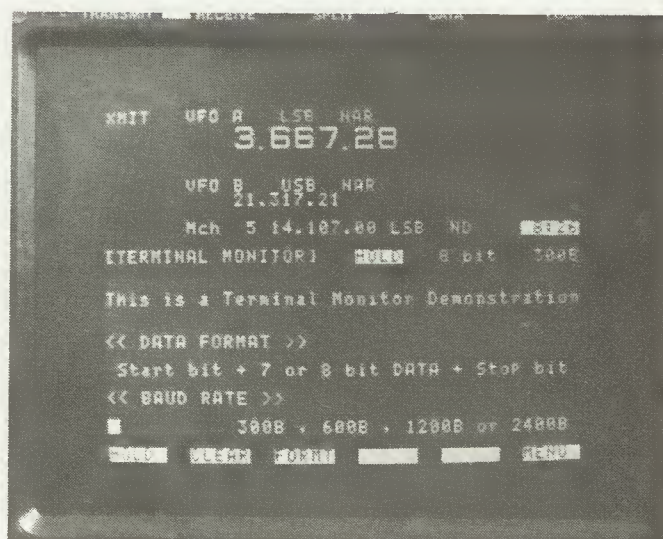
The IC-781 is a fairly large affair, measuring 425mm(W) × 149mm(H) × 411mm(D), weighing in at 23 kg (yes I did have to help the delivery van driver carry it!). It comes supplied with a 96 page user manual together with circuit diagrams, attachable rack mounting handles, an AC mains lead, and no less than 17 various plugs to fit the many rear-mounted accessory connections. These include facilities for serial computer control, data terminal units, transverter and linear amplifier facilities, tape recorder switching, and the usual speaker and CW key sockets.

Queues

I was fortunate in receiving a copy of the IC-781 manual before the set arrived, I say fortunate as it does take a bit of learning and hence gave me a chance to 'swot up'! When first switching on, it took me several cautious minutes to get used to the set, but after becoming familiar with the many controls I found it, surprisingly, very easy to use. The word quickly got round that the G4HCL shack had a rather special temporary new addition, and such was the interest in the set that a number of East Anglian amateurs with itchy tuning fingers



Memory channel list display on VDU.



Terminal display on VDU.

couldn't resist paying a visit over the review period!

In Use

After being suitably overwhelmed at first, I started tuning around to see how the set 'felt'. In a word, superb. Not surprising really considering the price is in excess of four thousand pounds, but then you get what you pay for! I found the VDU very easy to read although I had to turn the brightness control almost to maximum and the amount of information displayed was far more than one could achieve from LCDs or whatever, hence it provided a 'central focus' for the operator's attention. A socket on the rear does exist for an external, possibly larger monitor to be connected in case your eyesight is failing!

The set has an automatic aerial tuning unit internally fitted which operates as and when changing bands and fine tuning automatically as required. The preset positions however must be initially set by the user on each band with simple 'turn for minimum LED brightness' controls tucked away under a small cover on the top panel. I performed all the required operations within a couple of minutes, the set then being nicely matched to my aerial system. When changing bands, a quiet 'whirr' occurred for around a second as the tuner adjusted itself, and in use I was very pleased to find that it always provided a perfect match within 2 or 3 seconds of initial transmit operation - even

when connected to a different aerial system.

Bandscope

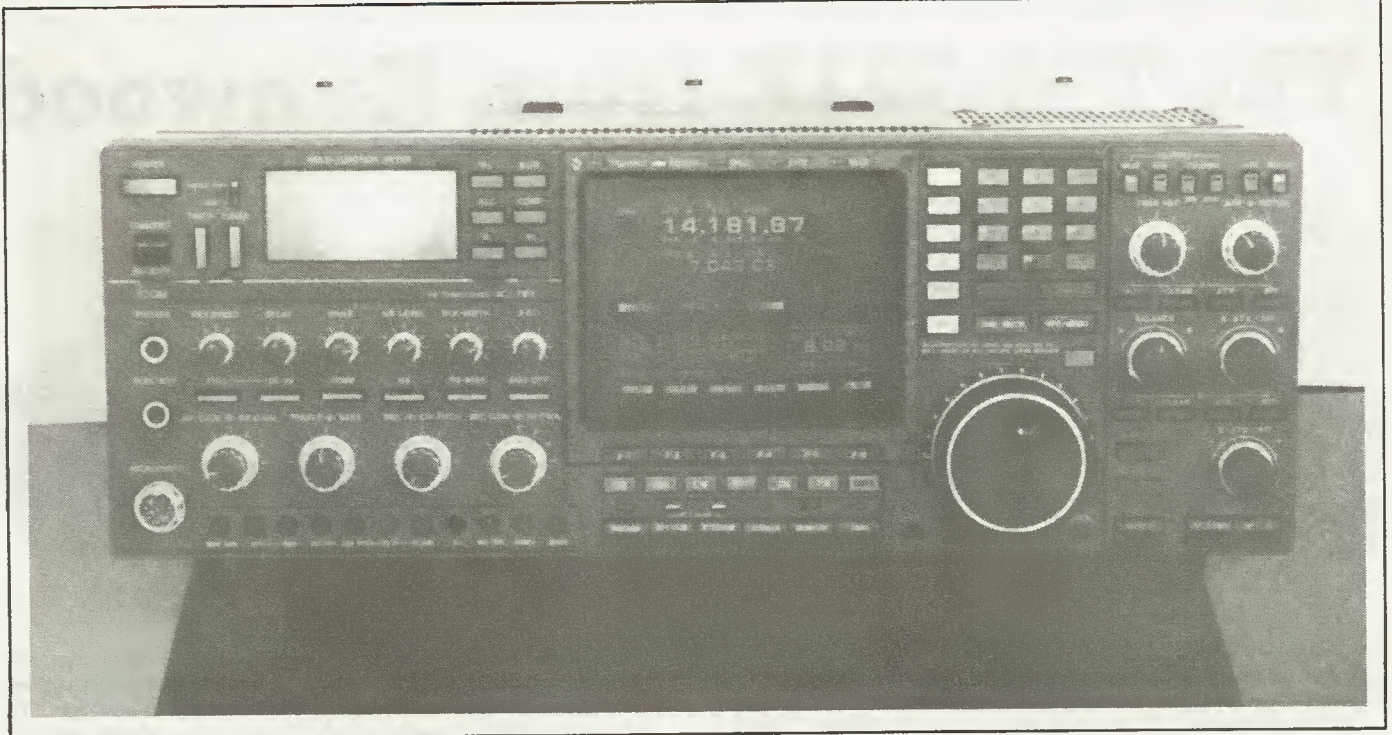
When initially tuning over a band to get a feel of the activity present, I found the bandscope function very useful. This gives a panoramic display of +/-25kHz, +/-50kHz, or +/-100kHz of the tuned frequency, using a digital 'dot matrix' type of readout updated a few times a second. The main tuning knob was nicely weighted with a 'flywheel' type effect and using it was an absolute pleasure; an adjacent 'TS' button changes the normal 10Hz steps to 1kHz steps for fast tuning, useful when quickly searching around. Changing between bands is performed by a single button push of the appropriate keypad button and a 'band stacking register' may be switched in as required which automatically remembers the last tuned frequency, mode and filter selection of each band, automatically reselecting these on returning to the band. I found this facility very useful, as I am often annoyed with sets which on changing band require you to retune by a large amount to get to the desired segment. You can of course directly enter the frequency you want to get to, a press of the 'F' button lights up the keypad ready for action. Programming the memories using this was very simple and an added bonus is that you can store up to 10 characters in the memory display next to the

frequency, mode etc. to remind you what's in there - useful for the broadcast bands as well as reminding you which 80m frequency the local ferret breeding net resides on!

In QSO on the amateur bands using SSB, I received excellent audio reports using the set with an Icom SM8 desk microphone and found the best mic tone control position for my voice was mid-travel. Several tests were performed using different voices from visiting amateurs to my shack, one amateur (who visited the next day!) was kind enough to tape record different operators during one QSO for comparison purposes. From all this we found that the variable tone facility was most useful in increasing operator readability rather than being just a 'gimmick' (see *HRT* July 1986 for results of my tests on Tx graphic equalisation).

QRM Rejection

Reception of RTTY and AMTOR with my external KAM terminal was excellent, with the narrow filtering provided in the set working extremely well at cutting out adjacent QRM. A press of the DATA button adjacent to the mode switches disables the front panel microphone to prevent ambient noise corrupting AFSK data on transmit. When operating on Packet I used the appropriate SSB position with the two PBT controls suitably adjusted and again QRM rejection was very good.



When having ragchews on the LF bands at night, I found the PBT controls coupled with the IF notch very useful indeed, I often had no problems whatsoever receiving other stations when they were having immense difficulty with my signals due, not to a weak signal, but due to 'the adjacent QRO station' or 'the CW station who's come up on the frequency'. General band noise was often the limitation at my end

which the noise blanker could not reduce. However when an Over-The-Horizon radar 'woodpecker' came up on 20m just at the right time while I was listening to JA4FWM, a quick twist of the blanker width control restored the calm very nicely!

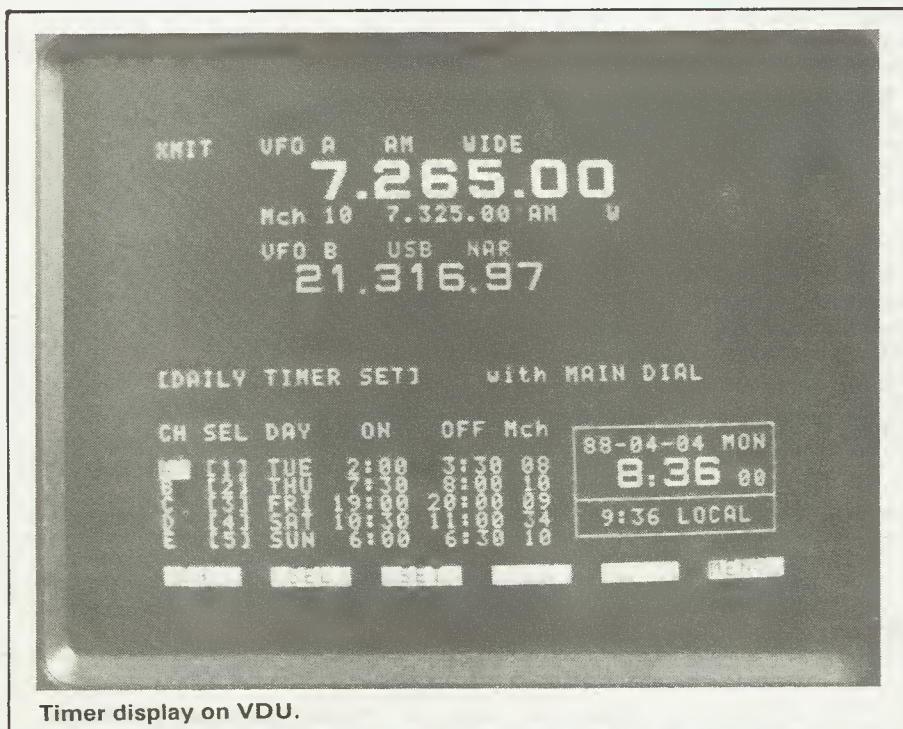
Whilst otherwise occupied in the shack I found the fine scan mode useful when listening out for calls for calls on frequencies such

as the 20m VHF net, invariably tending to operate on either side of a given frequency depending upon the prevailing QRM. Selecting the centre frequency with a +/-2.5kHz sweep range, followed by a single button push searched the frequency whilst range a small rotary control is provided to adjust the scan speed. An alternative mode of general listening I tended to use was that of the dual watch facility, to monitor a pair of frequencies in the same band without repetitive switching back and forth, and although I'm sure be very useful when operating split frequency working.

Conclusions

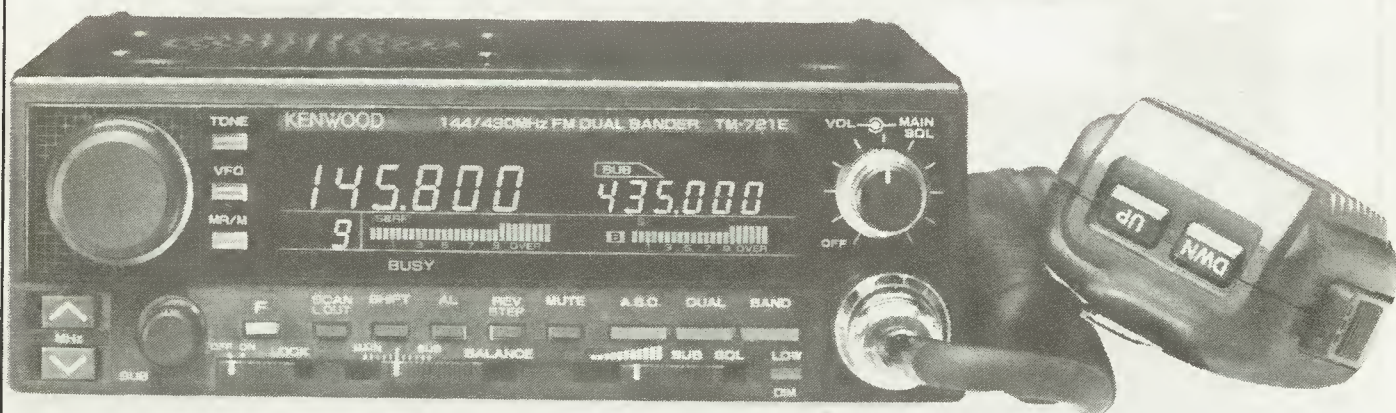
The IC-781 has virtually every conceivable feature that amateurs would require and to list them all would be beyond the scope of this article. In use I found it truly excellent at enhancing communications under difficult QRM conditions and I felt I was simply 'controlling' the rig rather than 'driving' it. The current price of over £4000 would restrict its purchase to those with a healthy bank balance, but if you can justify its ownership I'm sure you'll be very pleased with the result. I'm rather sorry I have to give it back!

My thanks go to Icom (UK) for the loan of the transceiver so soon after its arrival in the UK.



Timer display on VDU.

The TM-721E from Kenwood



I just cannot keep up with the demand for Kenwood products. Every time we get a new model you chaps out there seem to know about it by black magic or jungle drums, because we get a steady stream of customers asking for the equipment before I have even advertised it.

Such is certainly the case with the TM-721E, the new dual band VHF/UHF FM transceiver, but having studied the rig in detail and seen other people using it, I can certainly see the attractions. The TM-721E is yet another transceiver from Kenwood which demonstrates their undoubted ability to take a complex concept and engineer the operating facilities so as to make it simple and logical to operate. As in the case of the HF transceivers I have mentioned before, almost anyone can switch on the TM-721E and use its facilities without constant reference to the manual.

"But other manufacturers have dual band rigs" I hear you cry. True, but no one else has the combination of operating features, performance, and sheer ease of use which comes from Kenwood. Watch the reviews of this rig and see if they agree.

The TM-721E covers both 2 metres and 70 centimetres in the one small box. Despite its diminutive size (150mmW x 50mmH x 105mmD) the transmitters give 45 watts on 2 metres and 35 watts on 70 centimetres. As the detailed photographs in the brochure show, the entire body of the transceiver is a diecasting, with a massive heatsink taking up at least one third of the total depth. One thought for you - watch your fingers with 45 watts of RF up the spout "Mabel, will you let go of the *** microphone when I'm trying to adjust the whip".

What else? Dual band reception at all times - you can listen to your friends insulting you on VHF and UHF simultaneously. Full duplex cross band operation, and complete control from the optional RC-10 handset controller. You also have full front panel information on both bands, with two frequency readouts, two signal strength meters, even two independent squelch controls, but above all you have the knowledge that in the TM-721E you have the very best engineering in the amateur radio business, and in Lowe Electronics you have the backing of the sole appointed UK distributor for Kenwood amateur radio products.

For a detailed description of the TM-721E, simply clip the coupon on this ad. (or just ask, if you don't want to hack up the magazine) and send us two first class stamps for postage. For even more detail, including the full Kenwood catalogue, send £1 and we will return a lot of useful and informative reading. The staff of Ham Radio Today would appreciate it if you mention "HRT" when replying to this ad. (they like to know that you are out there reading the magazine).

Finally, the classical quote for the month; a very old Latin proverb which neatly applies to the man who purchases his equipment from a back street "twenty quid off, John" merchant.

"Brevis voluptas mox doloris est parens" which translates as: "Short pleasure is soon the parent of sorrow."

Caveat Emptor.
John Wilson
G3PCY/5N2AAC

TM-721E £699 inc. VAT
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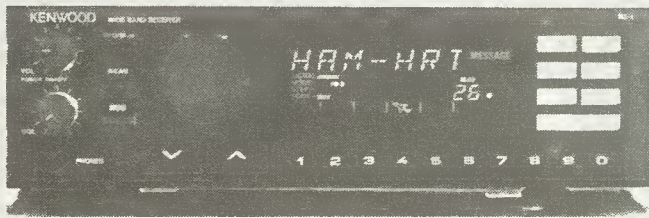
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FREE Information is free; only the Post Office demand payment for handling it - and the Penny Black is no longer used. Send us £1 to cover Post and Packing and we will return not only the full colour Kenwood catalogue, but details of any particular rig you mention and lots of other information including latest prices.

The RZ-1 from Kenwood



The RZ-1 from Kenwood is one of those receivers which doesn't fit into any of the usual categories, simply because it's unique. No-one has produced a scanner like this before, and judging by the demand it is something many people have been waiting for. 500kHz to 905MHz, AM, FM (narrow and wide), 100 memories which store frequency, mode, and even a text announcement which reminds you what was the station you programed into channel 89...

The review by Chris Lorek really tells the whole story, but if you want a leaflet on this exciting new idea from Kenwood, you need only ask.

The price has settled out at £465, and the RZ-1 is currently available from stock - but hurry before the in-car entertainment chaps find out about it.

RZ-1. Something new, something unique, almost irresistible.

ps. We stock an interesting range of scanners including the new AR800 hand held which covers 75-105, 118-174, 406-495, and, wait for it, 830-950MHz. Keypad entry, extremely small, and priced at only £199. Amazing.

HF-125 all mode receiver



We are understandably proud of the way the HF-125 has been received all around the world. We now have HF-125s in use in 14 different countries, and the receiver is being praised everywhere for its performance and quality. Not only is it being used world-wide, it's also being reviewed. A respected German reviewer says "The HF-125 is a serious piece of equipment, don't be deceived by the unassuming front panel and the lack of 'spectacular' features. The HF-125 will outperform most competitors. If you like an honest approach to receiver design, this is it: British Understatement at its best." That's a well balanced view from an internationally recognised expert, Rainer Lichte.

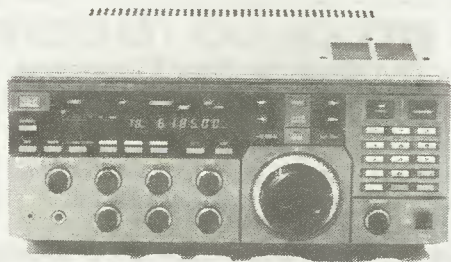
To show the care we tried to take over every detail, the same reviewer also says "Talking about manuals, this 24 page booklet is one of the best guides I've seen in years".

Mind you, he also comments on the somewhat plain appearance of the front panel, but of course we put the development money where we thought it should be - in the performance.

It may look different, but in the HF-125 you have a receiver which will comfortably outstrip competition in the real area where it matters - in use, on the air, listening to real signals.

And it's still only £375 inc. VAT.

Happy listening.



The NRD-525 has really caught the imagination of the enthusiastic short wave listeners, and I receive many letters telling me how much the users are enjoying its unique combination of performance and features. Put very simply, if you cannot receive a particular station on the NRD-525, it cannot be received on anything at all. It must be significant that Government monitoring stations and the BBC are using the NRD-525 to listen to the world.

I have been asked "Why should I buy my NRD-525 from Lowe Electronics?" This is an important query, because it is possible to buy an NRD-525 at a lower price than ours. The answer is quite simply that we are, first and foremost, an appointed JRC distributor; secondly that we have been established for over 25 years in this very specialised

business, and have always believed in giving a level of service which cannot be bettered anywhere in Europe

We employ eight trained and qualified engineers in our main workshop facilities, and have frankly built up a reputation for expertise and customer care that is the envy of many. All this is yours when you buy anything from us. If you want to trade that off against a discounted price, that is your choice, but as some have found to their cost, the thing which is actually being discounted is that all important level of service. In this life you probably get exactly what you pay for.

Happy listening.

The NRD-525 An extraordinary receiver

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CQ

CQ

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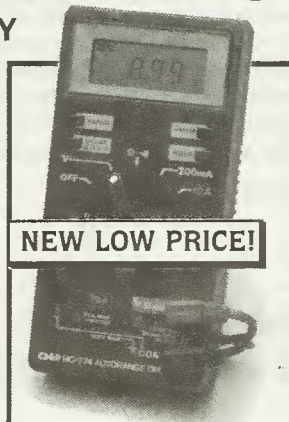
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2m Repeater Utility for The BBC Micro

```

Repeater Timer- G3NGD
.....
-----
MENU
-----
INPUT 'S' for TWO Mins Time-out
INPUT 'T' for 1.5 Mins Time-out
INPUT 'C' for Non-standard Time-out
Input 'H' to Convert Freq to Channel No
Input 'F' to Convert Channel No to Freq

INPUT A LETTER TO SELECT
Remember - Mobiles & Portables FIRST
*****

```

Fig. 1

Tired of timing-out? Can't convert S channels to frequency? In that case John Beaumont, G3NGD, has the answer with this handy utility.

Over the last five years, the BBC Microcomputer has found its way into many Radio Amateur Shacks, and with this in mind I decided to write this utility. The main objective was to control the FM transceiver when using repeaters as it is apparent when listing on repeater channels that some fixed station operators get carried away with talking and forget about the repeater timing-out.

Hardware Control

The transceiver is controlled from the computer using the Cassette Motor Relay. This relay is normally used to turn the tape recorder

on and off when "saving" and "loading" programs. To use this facility, the 2.5mm jack plug on the tape lead supplied with the BBC Micro has to be connected to the "press to talk" switch pins on the microphone socket of the transceiver via a 2.5mm jack socket and a length of single core screened cable. It is assumed that the current required to operate the transceiver relays is no more than that taken by the motor of a standard tape recorder (approx 100mA).

Software

When the program is RUN, the list of options as described below is

presented on the screen, and this is shown in Fig. 1.

1. When the letter "S" is input, the timer is set for a maximum "talk time" of two minutes. If a different pre-set time is required for a particular local repeater, this time can be changed in the program at line 290.
2. When the letter "T" is input, the timer is set for a maximum "talk time" of ninety seconds, again, this time can be changed in the program at line 300.
3. When the letter "C" is input, the timer can be set to any sensible time.

Before the transmitter can be switched on, a screen caption reminds the operator to check that the repeater is clear. When transmitting, the decrementing "talk time" left is displayed on the screen, together with a reminder that the transmitter is on (Fig. 2). During a period of transmission the cassette motor indicator lamp on the computer is also illuminated.

Over riding the program

At any time during the over, the system can be switched to receive by pressing the ESCAPE key. After pressing the ESCAPE key, the timer can be re-cycled on pressing the SPACE key twice. If the letter "E" is input at this point, the program returns to the Menu (Fig. 3). In an emergency, pressing the BREAK key will immediately switch the transceiver to receive and return the program to the Menu.

It is normal practise when using repeaters to transfer to a simplex channel when called by a local amateur. The operator may request


```

10REM !-----!
20REM !
30REM ! 2 Metre Repeater Utility !
40REM ! J.T.Beausont. G3NGD !
50REM ! January 1988 !
60REM !
70REM !
80REM Disable BREAK KEY
90 $KEY 0 OLD:MRUNH
100 REM Re-program ESCAPE KEY
110 $FXZ29,1
120 MODE7
130 $M=3
140 PROC_Header
150 PRINT CHR$(129);"-----"
160 PRINT CHR$(129);"----- MENU -----"
170 PRINT CHR$(129);"-----"
180 PRINT CHR$(134);"INPUT 'S' for TWO Mins Time-out"
190 PRINT CHR$(132);"INPUT 'T' for 1.5 Mins Time-out"
200 PRINT CHR$(129);"INPUT 'C' for Non-standard Time-out"
210 PRINT CHR$(130);"Input 'H' to Convert Freq to Channel No"
220 PRINT CHR$(131);"Input 'F' to Convert Channel No to Freq"
230 PROC_Info2
240 PROC_Info6
250 PROC_Cursor_off
260 $S=GET$
270 IF $S="H" OR $S="h" THEN PROC_Chanfreq:RUN
280 IF $S="F" OR $S="f" THEN PROC_Freqchan:RUN
290 IF $S="S" OR $S="s" LET min=2:sec=0:PROC_Header:PROC_Start:GOTO 580
300 IF $S="T" OR $S="t" LET min=1:sec=30:PROC_Header:PROC_Start:GOTO 580
310 IF $S="C" OR $S="c" THEN CLS:PROC_Header:PROC_Ci:PROC_Header:PROC_Start:GOTO 580
320 GOTO 260
330 LET min=min:sec=sec
340 PROC_Header
350 PROC_Info5
360 PROC_Duration
370 PROC_Info3
380 $MOTOR 1
390 DN ERROR GOTO 520
400 REPEAT:REPEAT
410 TIME=0
420 REPEAT UNTIL TIME=95
430 IF sec<10 THEN FOR B=13 TO 14:PRINT TAB(14,B);CHR$(141);CHR$(134);"0";min;"0";sec:NEXT
440 IF sec>9 THEN FOR B=13 TO 14:PRINT TAB(14,B);CHR$(141);CHR$(134);"0";min;"1";sec:NEXT
450 Stop=INKEY(0)
460 IF Stop=27 THEN GOTO 520
470 sec=sec-1
480 UNTIL sec=-1
490 min=min-1
500 sec=59
510 UNTIL min=-1
520 $MOTOR 0
530 PROC_Info1
540 VDU7
550 FOR R=1 TO 5000:NEXT:REM Time for Repeater to RE-SET
560 PROC_Info4
570 $FXI5,0
580 $S=GET$
590 IF GET$="" GOTO 330
600 IF GET$="E" OR GET$="e" THEN RUN
610 GOTO 580
620 DEFPROC_Chanfreq
630 CLS:FOR A=5 TO 6:PRINT TAB(2,A);CHR$(141);CHR$(130);"Conversion Frequency to Channel":NEXT
640 PROC_Cursor_off
650 PRINT" CHR$(131);"INPUT Frequency as decimal, e.g. 0.275"
660 PRINT TAB(5,12);CHR$(130);".... then press RETURN"
670 INPUT Freq
680 PRINT TAB(0,10);" "
690 LET Freq=Freq*1000
700 LET CH=(Freq/25)
710 LET H=INT(CH)
720 IF CH>H OR CH<40 THEN CLS:FOR A=12 TO 13:PRINTTAB(9,A);CHR$(141);CHR$(132);"ERROR---INPUT AGAIN":NEXT A:FOR B=1 TO 2500:NEXT B:GOTO 520
730 FOR A = 12 TO 13:PRINT TAB(6,A);CHR$(141);CHR$(132);"145.";Freq;"MHz = Channel ";CH:NEXT A
740 $=Freq/1000+145:REM Check if channel is reserved
750 PROC_Reserved
760 PRINT" CHR$(136);CHR$(135);CHR$(157);CHR$(129);"Do you want another go? Yes/No?"
770 Ans=GET$
780 IF Ans="Y" OR Ans="y" GOTO 620:ELSE ENDPROC
790 GOTO 770
800 ENDPROC

```

```

810 DEFPROC_Freqchan
820 CLS:FOR A=5 TO 6:PRINT TAB(2,A);CHR$(141);CHR$(130);"Conversion Channel to Frequency":NEXT
830 PROC_Cursor_off
840 PRINT" TAB(5);CHR$(131);"Input Channel Number 0 - 40."
850 PRINT TAB(4,12);CHR$(130);".... then press RETURN"
860 INPUT M
870 PRINT TAB(0,10);" "
880 IF M<0 OR M>40 CLS:FOR A=12 TO 13:PRINTTAB(9,A);CHR$(141);CHR$(132);"ERROR---INPUT AGAIN":NEXT A:FOR B=1 TO 2500:NEXT B:GOTO 820
890 LET Q=(M*25/1000)+145
900 FOR A=12 TO 13:PRINT TAB(4,A);CHR$(141);CHR$(132);"Channel No. ";M;" = ";Q;"MHz":NEXT A
910 PROC_Reserved
920 PRINT" CHR$(136);CHR$(135);CHR$(157);CHR$(129);"Do you want another go? Yes/No?"
930 Ans=GET$
940 IF Ans="Y" OR Ans="y" GOTO 820:ELSE ENDPROC
950 GOTO 930
960 ENDPROC
970 DEFPROC_Duration
980 PRINT TAB(0,B);CHR$(132);CHR$(157);CHR$(135);"Repeater Timer set to ";min;"Mins ";sec;"Sec
990 IF min<2 THEN PRINT TAB(0,B);CHR$(132);CHR$(157);CHR$(135);"Repeater Timer set to ";min;"
1000 ENDPROC
1010 DEFPROC_Info1
1020 PRINT TAB(11,5);CHR$(134);"TRANSMITTER";CHR$(130);"OFF"
1030 PRINT TAB(0,19);CHR$(136);CHR$(135);CHR$(157);CHR$(129);" REPEATER IS RE-SETTING"
1040 ENDPROC
1050 DEFPROC_Info2
1060 PRINT TAB(0,20);CHR$(135);CHR$(157);CHR$(133);" INPUT A LETTER TO SELECT"
1070 ENDPROC
1080 DEFPROC_Info3
1090 PRINT TAB(11,5);CHR$(134);"TRANSMITTER";CHR$(129);"ON"
1100 PRINT TAB(0,19);CHR$(136);CHR$(157);CHR$(132);" Talking Time Left "
1110 ENDPROC
1120 DEFPROC_Info4
1130 PRINT TAB(0,19);CHR$(135);CHR$(157);CHR$(132);"Wait until you hear the "K" then:"
1140 PRINT TAB(0,21);CHR$(129);CHR$(157);CHR$(134);" Press space-key 'TWICE' to TRANSMIT"
1150 PRINT TAB(0,23);CHR$(129);CHR$(157);CHR$(134);" Press 'E' to Exit to Menu "
1160 ENDPROC
1170 DEFPROC_Info5
1180 PRINT TAB(0,23);CHR$(136);CHR$(129);CHR$(157);CHR$(134);" To STOP transmitting press ESCAPE"
1190 ENDPROC
1200 DEFPROC_Info6
1210 PRINT TAB(0,22);CHR$(136);CHR$(129);CHR$(157);CHR$(134);"Remember - Mobiles & Portables FI
1220 PRINT TAB(0,23);CHR$(136);CHR$(129);CHR$(157);CHR$(134);"*****"
1230 ENDPROC
1240 DEFPROC_Start
1250 FOR A=8 TO 9:PRINT TAB(0,A);CHR$(141);CHR$(136);CHR$(129);CHR$(157);CHR$(134);"WAIT UNTIL
1260 FOR A=14 TO 15:PRINT TAB(0,A);CHR$(141);CHR$(132);CHR$(157);CHR$(134);" then PRESS the Spa
1270 ENDPROC
1280 DEFPROC_Header
1290 CLS:FOR A=1 TO 2:PRINT TAB(7,A);CHR$(141);CHR$(130);"Repeater Timer- G3NGD":NEXT A
1300 FOR A=3 TO 4:PRINT TAB(7,A);CHR$(141);CHR$(130);"-----":NEXT A
1310 ENDPROC
1320 DEFPROC_Cursor_off
1330 VDU23;B20;0;0;0;1:REM FLASHING CURSOR OFF
1340 REM FOR BASIC 1.0 FLASHING CURSOR OFF is VDU23,1,0;0;0;0;
1350 ENDPROC
1360 DEFPROC_Reserved
1370 IF Q=145.6 AND Q<=145.775 PRINT" CHR$(129);TAB(2);"THIS IS A REPEATER OUTPUT CHANNEL"
1380 IF Q=145 AND Q<=145.175 PRINT" CHR$(129);TAB(2);"THIS IS A REPEATER INPUT CHANNEL"
1390 IF Q=145.8 AND Q<=146 PRINT" CHR$(129);TAB(2);"THIS IS RESERVED FOR SATELLITES"
1400 IF Q=145.5 PRINT" CHR$(129);TAB(6);"THIS IS THE CALLING CHANNEL"
1410 IF Q=145.2 PRINT" CHR$(129);TAB(6);"THIS IS THE RAYNET CHANNEL"
1420 IF B=145.3 PRINT" CHR$(129);TAB(1);"THIS IS THE RTTY (FM - AFSK) CHANNEL"
1430 ENDPROC
1440 DEFPROC_C
1450 PRINT TAB(4,8);CHR$(129);"INPUT the Repeater Time-out"
1460 PRINT TAB(8,18);CHR$(131);"....then press RETURN"
1470 INPUT TAB(8,12);"Minutes = ";min
1480 IF min<0 OR min>5 THEN FOR B=20 TO 21:PRINT TAB(0,B);CHR$(141);CHR$(136);CHR$(130);"Think
of others - KEEP OVERS SHORT":NEXT B:FOR A=1 TO 5000:NEXT A:CLS:GOTO 1450
1490 INPUT TAB(8,14);"Seconds = ";sec
1500 IF sec<0 OR sec>59 THEN FOR B=20 TO 21:PRINT TAB(0,B);CHR$(141);CHR$(136);CHR$(130);"Don't
be SILLY!":NEXT B:FOR A=1 TO 5000:NEXT A:CLS:GOTO 1450
1510 LET min=INT(min):LET sec=INT(sec)
1520 ENDPROC

```

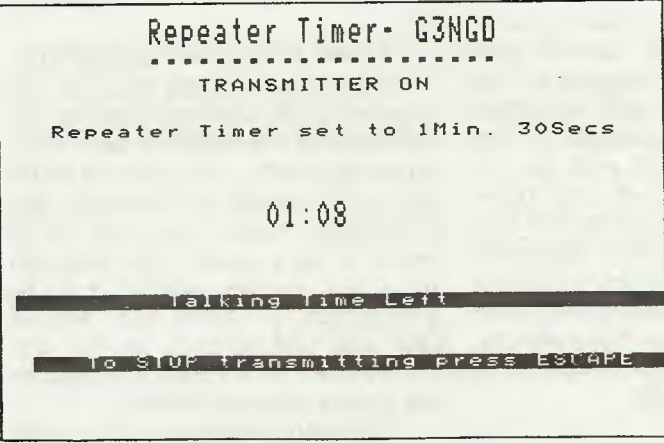


Fig. 2



Fig. 3

Conversion Frequency to Channel

INPUT Frequency as decimal. e.g. 0.275

145.300MHz = Channel 12

THIS IS THE RTTY (FM - AFSK) CHANNEL

Do you want another go? Yes/No?

Fig. 4

you to transfer to a particular channel or frequency. Some transceiver dials display the exact frequency, whilst others show a channel number. It was with this in mind that two extra options were included:

H. If the decimal part of the frequency is input here, the channel number will be calculated and displayed on the screen (Fig. 4).

Conversion Channel to Frequency

Input Channel Number 0 - 40.

Channel No.8 = 145.2MHz

THIS IS THE RAYNET CHANNEL

Do you want another go? Yes/No?

Fig. 5

F. Here, an input channel number (0 - 40) will be converted to frequency in the range 145 - 146MHz (Fig. 5).

If in options H and F, the channel requested is used by other Amateur services (e.g. Raynet), a note to this effect is printed on the screen. As FM working is normally confined to the frequency range 145 - 146MHz, it was not considered

necessary to include the range 144 - 145MHz. If however, this range is required, the decimal part of the frequency should be input in the normal way, and 1MHz subtracted from the result.

Although this utility is designed for the two metre amateur band, it should not be too difficult to modify the program to work for the seventy centimetre band if desired.

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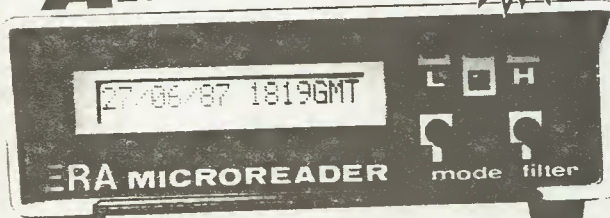
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2m to HF 4 BAND TRANSVERTER Part 2



components appear with a,b,c, and d suffixes in the component list. This was done so as to differentiate between the four local oscillators — eg. R32a is fitted to the top (160m) LO, R32b is fitted to the 80m LO and so on.

Local Oscillator Design

It struck me that if the local oscillator designs used earlier were good enough for G4DHF and G3WPO then there was no good reason for using some other circuit when all the potential bugs had been already ironed out. As a result the local oscillator design used here (see Fig. 5) is identical to that found in the earlier articles.

VSWR meter

The VSWR indicator is of a conventional design, employing a front panel mounted 100 microamp meter which gives a full scale deflection reading of about 10 watts. The circuit does not give a direct reading of SWR but measures

In this, the final part of our transverter project, Steve Hunt, G3TXQ, describes the final construction techniques and inter-board wiring

So far in this project we have dealt with the main transverter board, low-pass filter board and the theory behind the circuits' operation. The local oscillator circuitry was omitted for reasons of clarity in the first part but is shown here in detail. With the exception of the various coil windings, the layout of each of the four separate local oscillators is identical; component values for each range being detailed in the components list. Readers will note that certain resistors and other

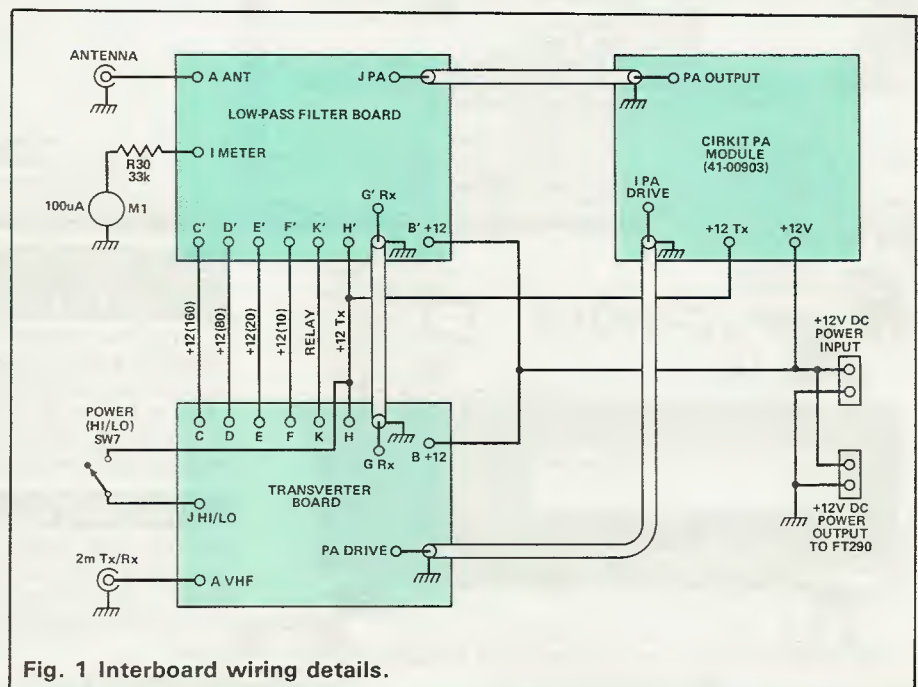
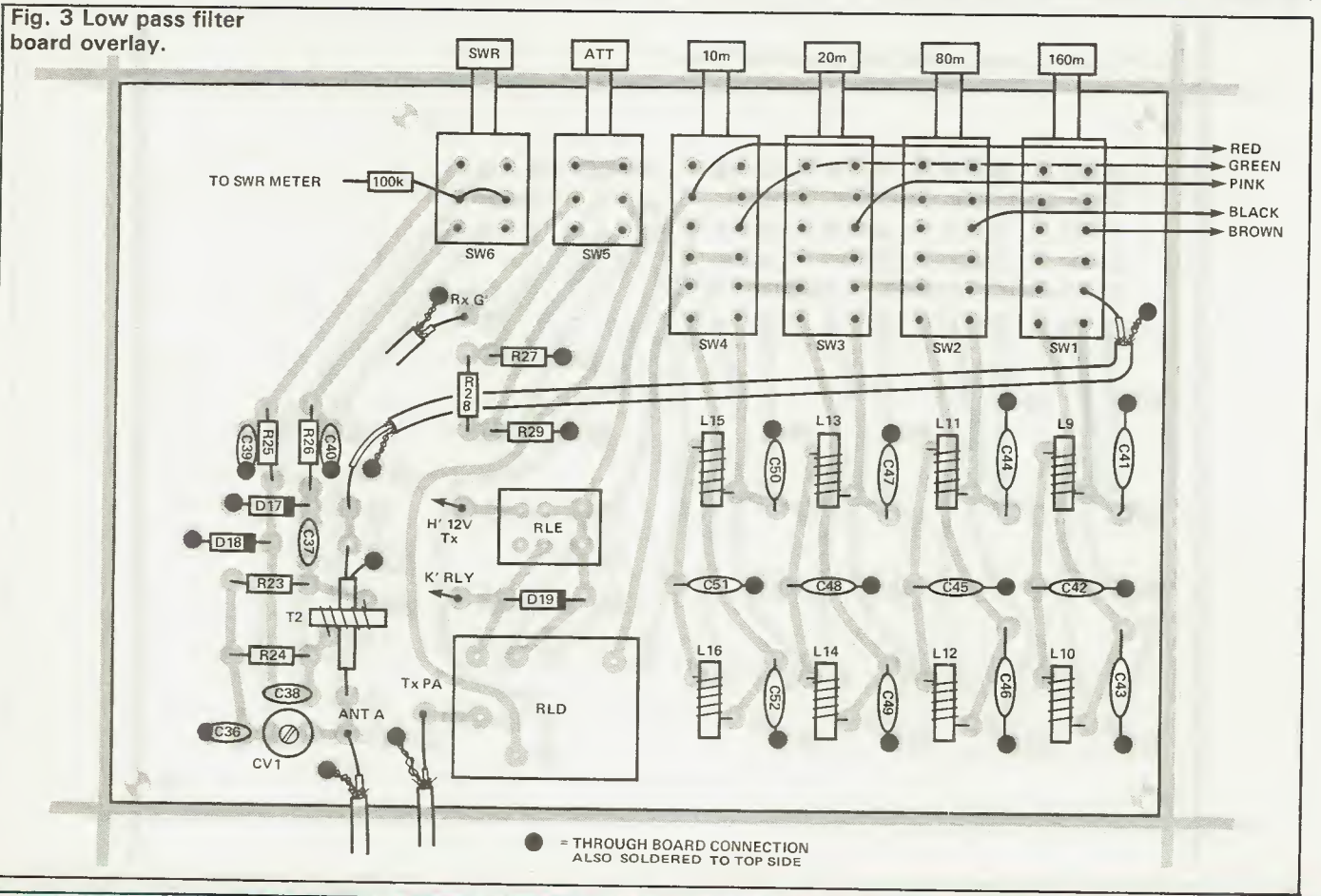
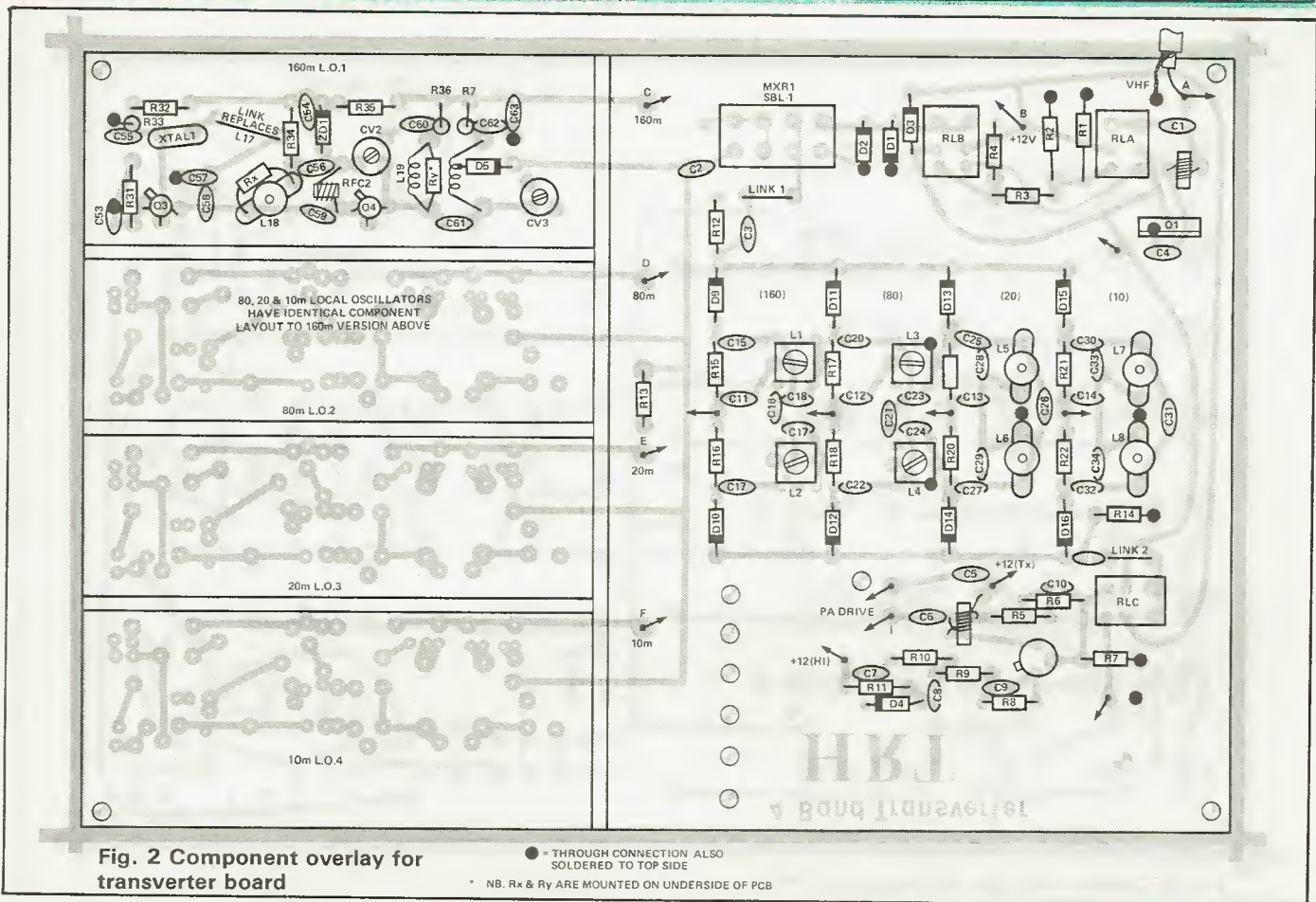


Fig. 1 Interboard wiring details.



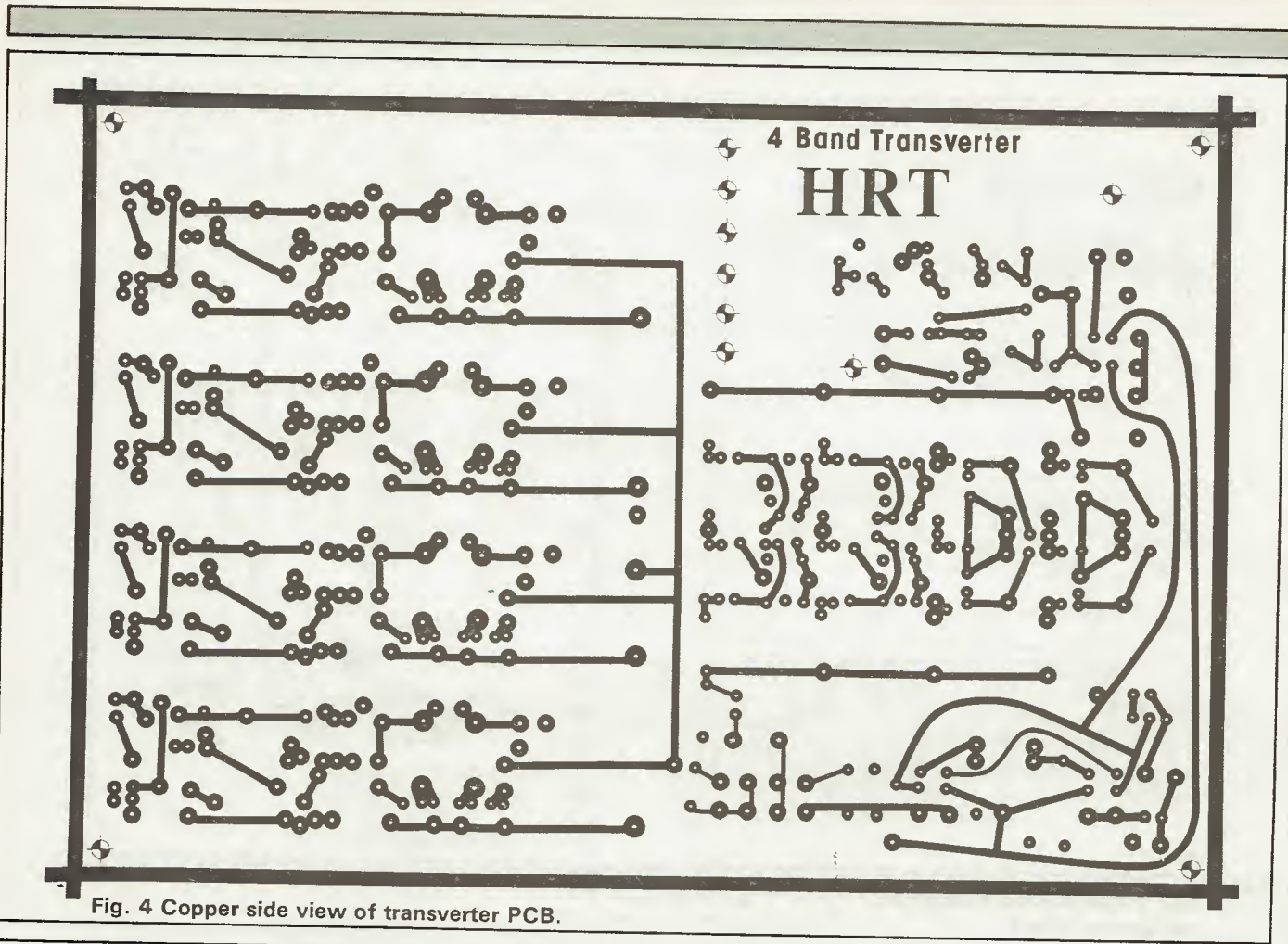


Fig. 4 Copper side view of transverter PCB.

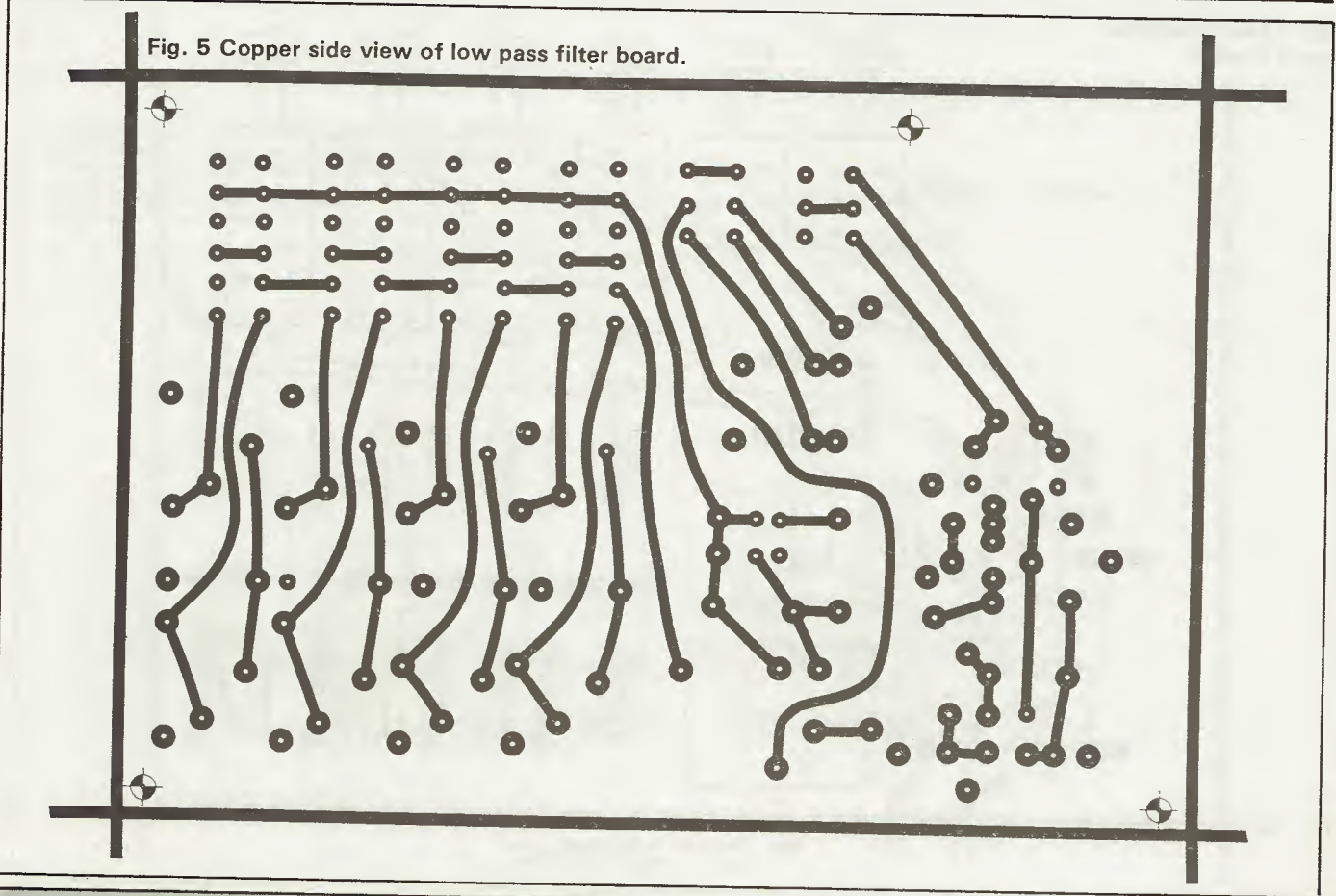


Fig. 5 Copper side view of low pass filter board.

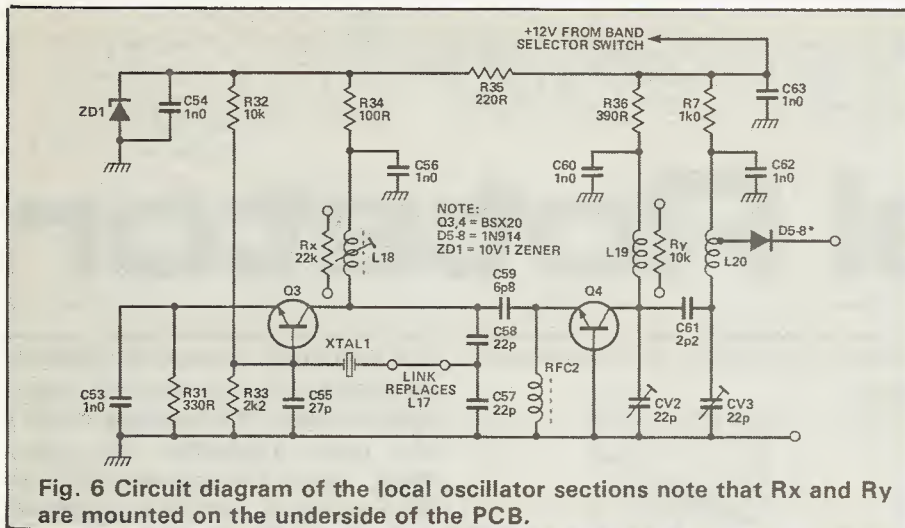


Fig. 6 Circuit diagram of the local oscillator sections note that Rx and Ry are mounted on the underside of the PCB.

the forward and reflected power levels independantly, according to the setting of the switch S6. The advantage of this design is that it is fairly immune to frequency variation and when in the 'forward power' position gives the operator a clear indication that she/he is getting out. In common with all the other switching functions in this project the VSWR switch S6 is part of a six-way bank of push button switches running cross the front panel of the transverter — the only exception being the Hi/Lo transmitter output level switch S7 which is mounted separately below the VSWR meter.

Construction

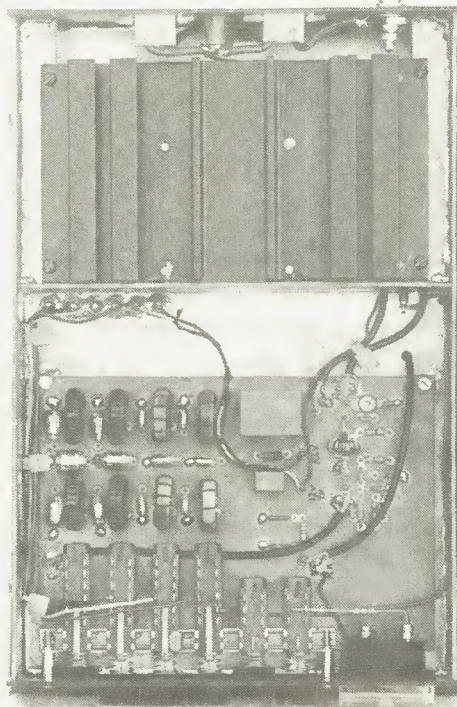
As mentioned previously, the transverter comprises of three PCBs; one for the transverter, one for the low pass filter bank and one for the PA module. Construction of the PA (Cirkit part No. 41-00903) need not concern you here as the kit is supplied with full instructions — only the minor modification referred to earlier has to be carried out.

The two remaining boards are very simple to construct being made up of double sided PCB material with component tracking on the underside and the top surface left as an earth plane. Adequate clearance must be provided where component leads pass through the earth plane and this can be done either by making up a second PCB mask so as to etch holes in the appropriate places, or alternatively the copper may be removed after the board has been drilled by means of a spot face cutter or larger drill bit. Earth connections can be made directly to the

earth plane bearing in mind that component leads should be kept as short as possible and in any event should not be longer than 2 or 3mm in the RF sections of the circuit.

Screening

With the exception of the top and bottom covers, the original transverter case was made entirely out of double sided PCB material in the shape of a four sided box. Initially a large piece of double sided board was cut out and then soldered to the mid point of four strips of PCB so that the final assembly had a 'floor' half way up from the bottom edge. The transverter board is mounted upside down in the lower 'tray' whilst the upper tray contains the low pass filter board (at the



front) and the PA module with heat-sink at the rear. When soldering the sheets of PCB material together it is important to make sure that the joint between adjacent walls and the floor consists of a continuous seam of solder, this not only ensures a good RF tight seal but also contributes to the rigidity of the final product.

The same technique should also be applied to the vertical seams and ideally to the double sided PCB screens which separate the local oscillator circuits from each other and the rest of the transverter. These screens need only be continued up to the edge of the transverter circuit board, there is no need to take them right to the walls of the case. As would be expected, the PA module located in the upper tray does need to be well screened, with a piece of double sided PCB material running across the whole width of the case and a solder seam used to make it RF tight. Two smaller pieces of PCB were added to the edges of the PA compartment — set a little way up from the floor so that the PA heatsink could be securely attached.

Alignment

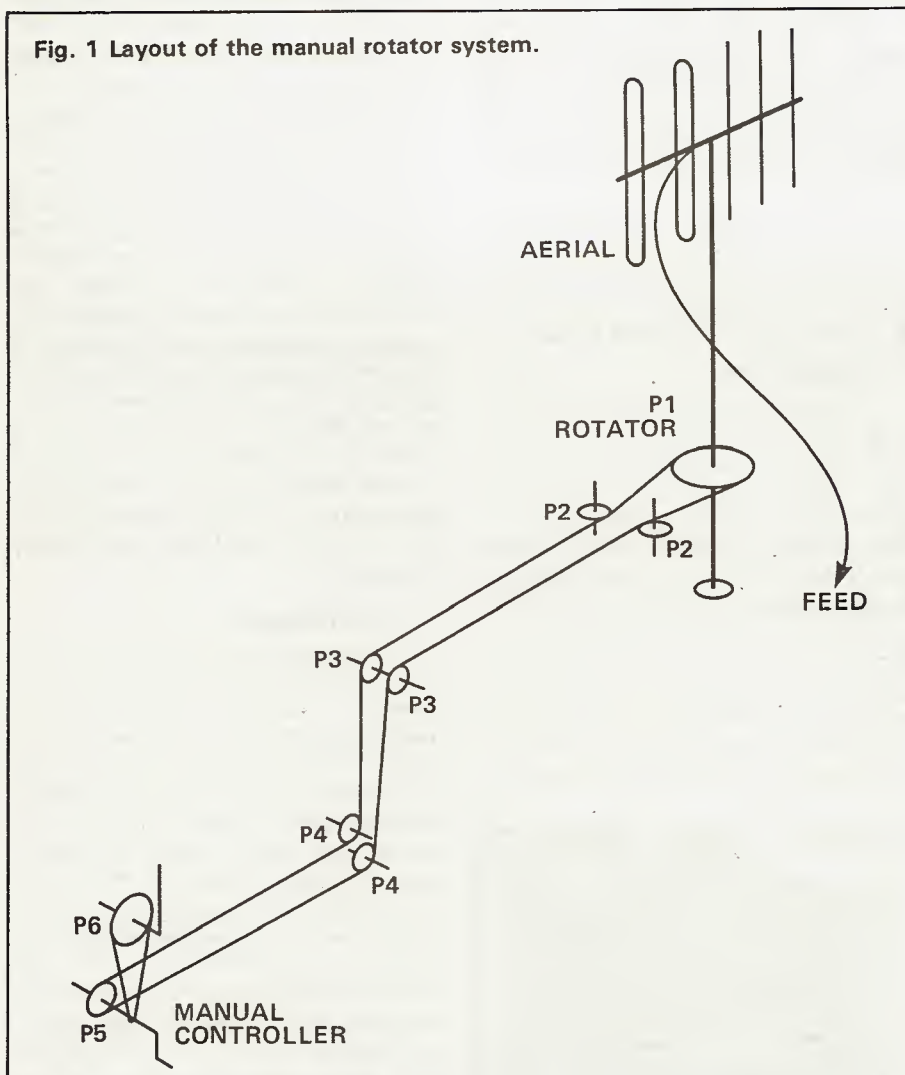
Conventional techniques for local oscillator alignment can be used, a suitable receiver or frequency meter will ensure that the LO is on frequency and working and either an RF probe or suitable receiver can be used to tune each LO for maximum output. The band-pass filters situated on the main transverter board can most easily be aligned with a signal generator, but if one is not available then the coil cores can be peaked for maximum received signal strength, although it may be found in some instances that slight stagger tuning offers better coverage of the band in question.

Before proceeding to the transmit mode it is perhaps worth noting once more than the maximum input to the transverter should be no more than 0.5W — if you are in any doubt about your transceiver output power, get it measured!

Finally, make sure that the chosen box and intercabling are of a suitable standard to ensure good RF screening, power up your project and get onto those HF bands!

Shoe String Aerial Rotator

Fig. 1 Layout of the manual rotator system.



was fortunate enough to obtain a secondhand rig for the two metre band through the evening class I had been attending. The other major item of equipment was an efficient aerial, which I felt would not be too difficult for home construction. How sad that radio circuitry generally has developed way above the capabilities of the average amateur. However, I digress, so back to aeri-als.

My immediate requirement was for something that would cost next to nothing, be simple to construct and suitable for mounting in the loft. Here the 'Slim Jim', so clearly described by FC Judd G2BCX in 'Out of Thin Air' seemed ideal. Material used was 14swg. copper wire bent to shape for the element, thin nylon cord for staying between rafters and floor joists and a plastic lid from which spacers and insulators were cut. It proved an instant success.

ZL Special

I then became more enthusiastic and ambitious, thirsting for that extra gain and selectivity to bring in the more remote stations which could only be achieved by the use of a beam aerial and would require some form of rotator to provide full 360 degrees coverage. The five element 'ZL Special' so well described by the same author fitted these parameters admirably. The elements were of 6mm diameter aluminium tube, 32mm diameter plastic waste pipe was used for the supporting boom etc, kitchen foil for the $\frac{1}{4}$ wave unbalanced to balanced co-axial connection and 18swg copper wire for the cross-over between the two driven elements. A 50pf tuning capacitor was also included across the aerial co-axial lead terminals and adjusted for the best SWR reading which turned out to be 1.2:1.

Having tested the 'ZL Special' as a hook-up job on a pair of steps in

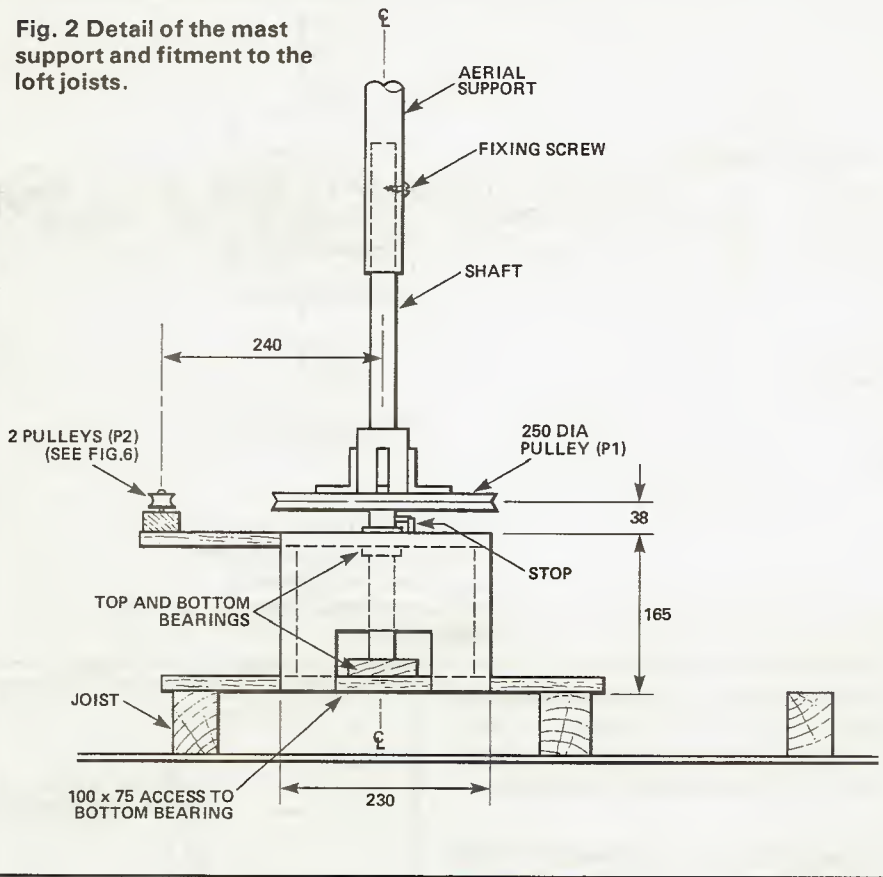
Strapped for cash or sick of having emergency power for the rigs but not for the rotator? Then why not build this novel manual rotator designed by K Neville, G1XLP - it's fun and functional!

From a personal point of view, retirement with all its financial restraints, has been the motivation for the many happy (and sometimes frustrating) hours I have spent (and still spend) working out practical solutions to simple, but otherwise,

costly items of equipment in the field of amateur radio.

With congratulations on passing the 'B' Licence examination behind me, my first consideration was to get on the air as quickly as possible. Here luck played a part. I

Fig. 2 Detail of the mast support and fitment to the loft joists.



shown in Fig. 2 and 3. All timber being of ample thickness for rigidity. The base spans two floor joists and when assembled and lined up, should be firmly screwed down to prevent movement. The top bearing is merely a plastic container, cut to form a sleeve which is glued and fitted into a suitable hole cut to size in the top of the rotator base. The bottom bearing is an old discarded ball race fitted into a recess in the base. The shaft of the rotator is then fed through the top bearing to locate in the bottom bearing and hence permit free circular movement. The shaft is 25mm sq. timber cut to required length. A layer of thin plastic or celluloid approximately 25mm wide is wrapped round the shaft and tacked in place at the point of contact with the top bearing to prevent wear on the shaft. The lower end of the shaft is formed to provide a push fit into the bottom bearing. A simple alternative providing minimum friction at this point may be obtained by the use of drawing pins and a locating sleeve as shown in Fig. 3(a). A 250mm diameter pulley formed from 12mm,

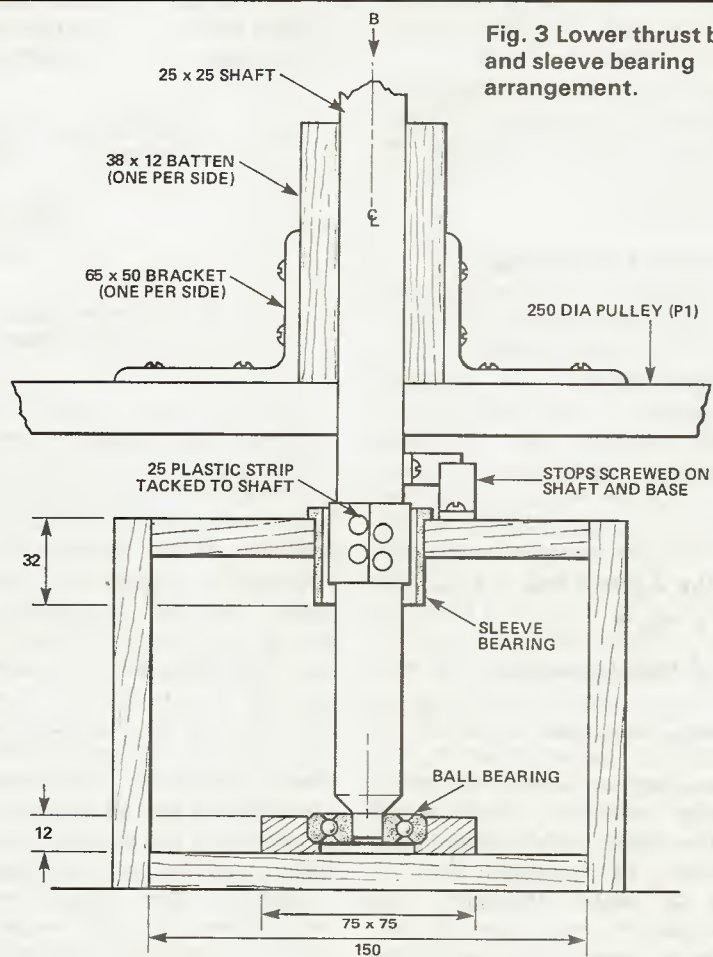
the garden, and finding its gain over the 'Slim Jim' quite remarkable, the next step was its installation in the loft space, utilising some means of rotation to take advantage of its directive properties. This, of course, applies to any beam aerial so the following simple to construct rotator may be used with any array of your choice.

Manually Operated Rotator

The device to be described is shown in schematic form in Fig. 1. I would not presume to even faintly compare it with a Heath Robinson masterpiece, but it may give rise to some amusement; however, the end product does work, having been in constant use for the past eight months, so those with a taste for adventure please read on! A corner of the second bedroom is used as the shack and the distance from there to the most convenient position for the aerial in the loft space is five metres. Note that when siting the aerial, sufficient space must be allowed between the aerial and local roof supports for the free movement of the beam through 360 degrees.

The rotator was constructed as

Fig. 3 Lower thrust bearing and sleeve bearing arrangement.



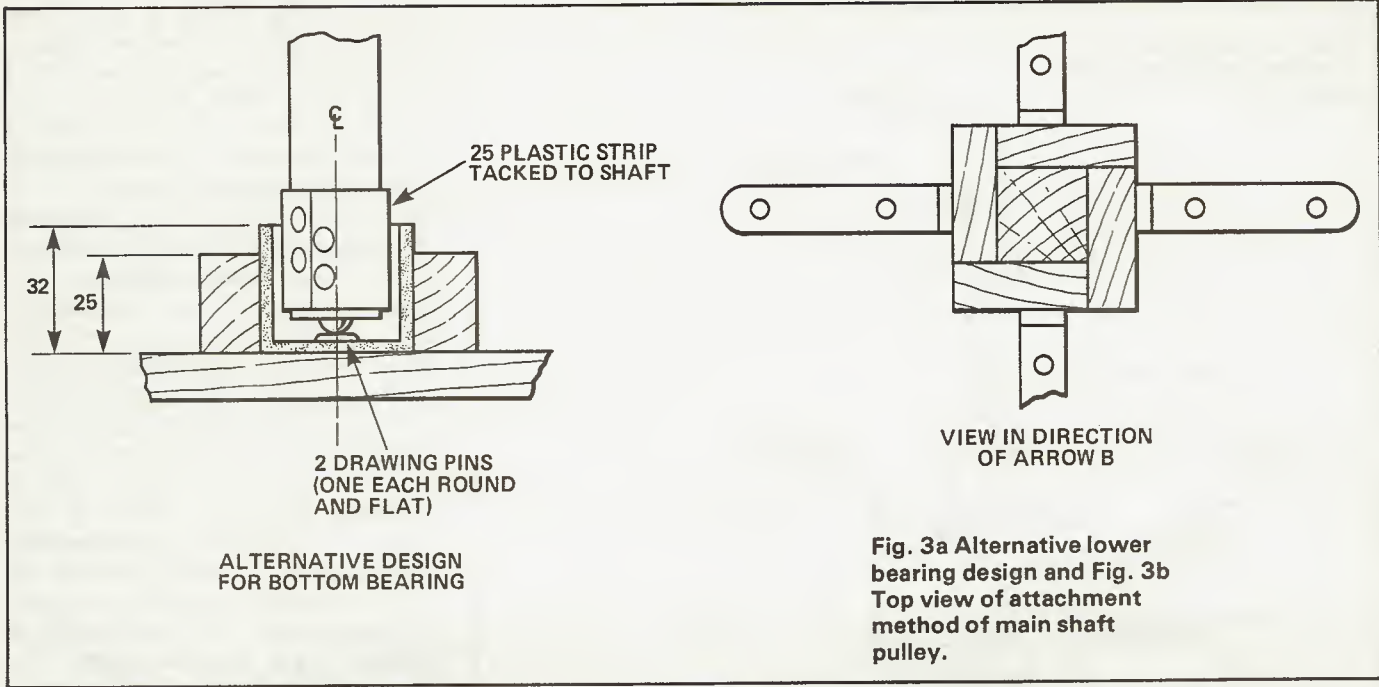


Fig. 3a Alternative lower bearing design and Fig. 3b Top view of attachment method of main shaft pulley.

thick chipboard has a hole cut centrally to take the shaft, and a continuous 'V' shaped groove round the periphery to take 1½ turns of nylon control cord. Wear on the pulley may be prevented by tightly stretching insulating tape over the full length of the groove and bedding it in to shape. This has proved quite successful in practice.

To confine rotation of the aerial to one revolution, stops are fitted to the shaft and base as indicated, so arranged as to locate the north point when in operation.

Manual Controller

The manual controller is fitted in the shack and details of its construction are shown in Fig. 5. The control box may be of any suitable sturdy timber to hand but should basically conform to the inside dimensions indicated. Having decided upon the route the control cord will follow into the loft, a slot (or hole) should be cut in the top or side of the control box to suit. The control cord is wound 1½ turns around a 25mm diameter pulley which is fixed securely to the winder shaft after assembly is complete. The winder is part of an old windscreen wiper assembly, but other alternatives will surely come to mind eg. Meccano or even wood dowel complete with rubber door stop serving as the pulley etc. To indicate in which direction the aerial is pointing, a separate pulley assembly is used, connected to the

winder shaft by rubber band. In order to limit the pointer to one revolution, the pulley diameter will need to be calculated as follows:

$$\frac{\text{Rotator Pulley diameter}}{\text{Winder pulley diameter}} = \frac{\text{Indicator Pulley diameter}}{\text{Winder shaft diameter}}$$

eg. $\frac{250\text{mm}}{25\text{mm}} = \frac{X}{6\text{mm}}$

ie. $X = \frac{250 \times 6}{25}$

ie. X = 60mm diam. (Indicator pulley diam.)

Having ascertained the size of indicator pulley required (and prior to fitting same) a piece of white card is cut to suit and then glued to the face of the control box central to the location of the indicator for later calibration. Next, the indicator pulley may be constructed using two plastic lids glued back to back and strengthened with wood stays one of which has a recess cut centrally for keying purposes. The key is simply an electrical cable connector with insulation removed, and the depth of recess should be made to take half the length of the connector without its grub screw. The connector (key) should then be firmly glued into the recess leaving half the connector protruding com-

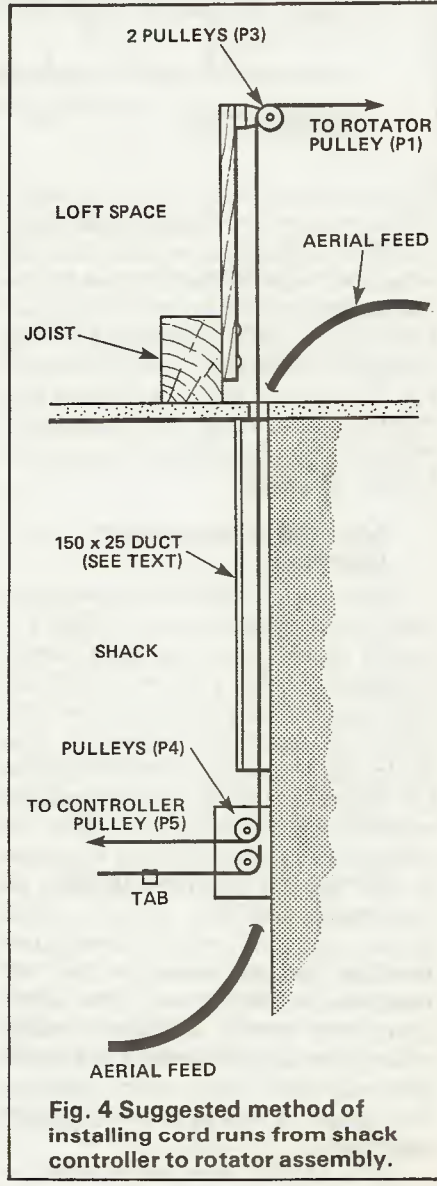


Fig. 4 Suggested method of installing cord runs from shack controller to rotator assembly.

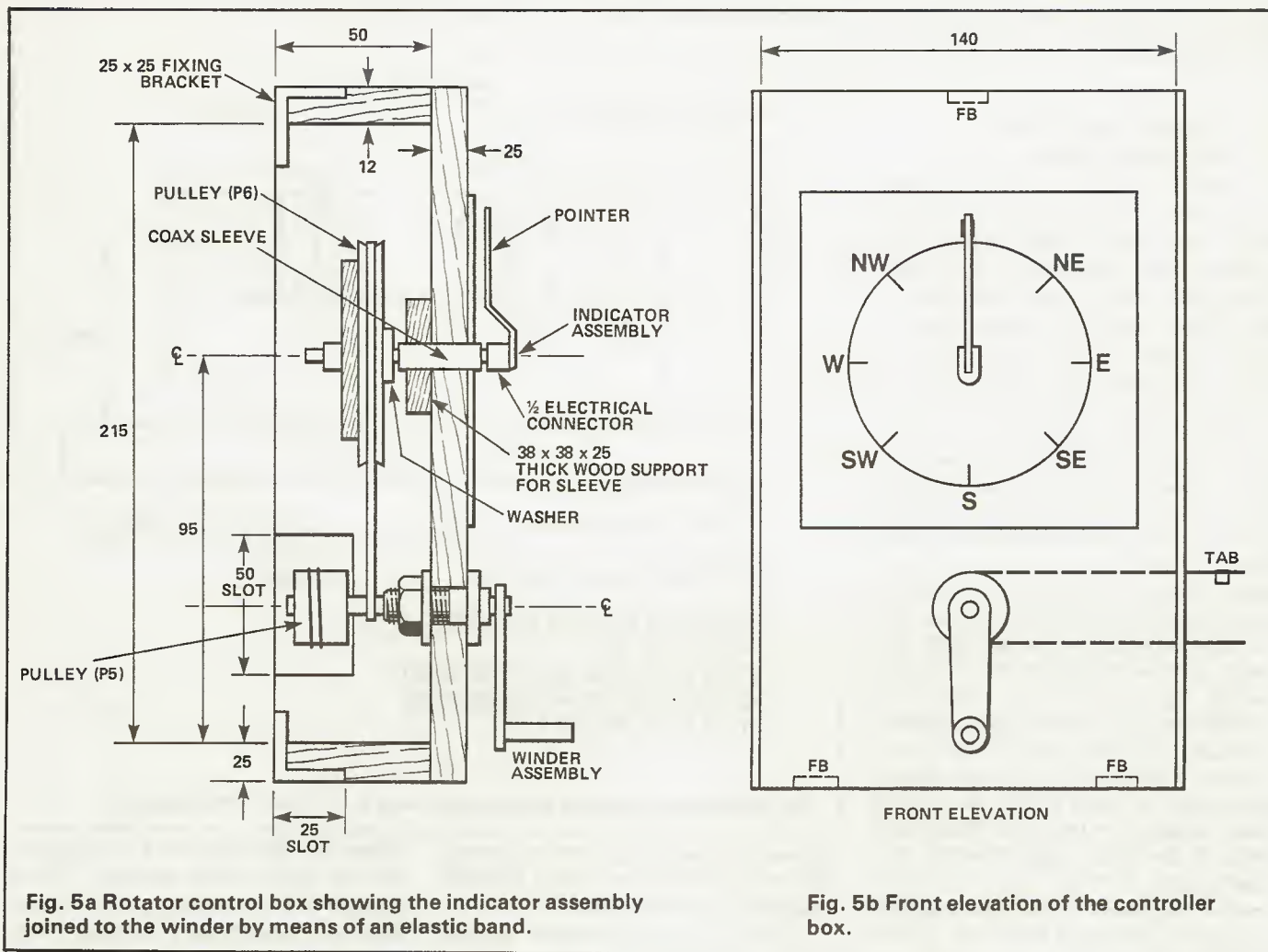


Fig. 5a Rotator control box showing the indicator assembly joined to the winder by means of an elastic band.

Fig. 5b Front elevation of the controller box.

plete with grub screw for fixing on to the indicator shaft. A length of 18swg steel wire is next bent to form the pointer and indicator shaft which, with its spacer (1/2 an electrical cable connector with insulation removed), is then threaded through the sleeve bearing (inner co-axial insulation) in the control box front panel, after which the indicator pulley is slid onto the shaft and firmly screwed on, leaving only slight slack on the shaft. A rubber band, as previously mentioned, stretched between the winder shaft and indicator pulley completes the manual controller.

Remote Activation of the Rotator

Activation of the Rotator from the controller is accomplished by means of a continuous nylon cord fitted over small pulley assemblies where change in direction of the nylon cord is necessary en route as indicated in Fig. 4. Pulley assemblies removed from an old cassette player were used, mount-

ing on timber off-cuts and rawl plugged to the shack wall and screwed to floor joists in the left space to suit. The nylon cord is then wound 1 1/2 turns on the rotator and

winder pulleys to prevent slip, and joined at a convenient point on a straight section between pulleys to prevent fouling. The nylon cord should be reasonably taught

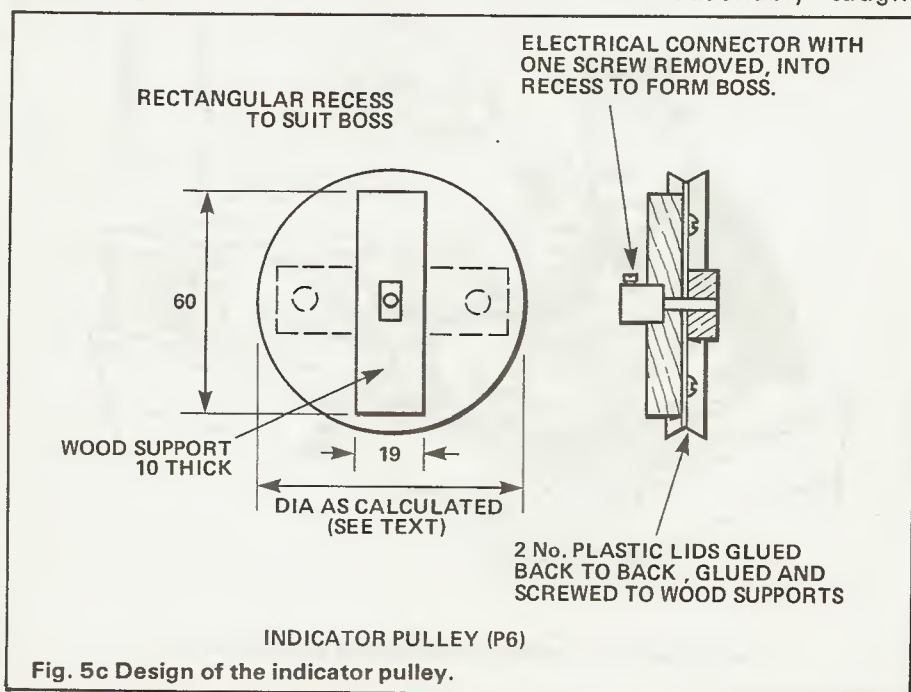
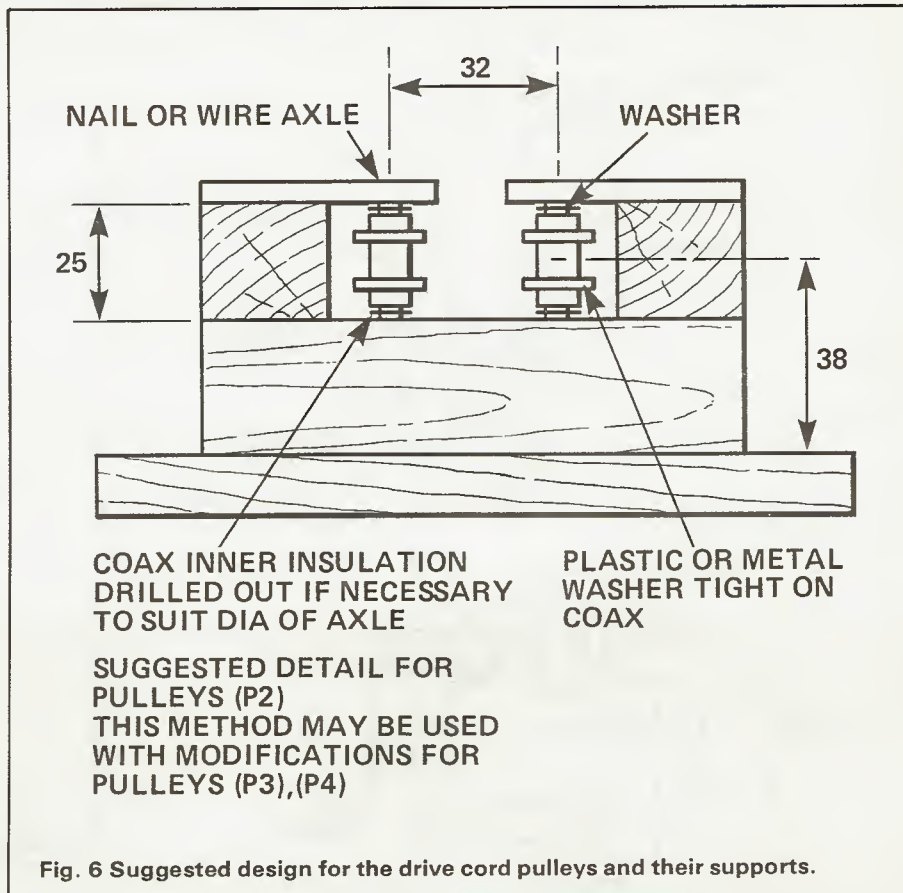


Fig. 5c Design of the indicator pulley.

without placing too much strain on the mechanism.

Calibration of the Indicator Dial

When the manual controller has been fitted on the shack wall with the usual rawl plugs and screws, the indicator dial may be calibrated. This is accomplished by gently turning the winder handle anticlockwise until resistance is felt, which coincides with the limit of the rotator travel in that direction. At this juncture, adjust the aerial to point towards true north (allowance being made for the compass reading magnetic north). This setting should then be transferred to the indicator dial at the 12 o'clock position and the pointer adjusted and retightened on the shaft. Slowly turn the winder handle clockwise until the stop in that direction is reached, which again indicates north, the aerial having made one rotation through 360 degrees. This is not strictly true due to the thickness of the material used for the stops, but near enough in practice. This point should be lightly pencilled on the dial and it is then quite a simple matter to pencil in the intermediate compass points as required. Check



the aerial against the setting on the dial after which the points may be marked in permanently.

Should the compass points

either not take up the full circle or, on the other hand overlap, this is due to the indicator pulley being over or under-sized respectively. However, this should not cause any inconvenience in practice. To give pre-warning that the aerial has reached the limit of its travel in either direction, tabs of insulating tape were stuck to the control cords immediately adjacent to their outlet from the control box. To disguise any work carried out in the shack, a 150 x 50mm vertical duct 120mm high was fitted directly below ceiling level and covered in matching wallpaper see Fig. 4. This comprises two compartments of 100 x 50mm and 50 x 50mm for the nylon cord and co-axial aerial lead(s) respectively. The lower end is hidden behind a wardrobe and from there the nylon cords and aerial leads travel horizontally to the controller and aerial socket on the rigs.

As a further inducement to any reader contemplating constructing this inexpensive rotator, the total financial outlay amounted to under £2. Obviously the cost will rise should it be necessary to purchase any major items, but by using your ingenuity you will be surprised at the end result!



RADIO Tomorrow

- 1 Jun** Cheshunt DARC: NFD preparation. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm
Wirral DARC: Practice DF Hunt, meet at the Irby Cricket Club, Irby Mill Road, Irby. 8.00pm start
Wirral ARS: Surplus sale at Ivy Farm, Arrowe Park Rd, Wirral. Details from: G3VEB on 051 638 1346
S Bristol ARC: Bristol Rally 1988 — Briefing at the Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol. Details from Len, G4RZY on Whitchurch 834282
- 2 Jun** North Wakefield RC: Bar-B-Q. Details Steve Thompson, G4RCH. Leeds 536633
Horsham ARC: Talk 'Independent TV' by Robin Powell G3OGP. Guide Hall, Denne Road, Horsham.
Mid Sussex ARS: Anniversary evening at Jack & Jill Windmills, Clayton.
Meirion ARS: Talk 'Software & Computers' by GW3RRI at the Dolgellau Hall, 8pm
Ponterfract DARS; Talk by RAYNET County Controller Colin Thomas G3PSM at the Carleton Community Centre, Carleton Road, Pontefract at 8.00pm
Salop ARS: Junk Sale
Yeovil ARC: Junk Sale at The Recreation Centre, Chilton Grove, Yeovil
Vale of Evesham RAC: 2m Fox hunt. MEB Club, Evesham (B4084, on left entering town) at 7.30pm. Talk-in on S22 from 7pm. 50p car entry. £10 prize.
- 3 Jun** Loughton DARS: HF DF Hunt. 7.30pm start for 7.45pm first call. Freq. 1910kHz. Loughton Hall, Rectory Lane, Loughton, Essex.
HF National Field Day.
- 4/ National Field Day Contest**
- 5 Jun** Stevenage ARS: HF Field Day
- 5 Jun** Bolton ARC: Rally. Deane Sports Complex, New York, Bolton, Greater Manchester
Spalding DARS: Rally. 10am onwards at Springfield Gardens, Spalding, Lincs. Details from Terry, G4TWR on (0775) 2940
- 6 Jun** Stourbridge ARS: Informal meeting
Todmorden DARS: Talk, 'Clandestine Radio' by Gordon Adams, G3LEQ. 8pm. Queen Hotel, Todmorden.
Welwyn-Hatfield ARC: Summer social barbeque plus model aircraft display. (Provisional cost £2.50)
Lemsford Village Hall, Brocket Road, Lemsford
Stourbridge & DRS: Natter/On-air night. Robin Woods Centre, Beauty Bank, Stourbridge.
- 7 Jun** Flyde ARS: Talk 'Aerials for Confined Spaces' by H Fenton G8GG at The Kite Club, Blackpool Airport.
Stevenage ARS: Talk & Demonstration. "Shefford" 2m TCVR by members of Shefford club
Rugby ATS: Test gear night. 7.30pm. Cricket Pavilion, BTI Radio station, 'B' building entrance, A5 Trunk Road, Hillmorton
- 8 Jun** Wakefield & DRS: DF Contest.
Cheshunt DARC: Natter evening. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.
Fareham DARC: Talk 'Solving breakthrough' by Alan, G1WZZ. 7.30pm. Portchester Community Centre, Westlands Grove, Portchester, Hants
Wirral DARC: Club 10th Anniversary with Special Event Stations at the Irby Cricket Club, Irby Mill Road, Irby. 8.00pm start
S Bristol ARC: Packet Radio Evening at the Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol. Details from Len, G4RZY on Whitchurch 834282
Farnborough DRS: Quiz evening at the Railway Enthusiasts Club, 103 Hawley Lane, Farnborough at 7.30pm. Details from Tim on Camberley 29321
- 9 Jun** North Wakefield RC: On the air. G4NOK Details - Steve Thompson, G4RCH. Leeds 536633
Mid Sussex ARS: Informal evening at Marle Place Adult Education Centre, Leylands Rd., Burgess Hill. Starts at 7.45pm.
Edgware DRS: Talk 'Digital Transmission for Amateurs — What does the future hold?' by E Kessler at Walting Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware
Ponterfract DARS: Committee meeting at the Carleton Community Centre, Carleton Road, Pontefract at 8.00 pm
Salop ARS: Natter night
Yeovil ARC: Talk Regulated PSUs by G3GC. 7.30pm. The Recreation Centre, Chilton Grove, Yeovil.
- 10 Jun** Itchen Valley RC: Surplus equipment sale
Wimbledon DARS: Talk 'Nuclear Magnetic Resonance in Medicine' by Dr J Griffiths at St Andrews Church Hall, Herbert Road, Wimbledon. Details from David G4RBA on (07373) 51559
Blackwood & DARS: Talk FT101ZD — a technical description by Ross Clare, GW3NWS. 7pm. Oakdale Community College.
- 12 Jun** Mid Lanark RS: Open Day. Bring & Buy, trade stands, demos of packet radio, RTTY, annual award of EH1 trophy, refreshments. Talk-in on S22. Venue — Community Centre, Newarthill, by Motherwell
Elvaston Castle Mobile Radio Rally
- 14 Jun** Malvern Hills RAC: Constructional competition, venue is the Red Lion, St. Annes Road Malvern
Dorking & DRS: Talk, 'Operating techniques' by Lawrence G4PNA
Rugby ATS: 2m DF. 7.30pm. Cricket Pavilion. BTI Radio station, 'B' building entrance, A5 Trunk road, Hillmorton
Wakefield & DRS: 144MHz Contest discussion/club aerial inspection.
- 15 Jun** Cheshunt DARC: British Telecom. Church Room,



- Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.
Wirral ARS: DF Hunt starting at Ivy Farm, Arrowe Park Rd, Wirral. Details from: G3VEB on 051 638 1346
S Bristol ARC: Computer Activity Evening at the Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol. Details from Len G4RZY on Whitchurch 834282.
- 16 Jun** North Wakefield RC: Trip on the 'Water Prince Floating Restaurant'. Details — Steve Thompson, G4RCH. Leeds 536633
Barry College of Further Education RS: Video 'SWL's in the early days of radio'
Mid Sussex ARS: Bring & Buy Tabletop sale. Tickets £1 in advance, £1.50 on the night, at Marle Place Adult Education Centre, Leylands Rd., Burgess Hill. Starts at 7.45pm.
Pontefract DARS: Talk 'CW Keys and Keying' by Dave G4OSY at the Carleton Community Centre, Carleton Road, Pontefract at 8.00pm
Salop ARS: RSGB Talk & presentation by GW4FRX
Vale of Evesham RAC: Club meeting — work on club caravan for contests, special event stations. MEB Club, Evesham (B4084, on left entering town).
Yeovil ARC: Talk The horizontal full wave dipole by G3MYM. 7.30pm. The Recreation Centre, Chilton Grove, Yeovil.
- 17 Jun** Sutton & Cheam RS: Inter-club quiz. CATS vs Sutton & Cheam RS at St Swithins Church Hall, Grovelands Road, Purley
Blackwood & DARS: Talk 'Planning permission' by Robert Morgan. 7pm Oakdale Community College.
- 18 Jun** S Bristol ARC: Club Open Day, Special call, GB2WFH at the Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol. Details from Len, G4RZY on Whitchurch 834282.
- 19 Jun** Wakefield & DRS: Practical Wireless VHF QRP contest
- 20 Jun** Stourbridge ARS: Informal meeting
Todmorden DARS: Natter night. 8pm. Queens Hotel, Todmorden
Welwyn-Hatfield ARC: VHF Field Day preparation
Knightsfield Scout HQ opposite Ingles. Welwyn Garden City
Stourbridge & DRS: Summer surplus sale. Robin Woods Centre, Beauty Bank, Stourbridge
- 21 Jun** Midland ARS: Treasure Hunt
Fylde ARS: Informal meeting at The Kite Club
Blackpool Airport
Rugby ATS: Talk, 'QRP kits' by C.M. Howes
- Communications 7.30pm. Cricket Pavilion, BTI Radio station, 'B' building entrance, A5 Trunk Road, Hillmorton
Wakefield & DRS: RSARS Talk by G4RBY
- 22 Jun** Cheshunt DARC: Natter evening. Church Room, Church Lane, Wormley, Nr. Cheshunt, Hert. 8pm
Wirral DARC: Bar-B-Que at Heswall Shore
Farnborough DRS: VHF Field Day review at the Railway Enthusiasts Club, 103 Hawley Lane, Farnborough at 7.30pm. Details from Tim on Camberley 29321
S Bristol ARC: Briefing for VHF NFD at the Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol. Details from Len, G4RZY on Whitchurch 834282
- 23 Jun** North Wakefield RC: Natter night. Details — Steve Thompson, G4RCH. Leeds 536633
Mid Sussex ARS: Informal evening at Marle Place Adult Education Centre, Leylands Rd., Burgess Hill. Starts at 7.45pm
Edgware DRS: Antenna Surgery — or How to Cut Your Wire Antennas by G4GYS at Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware.
Pontefract DARS: Annual Open HF Hunt starting at the Carleton Community Centre, Carleton Road, Pontefract at 8.00pm
Salop ARS: Natter night
Yeovil ARC: Talk 'Sporadic E propagation' by G3MYM. 7.30pm. The Recreation Centre, Chilton Grove, Yeovil
- 24 Jun** Itchen Valley RC: RSGB video tapes — 'Amateur Radio's Newest Frontier WSLFL Space Shuttle' 'New World of Amateur Radio ARRL'
Wimbledon DARS: Club Bazaar at St Andrews Church Hall, Herbert Road, Wimbledon. Details from David G4RBQ on (07373) 51559
Stevenage ARS: Committee meeting
Blackwood & DARS: Natter nite. 7pm. Oakdale Community College
- 25 Jun** Meirion ARS: Special Event Station GBOTPR at Barmouth for the 'The Peaks' sailing, climbing & running race from Wales to Scotland. Operating HF and VHF from 10am to 10pm
- 26 Jun** Longleat Mobile Radio Rally
- 27 Jun** Atherstone ARC: Club night on the air. Held at the Physics Laboratory, Atherstone Upper School, Long Street, Atherstone
- 28 Jun** Dorking & DRS: VHF National Field Day planning
Rugby ATS: Mid-summer barbecue. 7.30pm. Cricket

- Pavilion, BTI Radio station, 'B' building entrance, A5 Trunk road, Hillmorton
Wakefield & DRS: On the air
- 29 Jun** Wirral DARC: Eileen Medley DF Cup, meet at the Irby Cricket Club. Irby Mill Road, Irby. 8.00pm start
- 30 Jun** North Wakefield RC: Monthly meeting. Details — Steve Thompson, G4RCH. Leeds 536633
Mid Sussex ARS: Informal evening at Marle Place Adult Education Centre, Leylands Rd., Burgess Hill Starts at 7.45pm
Pontefract DARS: Night on the air at the Carleton Community Centre, Carleton Road, Pontefract at 8.00pm
Salop ARS: HF special event on air.
Yeovil ARC: Talk 'Sporadic E propagation' by G3MYM. 7.30pm. The Recreation Centre, Chilton Grove, Yeovil
- 1 Jul** Loughton DARS: Rainbow & Dove Field weekend planning night. Loughton Hall, Rectory Lane, Loughton, Essex.
Blackwood & DARS: Video night. 7pm. Oakdale Community College
- 2/3 Jul** **VHF National Field Day**
- 4 Jul** Welwyn — Hatfield ARC: Talk 'Safety in the Shack.' Lemsford Village Hall, Brocket Rd, Lemsford.
Todmorden DARS: Treasure Hunt for G4HYY trophy. 8pm. Queen Hotel, Todmorden.
- 5 Jul** Stevenage ARS: Fox hunt.
Rugby ATS: 2m DF. 7.30pm. Cricket pavilion, BTI Radio station, 'B' building entrance, A5 Trunk Rd, Hillmorton, Rugby.
Fylde ARS: DF Fox hunt. The Kite Club, Blackpool Airport.
- 6 Jul** Cheshunt DARC: Natter evening. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.
Stourbridge & DARS: Carnival Briefing. Robin Woods Centre, Beauty Bank, Stourbridge.
Fareham DARC: 'When the wind blows' by SE Hants Raynet group. 7.30pm. Room 12, Portchester Community Centre, Westlands Group, Portchester, Hampshire.
Mid-Sussex ARS: Informal meeting.
Yeovil ARC: Club visit to Hinkley Point.
Pontefract DARS: Talk 'Amateur Radio Awards' by G4OSY. 8pm. Carleton Community Centre, Carleton Rd, Pontefract.
Horsham ARC: Talk 'PO Box 88' by G3FXB 8pm. Guide Hall, Denne Rd, Horsham.
- 7 Jul** Blackwood & DARS: Quiz with Newport ARC. 7pm. Oakdale Community College.
Wimbledon & DARS: Talk 'Raynet' by G4SYT & G1ADW. 7.30pm. St Andrews Church Hall, Herbert Rd, Wimbledon.
Itchen Valley RC: Talk 'PCB design using CAD' by Mike G6LMK.
- 8 Jul** Stevenage ARS: Talk 'Satellite Comms' by Jay G3HEA
Stourbridge ARS: Stourbridge Carnival.
Ariel RG (BBC Club): Summer Festival. Further details from Trevor Butler, Day: 01-927-4372, Eve: 01-747-0624.
- 9/10** Loughton DARS: Rainbow & Dove Field weekend at Hastingwood Common, Old Harlow. GB2LRS.
- 11 Jul** Atherstone ARC: DF Hunt 2 7.30pm. Physics laboratory, Atherstone Upper School, Long St, Atherstone.
- 12 Jul** Dorking DRS: Informal meeting at 'The Plough,' Coldharbour. 8pm.
Rugby ATS: Talk 'Stereo television' by Mr Robinson of BBC. 7.30pm. Cricket pavilion, BTI radio station, 'B' building entrance, A5 Trunk Rd, Hillmorton, Rugby.
- 13 Jul** Cheshunt DARC: Police — Security in the home. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.
- 14 Jul** Barry College of Further Education RS: Video 'DX-Pedition to VP8 land.'
Edgware & DRS: Test equipment — talk and demonstration. Watling Community Centre, 145 Orange Hill Rd, Burnt Oak, Edgware.
Pontefract DARS: Committee meeting. 8pm.
Carleton Community Centre, Carleton Rd, Pontefract.
- 15-17 Jul** **RSGB Convention, NEC Birmingham**
- 15 Jul** Loughton DARS: Informal evening. Loughton Ball, Rectory Lane, Loughton, Essex.
Blackwood & DARS: Natter night. 7pm. Oakdale Community College.
Sutton & Cheam RS: First Aid for the Radio Amateur. 7.30pm. Downs lawn tennis club, Holland Ave, Cheam.
- 16 Jul** Barry College of Further Education RS: Coach trip to RSGB Convention, NEC, B'ham.
Wakefield & DRS: Barbeque at G4VRY.
- 16/23 Jul** Colleshill (Llanelli) ARS: Special event GB4PCP. 8am-12pm.
- 18 Jul** Stourbridge & DARS: Talk 'Test equipment use & abuse' by G8JTL & G8MCK. Robin Woods Centre, Beauty Bank, Stourbridge.
Welwyn & Hatfield ARC: Fox Hunt. Knightsfield Scout HQ, opposite Ingles, Welwyn Garden City.
Todmorden DARS: Natter night. 8pm. Queen Hotel, Todmorden.
- 19 Jul** Wakefield & DRS: Annual Open pitch & putt — Holmfield Park.
Rugby ATS: Activity night. 7.30pm. Cricket pavilion, BTI Radio station, 'B' building entrance, A5 Trunk Rd, Hillmorton, Rugby.
Midland ARS: Talk 'Photography' by Tim Jebbett G0GPZ.
Fylde ARS: Informal meeting. The Kite Club, Blackpool Airport.
- 20 Jul** Cheshunt DARC: Natter evening. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.
- 24 Jul** **Burnham Beeches, Maidenhead & Chiltern ARC: 6th McMichael Rally. Traders' stalls, car-boot sale (£5 per day), CAMRA beer bar & refreshments. Special event station GB7MMR. 10.30am (10.15am for disabled) at The Haymill Centre, Burnham Beeches.**
- 25 Jul** Atherstone ARC: Informal meeting at 'The Bull,' Witherley at 8pm.
- 26 Jul** Dorking DRS: Portable activity 2-4-6 metres. Barbeque BYO. Assemble 7pm Devil's Dyke, Brighton.
Stevenage ARS: Committee Meeting.
Rugby ATS: 2m DF. 7.30pm. Cricket pavilion, BTI Radio station, 'B' building entrance, A5 Trunk Rd, Hillmorton, Rugby.
- 27 Jul** Cheshunt DARC: Portable on Baas Hill.
- 28 Jul** Edgware & DRS: Informal — station on the air.
Watling Community Centre, 145 Orange Hill Rd, Burnt Oak, Edgware.
Pontefract DARS: On the air night 8pm. Carleton Community Centre, Carleton Rd, Pontefract.
- 29 Jul** Loughton DARS: Night on the air. &m using G40NP. Loughton Hall, Rectory Hall, Rectory Lane, Loughton, Essex.
Wimbledon & DARS: Talk 'Raynet' by G4SYT & G1ADW. 7.30pm. St Andrews Church Hall, Herbert Rd, Wimbledon.
- 29/30 Jul** **Stevenage ARS: AMSAT Colloquium.**
- 30 Jul** Wimbledon & DARS: Annual Camp, Barwell Estate.

Uniden UBC 70

Review

The amateur in the market today for a handheld scanner has rather a wide choice, a few years ago none at all were to be found apart from the odd limited crystal-controlled affair. The latest model from

To find new active frequencies or to monitor within a given range, a 'Search' facility is available. This is enabled by entering the lower frequency followed by a press of the 'Limit' button, then the upper

Yet another scanning receiver from the Uniden stable is put through its paces in this report from Chris Lorek

Bearcat, who have been involved in scanners for as long as I can remember, is the UBC70XLT, a very neat model that is thin enough to hide in most inside pockets without a bulge for secret listening, real undercover spy stuff!

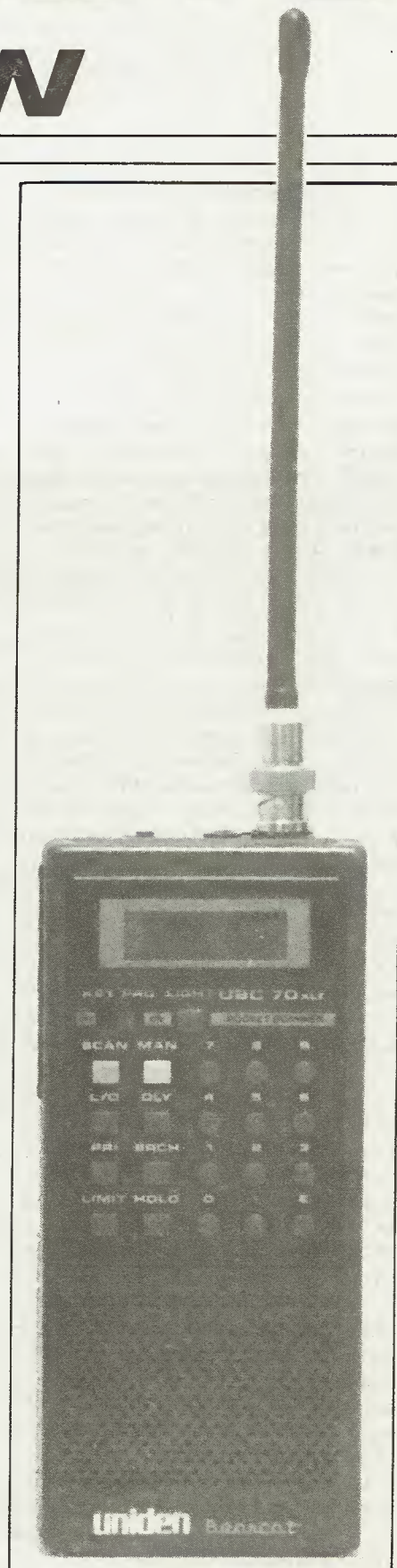
Features

A frequency coverage of 66-88MHz, and 406-512MHz is offered in FM only, this gives reception of the 4m, 2m, and 70cm amateur bands amongst a whole host of other frequencies in between. The set tunes in 5kHz steps on VHF and 12.5kHz steps on UHF, automatically selecting the nearest increment step if a frequency in between channels is keyed in. As well as direct frequency input using the keyboard, 20 memory channels are available for storage, these may be scanned for activity as desired, a programmable 'Lockout' feature being available to inhibit any of the channels from scan mode if required, to prevent the set locking up on busy repeaters or suchlike. Whether 'Locked out' or not, memory channels may be stepped through one by one by repeated presses of the 'Man' (Manual) button, also by keying in the channel number prior to pressing this button takes you directly to that memory channel. A two-second delay may be programmed into any of the memories as required, this prevents the scan resuming in between 'overs' when listening to simplex channels.

frequency again followed by 'Limit', then a press of the 'Srch' button. In all cases the scan halts as soon as the squelch raises, continuing either when the signal disappears or after two seconds if no signal of the 'Delay' facility has been enabled. A 'Priority' scan is also available, this briefly samples memory channel 1 for signals every two seconds regardless of other activity, halting on the channel when a signal appears.

An LCD (Liquid Crystal Display) shows the frequency, memory channel, lockout, delay and priority settings, together with a large 'Error' message in case you've incorrectly keyed in an invalid frequency. For night-time use an LCD backlight is fitted, switched by a front panel button, and an adjacent slide switch locks out the keypad if required to prevent accidental operation in use. A slider switch on the top panel switches the set on and off, adjacent to this is a 2.5mm jack socket allowing an earphone or external speaker to be plugged in.

The radio itself weighs 330g, measure 68mm(W) × 25mm(D) × 153mm(H), and comes with a 175mm long helical whip terminated with a BNC plug allowing an external aerial to be connected if required. Side-mounted recessed rotary knobs control volume and squelch, and a small DC socket is fitted serving a dual purpose of internal Ni-Cad recharging or for operation from an



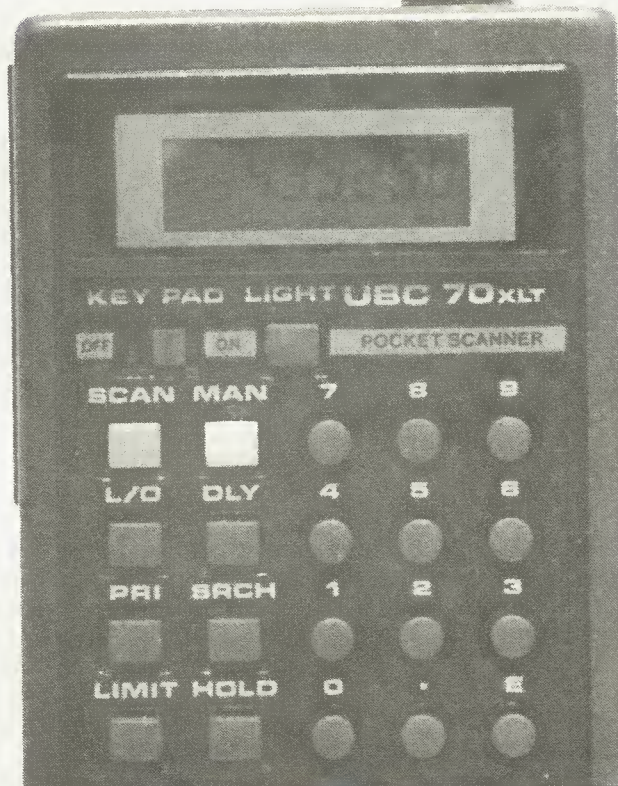
external 12.8V DC supply. An internal Ni-Cad pack consisting of 4 shrunk-wrapped 'AA' cells is supplied together with a continental-style 2-pin AC wall charger, a protective carrying case, earphone, and user instruction leaflet.

In Use

The set uses basically the same operating commands as the rest of the Uniden Bearcat scanner range, and not surprisingly (as they've been in the business a long time) this is very easy to learn and get used to, indeed I found I could control the majority of the sets functions without first reading the instruction leaflet. I found the 20 memory channels ample, even though I'm already a scanner user and hence have a general 'feel' in knowing many 'interesting' frequencies in my vicinity, I only found I needed a maximum of around 15 or 16 channels when generally walking around with the set, even over the review loan period of several weeks.

When programming new frequencies I found the small rubbery numerical keys a bit difficult to use, often I would fail to press them fully and hence miss the odd digit, but I had no problem with the larger 'mode' keys. The 5kHz steps on VHF were a bit of a nuisance when programming, however I found the set was capable of receiving the odd 2.5kHz offset frequency without any apparent problems. I found the set comfortably fitted inside my pocket, or onto my belt when using the supplied carrying case with its fitted belt strap. In the latter case I could happily wander around out and about all day monitoring on an earphone without the batteries going flat, my usual handheld scanner normally gives up the ghost after around four or five hours.

On 2m I found the set was rather on the 'deaf' side in comparison with a dedicated 2m portable, using my external discone with the set showed that repeaters I could normally hear fully quieting did not even lift the squelch. 70cm was better however, and 4m was quite good although I found little activity on this band. There was ample audio output from the set's internal



The main control panel, sensible scanning 'software' but occasionally 'iffy' key action.

Laboratory Results

Sensitivity: Input level required to give 12dB SINAD.

Freq.	Level
66MHz	0.205uV pd
70MHz	0.21uV pd
80MHz	0.215uV pd
88MHz	0.210uV pd
136MHz	0.855uV pd
145MHz	0.860uV pd
160MHz	0.880uV pd
174MHz	0.895uV pd
406MHz	0.465uV pd
430MHz	0.475uV pd
440MHz	0.480uV pd
450MHz	0.390uV pd
460MHz	0.451uV pd
470MHz	0.435uV pd
500MHz	0.620uV pd

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.

Spacing	Level
+12.5kHz	20.0dB
-12.5kHz	9.5dB
+25kHz	58.0dB
-25kHz	57.5dB

Blocking: Measured at 145MHz, 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.

Spacing	Level
+100kHz	68dB
-100kHz	69dB
+1MHz	86dB
-1MHz	87dB
+10MHz	97dB
-10MHz	99dB

Squelch Sensitivity

Threshold	10.5dB SINAD
Maximum	17.0dB SINAD

Image Rejection: Increase in level of signal at first IF image frequency (-21.7MHz) over level of on-channel signal to give identical 12dB SINAD signals.

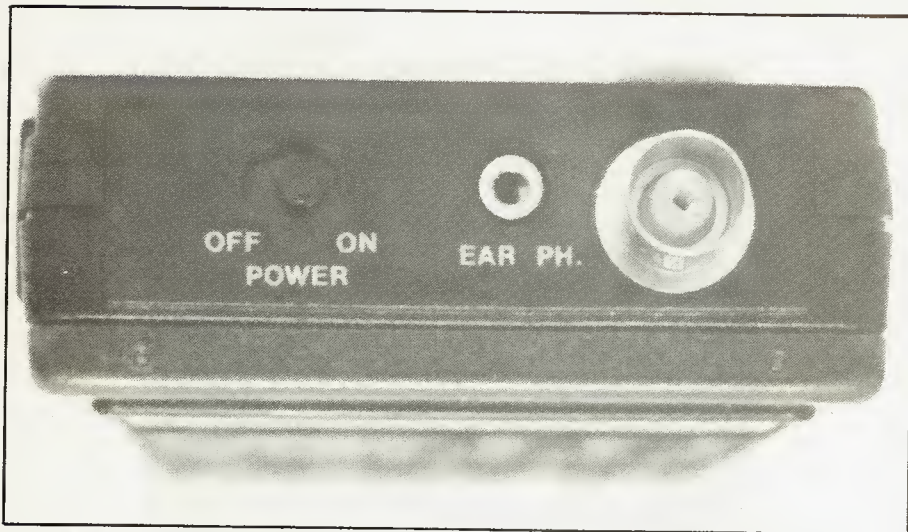
Freq.	Level
70MHz	19.0dB
145MHz	10.0dB
435MHz	6.5dB

Maximum Audio Output: Measured at 1kHz on the onset of clipping.

Load	Output
3ohm	140mW RMS
8ohm	130mW RMS
15ohm	89mW RMS

Current Consumption

No Signal, scanning	58mA
Receiving, mid volume	75mA
Receiving, max volume	176mA



Top panel of the radio.

speaker for normal use, even when operated as a mobile set in the average 'quiet' family car (when the junior ops don't add to the QRM!).

Laboratory Results

The sensitivity measurements generally confirmed what I had found in use, although I would not class this as unusual for a wideband

scanner I would have thought a better sensitivity on VHF high band, arguably the most popular of the listening frequency ranges, would have been a wiser move. The fairly high level of signal required to raise the squelch when set to its threshold position, at over 10dB SINAD which is a perfectly readable signal, added to this limitation. The image rejection, that is the ability of

the set to reject other signals that are present at its image frequency of -21.7MHz from the tuned frequency, was, not surprisingly, rather poor — this is however to be expected with a receiver such as this with good current consumption and small size in mind.

Conclusions

In the set's favour is its smart, high-tech appearance, not looking like a 'consumer' receiver as one so often finds nowadays, its thin profile allows it to be carried about easily. I was pleased with the good barrery life, especially as the set only operates from a 4.8V nominal supply when using its internal Ni-Cads. However at a current selling price of £199 it is not cheap, its 'brother' the Uniden Bearcat 100XL handheld scanner is cheaper and gives the facility of covering the 70SLT range as well as airband on AM, at the expense of a larger set with a shorter battery life. You pays your money and takes your choice!

My thanks go to Raycom Ltd for the loan of the review set.

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SPARK Transmitter Type 52M by Creed & Co Croydon. Circa 1917. Similar model in Science and War Museums. Will swap for new Sony ICF 7600DS with AN1 and Sony AIR 7. Phone Mac after 18th on 080-45 3826.

FOR SALE YAESU FT757GX Transceiver FC757 Auto A.T.U. FP 757HD heavy duty power supply. All boxed and as new. £925 the three. Phone 051-514 5998.

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RS METAL instrument cases new boxed. Two type 1 254 197x 159mm. £8.00 each. One Type 2 406x 197x 159mm. £10.00 offered at less than half 1983 prices. Type 2 in used condition, three for £5.00. Carriage extra. G3JHL. QTHR 0794 512283. Evenings.

REFTEL 934MHz CEPT 40 channel CB rig built in pre-amp £150 o.n.o. 26 element beam inc. Co-Ax £20 o.n.o. Phone Ian, Chester (0244) 535725.

SANGEAN World band RX. 150kc — 30MHz 87MHz — 108MHz AM FM USB LSB C.W. PLL synthesised digital readout. Auto scanning. Manual scanning. Direct key in. Manual rotary tuning 9 memories brand new boxed £95. C.J. Graham 8 Oaktree Drive, Ecclefechan, Dumfriesshire GMOBVF 057-63-494.

FL-200B Transmitter for sale with operators manual and spare valves. Offers around £75.00. Phone Wayne on 01-575-7078 evenings.

TRIO 9130 Multimode £250 realistic Pro 2009 Scanner boxed £90 Yaesu FRG7 receiver + Global 1000 ATU £150 Rotator AR40 Jaybeam eight over eight Yagi + Welz Colinear £100 Keigh 01-530-3080.

SSB Electronics (German) LSM 24 24cms (1268-1270MHz) LO/MHER unit 2 metre I.F. 500mW out for Oscar Phase III etc. LB5. ICS/AEA CPI RTTY T.U. plus BBC EPROM driver £80. NEC 12in. green screen monitor (perfect) £40. Phone Paul G4XHF (0293) 515201.

ICOM Rigs IC25E and IC202S both in good working order and complete. Offers invited for the pair but will separate. Telephone G3VSU 0304 612369.

YAESU FT690R, MR1, perfect with box £230. Ham Viking, 80CH, AM/FM, 10m £40. TET, 3 element, Tri Band Antenna, as new £140. (Buyer must disassemble) realilistic 1005 citizen-band hand-held with Ni-Cads etc. £65 wanted, Belcom 102L. All enquiries — John, Preston 726378.

FOR SALE Yaesu FT101ZD FM MK3, 250Hz CW Filter £500. Breml BR200 Linear £60. 5 digit 50 meg frequency counter £35. New $\frac{1}{8}$ wave ground plane antenna OK for 10FM £25. Cash only prefer buyer inspects and collects 0293 782910 Nr Gatwick Surrey.

TRIO TV502 2M Transverter £80. Spectrum TA6SI 30W 6M Linear amplifier with RP65 receiver preamp £35. TC6-10H 2.5 6M transmit converter £25. G3G1Q QTHR Tel.: 01-567-6389.

HALLICRAFTERS Sky Challenger 1939 communications receiver £60. FT-726R 2 metres, 70 CMS, H.F. and satellite modules fitted, with YM-48 microphone £850. Spectrum plus two £95 with ten games. JVC compact disc cost £200, selling £135. Mike G2XGM 01-461-5398.

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CONVERSION Marko Ex-caliber-II home base like Jumbo-II as new £100.00 o.n.o. Tel.: Glencaple 357 or write to Ken PO Box 08 Dumfries DG1-1AA Scotland.

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YAESU 225RD Mutek front end with crystals £500. WELZ SP200 PWR/SWR meter £40. New 2 metre 9EL crossed Tonna (boxed) £30. Strumech 35 foot mini tower £250 o.n.o. Phone John G4YNY (Burntwood) 054-36-74812.

REALISTIC 50Ch. Pro 2002 mains/12v. schanner UHF AM. Memory back-up 20, 480 programmable frequencies £255 o.n.o. or swap Commodore 64, cass/D/Drive Mouse. Or FV1022DM and FC102 cash adjustment W.H.Y. Brian G1UWY QTHR. New Milton Hants 0425 615860.

COMPLETE SWL Station FRG 7700 Pre Amp Atu all call books WRTH. H/held Uniden scanner all items excellent condition £380. Buyer collects or exchange for mint complete 934MHz station Tel: 0634 404096.

RADIOMOBILE CB201 40Ch UK FM G.W.O. £25 o.n.o. Harvard 40CM handset C/W Ni-Cads charger and rubber duck £30 o.n.o. Sirtel base Mic with pre amp power and tone controls with meter £20 o.n.o. Telephone Stephen (0747 85) 639.

MARCONI Atalanta RX 15k/cs to 28 MEGS full working order. Four comtrs conversion. Wanted Racal RA17 or £175.00 buyer collects. Ring Steve 01-549-

6853 anytime.

WANTED for copying. Circuit of Yaesu FT77 transceiver. All expenses refunded. G3ENB 16 Highmill Drive, Scarborough Yorkshire YO12 6RN.

SILENT KEY Valve CW TX belonging to the late GW3INV. Home made to high standard with A.T.U. Offers collected only please phone Patrick GWIZHK Wrexham 759617.

FOR SALE HC6/U crystals for 3.5MHz, various frequencies, phone for info. £1.50 each. PYE AM Westminster OK for 70MHz £10. Cambridge Low Band £7.50. Post extra. 93VKM QTHR Tel. 050277 622 (Norfolk).

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SCANNER receiver AR2001 continuous coverage 25 to 550 megs AM WFM NFM, 20 memories with priority and lockout. 2 speed scan or seach, 5KHz 12.5KHz 25KHz Backlite and keyboard lock £250. Phone Bath 0225 310741 or 446266 daytime Alan.

HAVE Spark transmitter type 52M by Creed & Co Croydon. Circa 1917. Similar model in science and war museums. Swop for new Sony ICF7600DS with ANI and Sony AIR 7. Phone Mac on 08045 3826 after 18th.

FOR SALE FRG7 very good condition also Sinclair ZX Spectrum + with RTTY software: £130 for radio: £120 for computer o282 815224.

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IC4E Good condition BP3 Ni-Cad pack manual and box £160 Bob GOFTO 0204 657410 evenings.

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FOR SALE KW202 and KW204 transmitter and separate receiver excellent condition, purchased but no time to use them. Operates all amateur bands 1.8 to 30 MHz, double conversion superhet 180 watts SSB 150 watts C.W., only £225 o.n.o. Mike (Radlett) 09276 2100.

CONVERTERS, hardly used, MMC144/28 £15. MMC432/28 £15. STE AR10 RX. Module 28 to 30MHz, AM/FM/SSB/CW, ideal

tunable I.F. £25. QV05-25 (807) new boxed £3. 5B/254M new unboxed £7. Heath VHF SWR/ power meter £10. Tel. G8JA1 Barbon (046 836) 276 (cumbria).

YAESU FT620B 50MHz base rig. S.S.B., C.W., A.M. mains or 13V input 12 watts out. Exchange for FDK multi with expander or W.H.Y? FT620B in mind condition and very rare. Phone Philip 01-405 6079 weekdays 10 am to 5 pm only.

IC2E hand held three battery packs rechargeable perfect £140 o.n.o. 2M transmit front end tunable 250mW output offers? Wanted multy mode 2M rig portable will consider deal with above. Ring 0709 583262 Mexbrough, South Yorkshire will collect Roy G1XR8.

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YAESU FT102 H.F. Trans W.A.R.C., C.W. filter, mint condition £550 o.n.o. Kenwood TS530S H.F. Trans W.A.R.C. C.W. filter U.G.C. £475 o.n.o. Tel: Weymouth (0305) 813202.

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YAESU FT 690R Mk1 6 metre multimode, excellent condition, less than 12 months old, also 5 element tonna, 10 amp P.S.U., SWR/ power meter. £350. Tel. 0260

280210 (Congleton).

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YAESU FR50B 160-10M receiver. Very slight scratch on case hence £65 o.n.o. Trio 2M TR-240 hand held keypad entry +memories +speaker-mic £105 o.n.o. Tono 100W2 meter AMP with Pre-Amp £100o.v.n.o. Exchange all above for FT707 plus cash or W.H.Y Dick 0303 76171.

HAMMERLUND HQ170 receiver, including clock works very well but heavy. £75 o.v.n.o. Muirhead decade oscillator £25. Wanted Yaesu FT707 100W any condition considered working - or not. Dick 0303 76171.

TRIO 900 2M multimode £210 Tono Mr150W 2M Linear £120 MML432-50W 70CM Linear £110 IC2E £135 Kenpro Elevation Rotator KR500 £110 creed 4444 £40 AR88 £45 MET Power Splitters 70CM 2 way £15 2m 4 way £25 VGC. Manuals Bruce 01-995-4965.

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FRG7 general coverage receiver + FM board + digital display + manual V.G.C. £155. Steve Congleton (0260) 277618.

PHILIPS D-2999-PLL synthesized world receiver. Double speaker systems direct frequency entry 16. channells memories 3 types scanning AM.LSB.USB CW.FM. Brand new cost £375 bargain £225 or exchange W.H.Y. 01.571 5759.

FOR SALE Yaesu FTDX401 low receive and transmitting just an IF down bargain £70 o.n.o. incl. H1-A base microphone, realistic pocket vision LCL television with adapter, in box as new cost £110 yours for £50. No offers. Mick G/E1G Leyland 424878.

FOR SALE Codar T28 RX 80. 160MTS £15. Codar R.F pre-selector £15.

HANSEN ZQM2 transistor and diode tester mint condition boxed full instructions £8.00 also Yaesu speaker MIC for FT208 or FT708 £11.00 two pye bantem P.M.R. portables superb condition three channel selector for 139 MHz A.M. W/Manuals £6.00. Each York 0904 422773.

COMPLETE Wood & Douglas 70CMS Synthesised transceiver kit. Eleven boards in all, with all boards built. With case mike. Full instructions to complete for the enthusiast sale due to illness £65.00 GOIRK QTHR. Tel. 01-390-2650 Surbiton, Surrey.

SALE Yaesu FT221R working order except Vernier Dial slips hence £150 or swap G.C. receiver Tel.: 0325 312420. G41LL.

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AR2002 Scanner 26 MHz — 1.3 GHz. Tape — socket. I.F. Output for SSR 9140 boxed

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DRAKE complete station. T4XB R4C HS4 speaker and power supply fitted all filters. Works transceive mode covers usual bands plus extra 15 bands. Condition as new original packing. The best equipment available. Going mobile. Give away £475.00 G3WPN Ledbury 4851.

ULTRA electronics private mobile radio TRX in metal case with P.S.U. for conversion or spares £35. Buyer collects. Phone after 5.30. 041 556 6985. Wanted: Handbook for Trio 9R-59DS also 500kHz crystal for Murphy B40/B receiver.

YAESU FRG 7700M Receiver with FRT7700 Antenna Tuner V.G.C. £300. Also Telereader CWR 675-EP Decoder, RTTY, Baudot, ASCII with 5½ Green Screen Monitor never used, in A1 condition £250. Realistic PRO 2004 300 channel scanner VHF UHF with Diamond 130 Discone wide band Antenna £300 o.n.o. Phone (0672) 52571.

TRIO TR7800 2M FM Transceiver 25W. Virtually mint C/W mounting bracket, NiCad memory back up etc., £165 buyer collects. Michael G1UPP (0460) 54583 after 4 pm.

CQ CQ CQ Yaesu FR101 De Luxe Communications receiver. USB/LSB CW W/N AM W/N FM RTTY plus fitted CW filter and 2m/6m converters. 21 bands plus 4 fixed XTAI Channels £230 o.n.o. Tel.: 0934 833478 near Bristol G4DYM.

SALE Trio R600 bought Lowe Electronic £220 also A.T.U. 1000 A.T.U. £48 can be tried at 21. Harvard Mansions St. John's Hill, London S.W.11 ITB. Phone (01) 223 4335. Cash only please.

TEKTRONICS D83 50MHz Oscilloscope G.W.O. £300 FRG 8800 as new £400 Audio Oscillator 10Hz-20KHz £8.00 FV101Z external VFO £80.00 30A P.S.U. current limit and over-voltage protected home brew professional finish. £60 2300V 500mA PSU (Suit 2XP13)

Linear £40.00. Wanted C64 in G.W.O. with P.S.U. Phone Tony 0375 378783 (Grays Essex).

KW2000E P.S. VGC £220 valves £20 6146B. £15 Shure HO1B. £15 KW Traps £12 home/built Z. Match. Switchable wide spaced caps. £35. Trio. 530S. £525 MC50 Mic £25 twin. S.W.R Bridges. Colour Geniecomp RTTY/CW. Split/Screen Recorder T./V. buyer collects Noel G3ZLN Ipswich H9139. **B & W MONITOR** standard loudspeakers type DC14. Height 22½ width 10 depth 11½ inches. With stands finished in teak veneer. £135 pair. Carriage extra. Technics system. SU-V5 2 × 60W amplifier ST-S6 synthesized tuner M270XK cassette SL-DL1 direct drive turntable £295 0403 710565.

YAESU FT101 six band HF rig SSB CW AM spare valves mike fan manual good condition £365 Yaesu FRG7000 HF RX SSB CW AM digital display/clock manual good condition £185 Pete G1SFS 23 chestnut walk Bishopsworth Bristol 3 Avon B513-7RF.

AR88LF Receiver with handbook G.W.O. £45. Hirschmann rotor and control unit. Hitro 250 boxed G.W.O. £20. Reace RC100 Transceiver monitoring system, power, SWR, modulation meters £20. Westbury (0373) 865421 evenings only.

FOR SALE ATU Kenwood AT 230 ATU mint condition in original packing including instruction manual hardly ever used £150.00 o.n.o. Philip GM4SUF QTHR Tel: 086282 246.

WANTED

WANTED Datong Woodpecker Blanker also 144MHz monitor receiver SSB FM preferred have several Plessey Type 72 switches looking for a good home WHY. S.P. Martin, 24 Collingwood Close, Worle, Weston-S-Mare, Avon BS22 9PQ. All letters will be replied to.

WANTED: 70cms and 2m FM Westminster, pref. Dash mounts, but anything considered must be complete and working although general condition not important, would consider any unit.

Please Ring me with your details, also required reprint of manuals for above. Tel: Simon 0505 29363.

WANTED Circuit diagram for GEC sound-deck music centre, 5 Spectrum power supplies, 9 volts, 1-4amps £15 postage paid. Also all types of non working CB amateur equipment bought for electronics student. Price particulars to J. Bakewell, 21 Newbarns Road, Barrow-in-Furness, Cumbria LA13 9SF.

PLEASE can anyone supply circuit diagram for FT202R 2 metre FM Handie. Manual or photocopy, expenses covered. G3KHU, 12 Thornyville Drive, Oreston, Plymouth PL9 7LF. Tel: 403426.

WANTED: Dead or Alive! Heathkit RA1 RX's for spares and project testbeds. Send details and price to Richard Marris, 35 Kingswood House, Farnham Road, Slough, Berks. SL2 1DA.

WANTED R109 W.D. Rx 6 volt pref. un-modified your price + carriage paid. Also "19 Set" type aerial Variometer ATU Peter, daytime only 0287 34397.

WANTED certain trader service sheets between numbers 1 and 573 on valve radios, also old QSL cards and postcards relating to radio, radio stations and amateurs. Please contact Tom Valentine, 38 Grampian View, Montrose, Angus DD10 9SX. Tel: 0674 76503.

WANTED Sinclair microdrive (condition immaterial) exchange amateur radio gear. J. Brown, 45 Marlborough Avenue, Falmouth, Cornwall TR11 4HS.

WANTED early Eddystone receivers, components and literature. Top prices offered by collector. Ring 021 556 3324 anytime, except weekends.

WANTED for Swan 350 AC PSU model 220/230, any condition so long as TXFMR OK. My windings gone short on HT. Also need HIZ mike for same, prefer ceramic. Please help. GIKHE QTHR, Telephone 0203 363123.

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MARCONI CL150 workshop manual wanted, also any technical information, photo copies will do. Also required frequency chart for inside lid Telephone Woking (04862) 71094 evenings.

WANTED I/F amp No. 178 (16.5MHz) or circuit also control box and pilots cable control for Bendix ARB (ex USN) also PE120A or PE117C Power Supply unit for BC620 Transceiver also Raib handbook.

WANTED: Barograph almost any condition acceptable also HF linear. PRM10 US Navy G.D.O. or sell head unit technical books on HF Antennas. All letters answered, (0229) 89635 anytime.

WANTED: T1083 transmitter and R1082 Receiver. Old GPO and private telephones. Wartime and pre-war "Radio Times".

WANTED any info. on Intel 330AB Computer, case for archive sidewriter tape unit. Any info on Micropolis double dish drive (Blux box). Keyboard and any options and leads for research machines 380Z. Rotherham (0709) 554665, 12 Eilam Road, Rotherham, South Yorks.

WANTED for Great Yarmouth ARC 144MHz multi-mode transceiver. Please send price required and details to: G3VKM or GOFEL QTHR. Tel: Aldeby 622 or 0493 780579.

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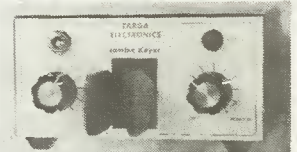
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There are no reimbursements for cancellations. Advertisements arriving too late for a particular issue will be inserted in the following issue unless accompanied by instructions to the contrary. It is the responsibility of the advertiser to ensure that the first insertion of every series is published correctly, and corrections must be notified in time for the second insertion, otherwise the publishers will not accept liability or offer any reduction in charges.

All advertising sales are subject to Government Regulations concerning VAT. Advertisers are responsible for complying with the various legal requirements in force eg. The Trade Description Act, sex discrimination act & the business advertisements (disclosure) order 1977.
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Rates: Lineage 51p per word (VAT inclusive), minimum £7.59
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Daytime Tel. No:

Signature Date.....

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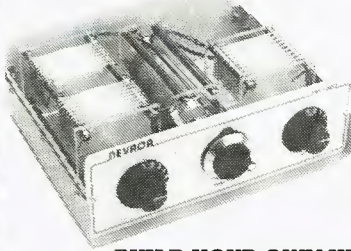
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NEVADA

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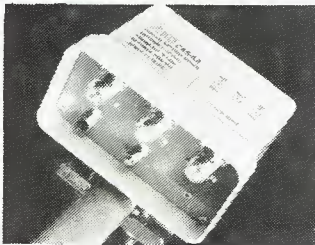


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Power: 300W P.E.P.

Insertion Loss: 0.19 dB at 900 Mhz
Connectors: Green Par 'N' Type

£49.95

ALLOWS SELECTION OF 2 ANTENNAS FROM 1 COAX FEEDER

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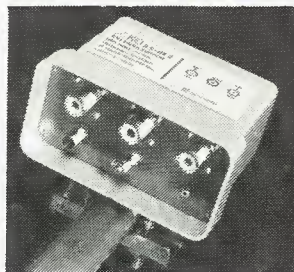
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Insertion Loss: 0.15 dB at 144 Mhz
Connectors: SO239



£39.95

50 Mhz LINEAR AMPLIFIER

WITH HARMONIC FILTER

SPECIFICATIONS

Supply: 13 V DC

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Output Power: 15 Watts

Freq: 50-52 Mhz

Power Gain: Approx 8dB

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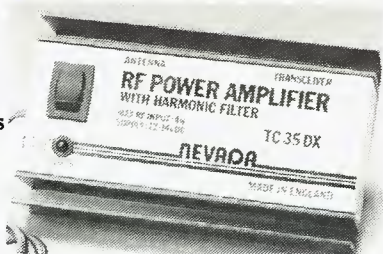
Input Power: 1-4 Watts

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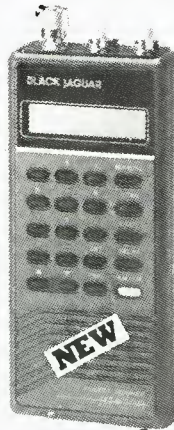
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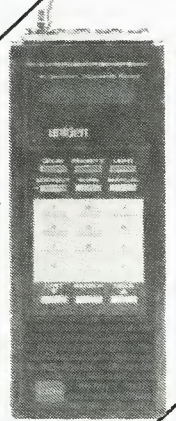
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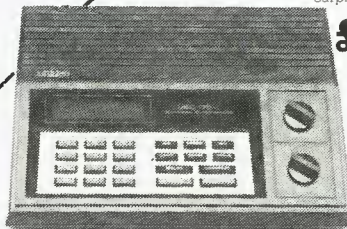
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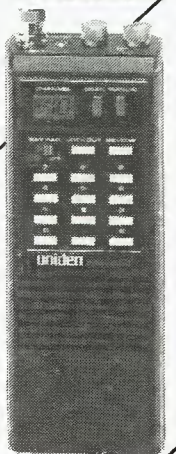
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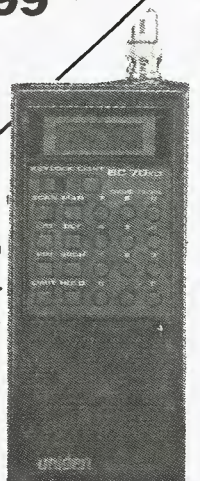
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