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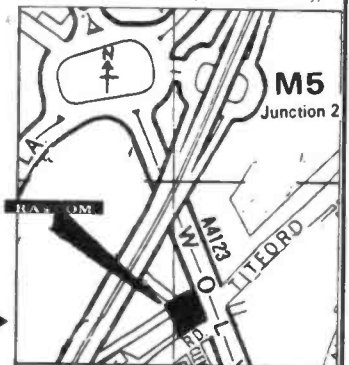
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HAM RADIO TODAY CONTENTS

VOLUME 6 NO 12 DECEMBER 1988

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RADIO TODAY



Not Too Hot To Handle

Antex (Electronics) Ltd. have launched a pair of soldering irons with in-handle temperature control, suitable for industrial use, at prices which compete favourably with hobbyist irons.

The TCS 24 and TCS 240 make the most of surface mount technology and electronic proportional voltage control to give a lightweight temperature controlled design which does not need a temperature control station. The temperature can be adjusted to any point between 200°C and 450°C via a small screwdriver-operated variable pot in the handle. Antex specify that the irons maintain temperature to within 1% in use and within 2°C while idling.

Features include zero voltage switching, sensor open/circuit failure protection and a leakage current of less than 5µA.

The mains voltage model TCS 240 costs less than £30 in the UK, and comes in 115V and 110V models for overseas use. The TCS 24 is designed to run from a 24V power supply. A new PSU with industry standard connections suitable for the TCS 24 and a wide range of other equipment has also been released. The PSU offers two anti static options, as well as versions stepping down from 115V and 110V.

Antex, successfully bought out by its management in September with venture capital backing, has published a new catalogue of soldering irons and equipment, with full technical specifications and a feature, 'How to choose the right soldering iron.'

Contact Antex at Mayflower House, Armada Way, Plymouth, Devon PL1 1JZ. Tel. (0752) 667377.

More Than an Aerial to Put Up!

HRT congratulates Worksop ARS on the opening of their new club premises in West Street, Worksop, built entirely by the hands of club members in the past year, 'with no professional help other than the statutory inspectors'. HRT further regrets that it didn't receive the news in time to send congrats for the event itself.

The Clubhouse opening took place on September 24th, attended by members of the local council and local industries who had contributed to the construction. The RSGB was represented by Past President Joan Heathershaw.

The clubhouse is appointed with a bar and kitchen, lounge, two fully equipped radio operating rooms, a large lecture theatre and workshop facilities, as well as all mod. cons. What a splendid way to spend off-air time.

The opening was followed on the 25th by an open day for the citizens of the district, with demonstrations and lectures.

We wish them many happy years in their new QTH. For information about the Society, contact the PRO, Kevin Fox G4MDQ, 14 Plantation Road, North Anston, Sheffield S31 7DA. Tel. 0909 566724.

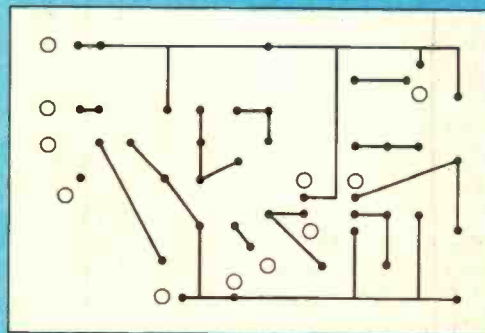
Battery Charger September 1988

There were some errors in Figure 3 in the Automatic Battery Charger published in the September 1988 issue. Comparing the above diagram with Figure 3, please note that three extra links have been added, and one leg of the IC,

shown as a connection pad in the original diagram, is now shown as a blank.

G4AVT also points out that the captions for figure 4 and 5 were swapped over. The unnamed component in Figure 5 (formerly figure 4) is a fuse.

HRT apologises for any confusion which may have arisen.



Put PEP in Your PM

John Fielden GW4NAH's popular radio circuits were available as constructed and tested boards through rallies and mail order for some years. The pep modules is now to produced and marketed by Technical Software.

The board will convert any power meter to read pep instead of average power. Technical have found that the board is easy to install and calibrate, and is easily switched out of circuit for average power readings.

A pep meter is a useful aid to the correct operation of SSB transmitters without overdriving the power amplifier with its resulting splatter and distortion.

The board is available with mounting kit and full instructions for installation, calibration and use for £12.00 all inclusive from Technical Software, Fron, Upper Llandwrog, Caernarfon LL54 7RF. Tel. (0286) 881886.

UK to implement CEPT in 1989

As was reported in these pages a few years ago, an announcement was made at the German "Ham Radio" (Friedrichshafen) convention in June 1985 of an historic agreement between a number of CEPT member countries to recognise each other's amateur radio licences for temporary visitors, subject to local regulations, much in the same way that driving licences are accepted. This has become known as the CEPT licence, or more properly the "Common Licence".

This CEPT Recommendation (Nr. T/R 61-01) is the first step towards a unified set of terms and conditions and was the result of much hard work by the Common Licence Group of Region 1 of the IARU under the leadership of Alfred Mueller, DL1FL.

The UK was one of the initial signatories to this agreement and the attitude of the UK Government to the idea has been described as very positive. However, unfortu-

nately for UK amateurs visiting the mainland, the UK has up until now been unable to implement the agreement due to administrative problems. One particular issue for the authorities is that the UK legislative system does not allow foreign governments to grant or deny permission to do *anything* within the United Kingdom, therefore in order for a foreign document to be valid in the UK, Isle of Man or Channel Isles, specific legislation must allow this. This is done by something called a "statutory instrument" and getting this through Parliament has caused the delay. Country after country announced their joining of the scheme, but each time the question was asked about the UK, the answer was always "in about a year's time".

The requirement in order to be able to use the CEPT agreement is that the licencing authority should classify its licences into two categories, Class I and Class II which correspond to the UK Amateur Licence A and B respectively. Intermediate licences such as the Dutch and German DH and

PB callsigns would be classified as Class II. Additionally the licence document should carry the following words "This radio amateur's licence is in accordance with Class I (or II) of CEPT Recommendation T/R 61-01. Its validity is indefinite" in English, French and German.

The following countries have already implemented the recommendation: Austria, Switzerland, France, Monaco, Belgium, Holland, Luxembourg, West Germany (incl. W. Berlin), Denmark (incl. Greenland and Faroes), Norway, Sweden, Spain. The most popular question asked at the RSGB stands at both the Hannover InterRadio and Friedrichshafen HamRadio exhibitions for the past two or three years has been "When is the UK going to implement the common Licensing agreement?", to which up until now, there has been no satisfactory answer.

In fact, because of the delay of the UK authorities in putting into practice something they have already agreed to, the German authorities were accommodating enough to uni-

laterally allow operation by UK amateurs providing a letter from the DTI was carried showing the CEPT classification of the licence. Thus **UK amateurs do not need a reciprocal licence for Germany**, provided they carry the DTI letter.

Two pieces of news were announced at this year's Friedrichshafen HamRadio exhibition. Firstly, that the Dutch authorities were also prepared to unilaterally allow operation in the Netherlands in the same way as the Germans allow operation in W. Germany "by amateurs from those countries which have *in principle* agreed to Recommendation T/R 61-01 but for administrative reasons have not yet implemented it".

And secondly, that the DTI will implement the CEPT Recommendation on January 1st 1989, in connection with the issuing of the revised licence document (which will be in the form of small licence document, with the conditions and regulations issued as a separate booklet). The Common Licence will have arrived in Britain at last. **G0CCI**

KW Back in Production

Now there's no way that anybody can not have heard of KW radio gear — for many of us it was with KW equipment that we took our first faltering steps on the HF bands and it was also KW which really brought SSB operation into the realm of possibility for early sidebanders with such landmark rigs as the KW2000. KW has of course still been going strong in the meantime by selling the Ten-Tec range of high-quality no-frills radios from the USA plus a wide selection of antenna equipment and accessories.

However, that is all about to change as KW has now started making the Century 22 20W multibander and the Argosy II 50W multi-mode multi-bander here in the good ol' UK! Not content with that,

KW has also re-designed their famous KW E-Z Match and now has a KW207 ATU in production.

HRT also got a smack on the wrist from Rowley Shears (KWs Managing Director) for saying that the Yaesu FT747 was the cheapest HF rig on the market at £659 — not so says Rowley — the Argosy II costs only £573.85 and its PSU retails at £105.80 as opposed to the Yaesu FP700 PSU which costs £195.50.

Well of course this is all absolutely true — the KW Ten-

tec Argosy is the cheapest multiband multimode rig on the market today, although to be fair to Yaesu their box of tricks does offer more in the way of memory facilities and power output.

So folks, if you want more details on the cheapest multimode multiband rig currently on the market, why don't you drop a line to KW and ask for a copy of their latest catalogue. Contact: KW Communications, Vanguard Works, Jenkins Dale, Chatham, Kent ME4 5RT.

Congo Emergency October 1987

Our apologies also to M C Pavely, G3GWD, author of *The Congo Emergency* in the October 1988 issue, who writes to say:

'My initials are MC, and not E as stated. You also refer to

905 stations instead of 9Q5 — both errors must be very confusing for readers. Everything has been typewritten, so I find it difficult to see how these errors occurred.'

Sorry, G3GWD. Even the offices of the honest typewriter don't stop us from doing silly things sometimes.

Stop Press

To celebrate the 75th Anniversary of the Radio Society of Great Britain, two members of Radio Link — Derby Hospital Broadcasting will be operating the Special Event Station, GB75RLD, from the outside broadcast caravan at the City Hospital, Derby on 2 metres on:

1 December, 7pm to 8.30pm
2 December, 7pm to 8.30pm
3 December, 10am to 5pm
4 December, 10am to 3pm

The aim of this special event station is to promote amateur radio, hospital radio, and help Amateurs collect points for the RSGB's GB75 Award. Each person contacted will receive a special QSL card.

For further information contact John Huddleston, Press Office, c/o 8 Wilmot Avenue, Chaddesden, Derby DE2 6PL.

The New Licence Conditions

Most readers will be aware that the amateur licence conditions are to be changed as of January 1st 1989. To reproduce the complete text of the licence would displace other material from the magazine, so here is a selection of the most interesting points:

First of all, the licence has been designed to comply with European (CEPT) standards, which will enable UK amateurs to operate in many European countries on their UK licences. This effect is reciprocal, and amateurs from said countries will be

can shut the station down if necessary. Forwarding of messages (digi-peeters) is also covered, though mailbox operation requires an extra permit, available from the RSGB. All this clarifies the situation as regards packet radio.

'Training' allowed

A separate licence will no longer be required for maritime mobile operation, and operation on a public transport vehicle is also allowed (subject to compliance with regulations of the transport authority).

vhf only licences, so that European operation of both classes of licencees is catered for. Raynet operation is less restricted as well, and the licence manifestly permits a wider range of activities which most amateurs would consider appropriate to amateur radio.

The only significant worry is the very last clause of the licence, clause aa. This states that 'Amateur apparatus operating only in the frequency band 28MHz to 29.7MHz may not be imported, manufactured or assembled in the UK without specific authority. Requests for such authority should be addressed to the Department of Trade and Industry, Radio Investigation Service, Room 102, Waterloo Bridge House, Waterloo Road, London SE1 8UA. "Manufacture" includes conversion.'

The new amateur radio licence is due to come into force on January 1st, 1989. G3YZW takes some points.

able to operate in the UK. The amateur's own callsign is used, along with the identifying letter for the country of operation. Thus, F9XYZ operating in England would use the callsign G/F9XYZ.

The DTI have taken account of the use of computers in several ways. Log keeping on disk or tape is permitted so long as the disk or tape is dedicated to that purpose. Automatic operation of the station, previously a grey area, is specifically covered. Unattended operation will also be permitted, on certain bands and with conditions as to how the authorities

Remote control of the station is also permitted by means of a low powered transmitter in most of the bands above 70MHz (but not 144 to 146MHz). The maximum permitted power is 10mW, and additionally no RF energy from the control system should be detectable "outside the curtilage of the premises in which the station is situated". Digital control using higher power is also permitted.

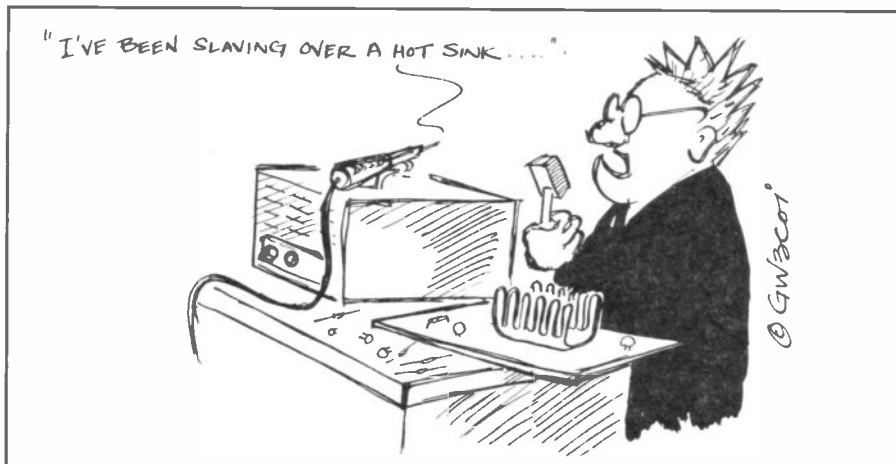
In general, the licence provisions are clearer, and designed to permit more in the way of new, experimental techniques. It is designed to meet European standards for all band and

Wrong to fear?

This may dismay some amateurs who use converted CB transceivers and the like, but a DTI representative told me that it would be wrong for people to fear that they would find themselves operating illegally once the new licence is introduced. Perhaps this clause is to be reworded, or maybe special permits will be easily available to amateurs, though no specific information was available.

Contrary to the rumour that this clause has in some way been instigated by black box manufacturers fearing loss of business due to economical CB conversions, I believe that the clause is a "hammer to crack a nut" effort to clamp down on illegal CB operation. It may prove possible to tackle illegal CB without restricting legitimate amateur radio operation.

Don't forget that the new licence provisions do not come into force until 1st January 1989. Copies of the new licence will be issued at the first renewal after that date, but copies will be available earlier if needed to permit operation in other European countries under CEPT regulations.



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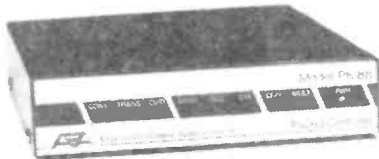


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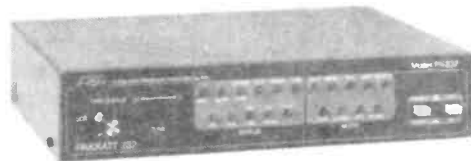


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LETTERS

Americans Did it Better for Longer

Dear HRT, The British radio amateur has no redress against interference, no matter how, or by whom, caused — not even from illegally operated radio apparatus — and certainly not from television receivers. Now that we are cursed with 24-hour TV in most areas, many amateurs must suffer the dreaded timebase racket for 24 hours of every day, every week, every month, every year.

Compare this situation with that in the United States. In my ARRL *Radio Amateurs' Handbook*, 1963 edition (note the date), page 573 deals with the question of interference from TV sets. I quote (the italics are mine):

"While measures to suppress radiation of this nature are required by FCC (Federal Communications Commission) in current receivers, many older receivers have had no such treatment . . . incidental radiation of this type from TV and broadcast receivers when of sufficient intensity to cause serious interference to other radio services (such as amateur) is covered by Part 15 of the FCC rules.

Last Hope for Morse Project

Dear HRT, I have decided to seek your help concerning a project that you published in *Ham Radio Today* January 1987 by Phil Green called *Morse to Centronics*.

The project was built with great care, onto a PCB as advertised, all the subsequent corrections were made to the circuit, but I was not able to get the project working.

I even got in touch with Mr Green, who with some reluctance had a look at the unit and returned it advising that it was now working. Unfortunately it doesn't.

Several of my radio friends have suggested that it could never have worked, otherwise its success in the commercial market would have been encouraged.

However I thought I would make a direct approach to you for your observations. Having spent around forty pounds I feel that you are my last resort.

When such interference is caused, the user of the receiver is obligated to take steps to eliminate it."

Again, note the date — a quarter of a century ago. Is it not time that the RSGB were seen at least to try to get their act together and make serious efforts to obtain similar legislation, instead of basking in the glory of having secured the 50MHz band? Who knows, they may even win themselves a few new members as a result. As things stand, I have the impression of a second rate society unable to head the pleas of a membership of second class citizens. Let nobody say "can't": the ARRL did, many years ago.

The £10 you will undoubtedly pay me for stirring up this particular hornets' nest will be placed on deposit in a building society account — by the time legislation is enacted, that £10 and its accrued interest will probably be sufficient for three years subscriptions to RSGB!

G6NPK

You must be a mind-reader! But I would be interested to hear what any American amateurs have to say about conditions now ongoing in the US; the grass is always greener on the other side of the pond. — HPA

H Bent, Selston, Nottingham.

P.S. My printer is an Amstrad DMP-2000.

This is the only letter in the files relating problems with this project. It has not been possible to contact the author with the post in its present unreliable state, and it does sound as if he has done his bit. The project certainly worked here!

Microprocessor circuits present a particular problem in fault diagnosis unless you have very fancy test

equipment, but there are some checks that you can make using just a DVM and an oscilloscope.

First of all, check that the power supply voltage is correct. Then check that the processor is not held reset after power has been applied. If all is ok so far, check that the crystal oscillator is working, either by listening for the frequency on a receiver or by using an oscilloscope. (The oscilloscope is the better method because you can check for proper logic levels on IC2 pin 6.)

You don't say in your letter whether the printer displays the initial message "Morse to centronics converter". If not, then suspect the wiring of the centronics cable, or a printer compatibility problem. If the initial message is displayed, then test the unit using a key connected to the port A input and send good morse at about 12 wpm. If this works then the problem may be in the tone decoder, which you can test with an oscilloscope to make sure that the output switches in time with an input tone.

Finally, try to find someone local with experience of microprocessor projects. Some problems can be very obscure, and it can be a serious challenge to make a new, working printer function with a properly working desktop computer. Perhaps testing the unit on another printer would yield some results. — G3YZW

We regret that *Ham Radio Today* cannot reply to queries individually. Every month we publish a section of the most interesting. We will endeavour to answer straightforward queries about the back issues index if readers enclose an SAE and much patience. It helps if letters and back issue enquiries arrive on separate sheets of paper, although the same envelope can be used.

£10 FOR THE LETTER OF THE MONTH

You've got a gripe about the bandplans, or you're sick of being wiped out by next door's microwave. Or maybe you've been bowled over by the excellent service from your local radio shop.

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Send your epistles to: Letters Column, Ham Radio Today, ASP Ltd, 1 Golden Square, London W1R 3AB.



...AND HERE WE ARE AGAIN. FREEZING TO DEATH ON HIS HORIZONTAL DIPOLE..



HE'D HURRY UP AND FINISH THAT BLOODY LINEAR!!



No PC Board

Dear HRT, With reference to your April issue, where there is an article concerning a PSU/fuse saver, I would like to make that unit but, the PCB is a drawback. Can you help? Where can I obtain the board?

Mr. Gibson, GM1SYA

Sorry, we have no PCB service at present, though we may institute one in the future. If you cannot make your own board, the unit could be built on Veroboard so long as suitable clearance is left around mains connections. I recommend that mains connections should be spaced two tracks apart, and that the intervening track should be peeled off. Track cuts should be doubled for extra safety. — G3YZW

Wet, Wet Wet?

Dear HRT, Please find enclosed £10 (Must have dropped out! — Ed) which you say I owe you for the honour of publishing my last letter (Not The Letter of The Month — July) in which I gave the readers a valuable tip for curing RFI in telephone memories.

Why are you so timid about publicising such useful information? Why do you have to cover yourselves by whining, "BT may not take too kindly to it..." Where is that fine cavalier CB spirit upon which our magazine was founded? If you don't watch out you'll be taken over by that champion of all faint-hearted wets, RadCom! And not many of us would wish that awful fate upon you. Come on, get your brave fingers on the keyboard and let's have some good and useful tips. I'll suggest a few to really interest your readers:

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Medium wave community

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A simple 40W linear for your videoser
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Meanwhile you might like to know that I am working on a very interesting letter, which is bound to win your £10. I reveal its subject below:

How I filled in my RSGB log really neatly with lovely handwriting but the Post Office (sorry, no), the Home Office (sorry, no), the DTI (are they the ones lumbered with us now?) never came round.

Digito extracto HRT — before it is tolatibus!

John Mayell, G3VPH

Well my comment about risking the wrath of BT was not so much a whining — I suppose you could say that it was more of a wharning! I loved the idea of a 40W videoser though — Oh dear I think that's the DTI on the phone! — G4IRQ

Living in the Real World?

Dear HRT, It disgusts me that so much time, effort and lack of brainpower has gone into discussions such as the efficiency/viability of novice licences, and many other minor subjects. Surely with the power of present day media, newspapers, television, and dare I mention it, the very powerful (still!) medium of radio, people must be aware of the much larger problems in life, such as starvation, poverty, and unemployment?

These exist in third world countries but many also exist within our own country. Isn't it somewhat ironic that people write irate, and often incomprehensible, letters about such a mediocre point as licencing problems and various other trivia when people, including children, are being starved, beaten or merely ignored within our society?

Perhaps if readers of this magazine (and many others besides) put their efforts into rectifying what was wrong in society rather than indulging in nit-picking/licence regulations then perhaps the people who actually had the luxury of contact with a wider world might be able to do something to rectify the *real* problems. Politics does not mean the actual party system itself which most people seems to be ignorant of; politics are, in fact, an attitude of life. I personally would much rather be associated with fighting, or at least speaking up for the rights of the people who have no voice in society.

I feel that people who have the ability, and qualifications to actually communicate with the rest of the world do not express and demonstrate their attitudes strongly enough, which may be why there is such a lack of real communication and response in the world as a whole.

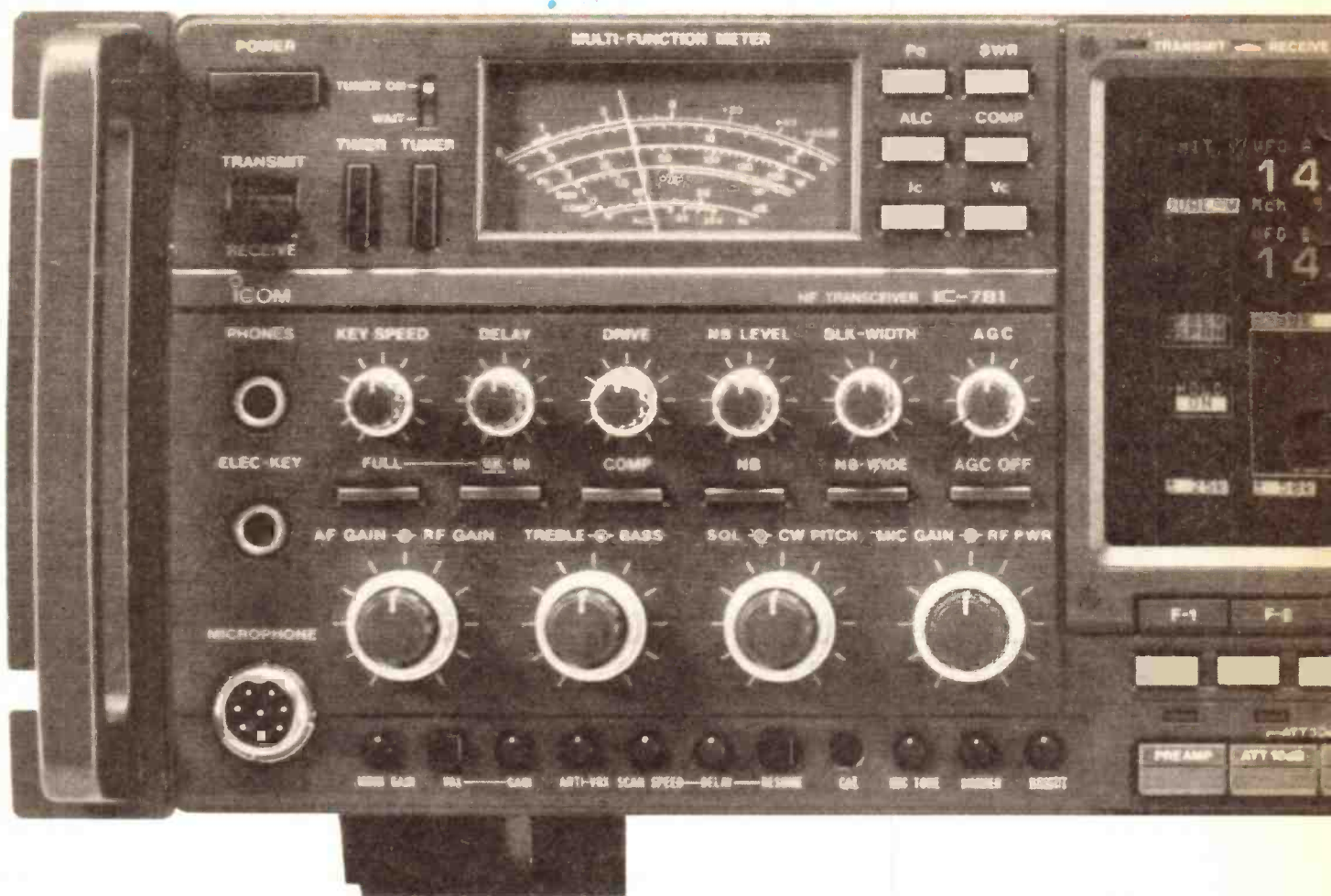
K Berkeley-Henderson

True so far, but do you appreciate how fantastic Amateur radio is! Amateurs can speak to the world, so long as they are not offensive to others' beliefs. Licencing conditions may look trivial, but they are (or should be) protecting the right of the Amateur to operate where people with louder voices, bigger drums or fiercer convictions won't shout them down.

We already have repeater abuse and other kinds of irresponsibility. Combatting these things is important. Amateurs should be proud of their service and take good care of it. In many times and places a radio service belonging to members of the public who are encouraged to be competent in radio technology would be seen as unthinkable, laughable, and totally subversive: — HPA

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Listening On...

Our outward bound ear chases the shifting frequencies of distant stations

With the ever-increasing number of short wave broadcast stations on the air, it is getting more and more difficult for the casual listener to find a particular station. At one time, most broadcast stations adhered to the same time schedule year-in and year-out and changed frequencies four times a year, in accordance with the ITU plans. These are still published, four times a year, and list registrations made by the broadcast stations of frequencies, times of transmission, power, antenna gain and directivity, and target area. They only take into account the *official* broadcasting bands, however. Thus the official ITU IFRB (International Frequency Registration Board) plans for the 31 metre-band, for example, show registrations for frequencies between 9505 and 9770kHz only, and ignore all those stations operating outside the official limits of the band, which in fact extends from about 9350 to 10000kHz in practice.

All Change

These days many stations tend to change their schedules quite frequently — and not only their frequencies, but also the timing of their broadcasts. The trend started several years ago, when most European countries started adopting daylight saving time during the summer months (for many years Britain was one of the few countries that had summer time, now almost all

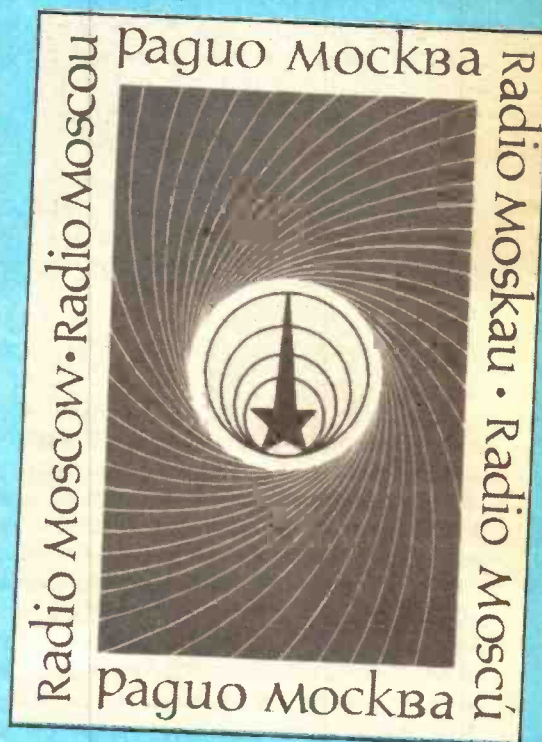
countries have it). In an attempt to provide their listeners with their favourite programmes at the same time all year round, some stations started to broadcast their programmes an hour earlier with respect to GMT in the summer, so that for the casual listener they appeared to be at the same local time.

Other stations, however, kept to the old system of broadcasting programmes at the same GMT time all year round, no matter what the local time in the target area. Some stations, for example Radio Sweden, which include relays of domestic broadcasts, started to change the time of some of their programmes (those that were relays of home service programmes), but not others (programmes made specifically for an international audience). Radio Canada International broadcasts programmes to Africa at the same time all year round, those to Europe are one hour earlier during European summer time, while those to the USA are one hour earlier during American summer time (which is not the same period as European summer time)! The result is total confusion and you really need to have a printed schedule from all the stations that you are interested in hearing in order to know when the broadcasts are, and what frequencies they are to be broadcast on.

As if that were not bad enough, there is now a trend to change frequencies far more often than the four

times a year recommended by the ITU, Radio Moscow was one of the first to start this trend: they change frequencies six times annually — the four ITU IFRB plan periods, and also twice a year when Europe changes from summer time to winter time and vice versa. This is no problem if you want to listen to Radio Moscow — they have so many transmitters available that they can afford to leave several of them on the same frequency and change only a few, such as moving ones from the higher frequency bands (say 13 metres, 21MHz) to the lower frequency bands (41 or 49 metres, 7 or 6MHz) during the winter period. In this way, they are always broadcasting on several frequencies in the most suitable frequency bands at all times a year.

The problems occur when broadcasters with far fewer transmitters start moving them up or down in fre-



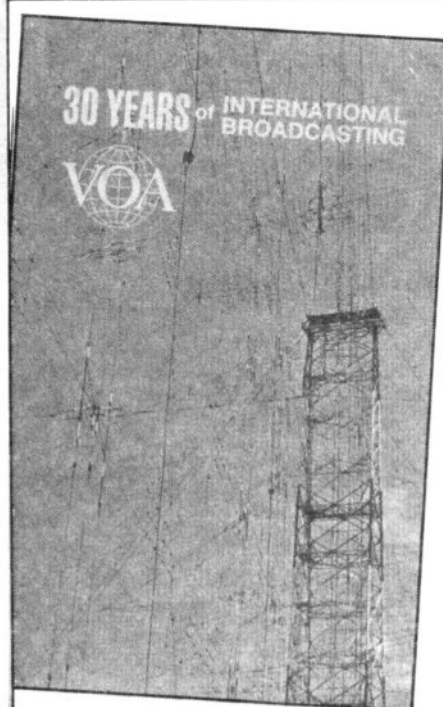
Radio Moscow changes its frequencies about six times a year...



Whereas Radio Denmark and Radio Norway International make frequency adjustments almost every month.



Radio RSA recently changed one of its frequencies for the UK from the 19 to the 41 metre-band, thus making it much more difficult to hear!



The Voice of America has awarded a 50 million dollar contract to Marconi for the provision of new transmitters.

quency, sometimes very often. One of the worst 'offenders' in this respect is Radio Norway International, which now seems to make frequency changes at the beginning of every month! Even worse still is Radio Denmark, which has but one transmitter to its name (and that only 50kW). Instead of carefully choosing one or two frequencies and using them for long periods of time, Radio Denmark moves its one channel up and down the bands almost every month. With a steady stream of 500kW transmitters about, it is often very difficult indeed for the casual listener to find its solitary small voice. The theory is that they move to a clear frequency so that their low power signal can be heard, but of course, it never remains clear for very long and thus they have to move again. Unless you know where to listen, it is almost impossible to find them.

Another station that has recently made a rather odd frequency management decision is Radio RSA in Johannesburg. For many months, years even, they have been well received even during the evening period on the 15, 17 and 21MHz bands. It is generally well known that propagation is improving and that the higher-frequency bands are becoming more

reliable, and yet Radio RSA recently moved their well-heard 15MHz frequency to the terribly overcrowded 41 metre-band for their 1800-1855 GMT English-language broadcast direct to the UK. It is now broadcast on 11915 and — with a power of 500kW — on 7245 kHz. However, despite the increase in power, reception has been much poorer on the lower frequency band. Radio RSA is another station that has in recent years started changing frequency rather too often for their own good, as now their listeners do not know where to look for them. No doubt by the time this appears in print they will have moved yet again, perhaps to a more audible channel!

Radio Free Africa?

While of the subject of South Africa, Radio Australia recently reported on an interesting-sounding project from Canada. There has been a proposal to set up a station called 'Radio Free Africa', which would be modelled on the American-financed Radio Free Europe station. The idea was that a short wave transmitter should be set up to broadcast material on behalf of the Commonwealth countries to South Africa. Programming would be targeted to

both the black and white inhabitants of South Africa and would consist of uncensored news. The proposal was put forward by the Canadians at the Commonwealth foreign ministers conference, but there was no mention of how far advanced the idea was, or whether other Commonwealth countries would go along with the project. With all the propaganda stations that are on the air, I am surprised that such a station is not already transmitting, although Radio Moscow did recently start broadcasts in Afrikaans and as if to reciprocate, Radio RSA has broadcast a number of unscheduled commentaries in Russian at the end of their broadcasts to Europe and the Middle East.

New Transmitters

There have been reports of several new broadcast stations either in the planning stages or recently coming on the air. By far the largest project is a 50 million US dollar contract which has just been awarded to Marconi by the Voice of America. Marconi are to supply ten 500kW transmitters for the VOA relay station in Morocco, to replace the second world war vintage 35kW and 50kW units near Tangier. They



Hear the sounds of the gamelan orchestra...



...and the 'Song of the Coconut Islands' on Radio Republik Indonesia stations.

plan to have the new station operational by 1992. Closer to completion is a new transmitting station for the Hashemite Kingdom of Jordan's Broadcasting Service. Several reports say that three 500kW short wave transmitters should be on the air by now, along with high power medium and long wave transmitters. This will be the first long wave station in the Middle East area, apart from a couple of transmitters in Turkey. Until now, Jordan's radio service has been a difficult one for the short wave listener to pick up, although they do have an English-language service relayed on short wave on 9560kHz at 1500-1730 GMT. This is part of a domestic service intended primarily for Western workers in Jordan, and it includes a lot of pop music as well as news and local announcements.

At least as difficult to hear, or rather up until recently, has been the **Voice of Ethiopia**. However, this station started a test transmission for listeners in Europe in the summer. It is broadcast in English at 1800-1900 GMT 7315kHz on Fridays, Saturdays and Sundays and — according to announcements — on 9660kHz the rest of the week; however, I have only heard it on the 41 metre band frequency. This station has an interesting history in as much as during Emperor Haile Selassie's time there was an international broadcast station in Ethiopia called 'Radio Voice of the Gospel', ETLF. During the coup, the radio station was taken over and for a while it broadcast as the 'Voice of Revolutionary Ethiopia'. More recently the station has broadcast externally to neighbouring countries, but these test transmissions to Europe are the first broadcasts from Ethiopia that have been well heard here since the days of ETLF.

Voice of Indonesia

There have also been reports of another hard-to-hear station, the **Voice of Indonesia**, getting a new 250kW transmitter, which will be used for broadcasts to Europe and Africa. An item on 'Sweden Calling DXers' (which incidentally recently celebrated its 2000th edition!) said that the Voice of Indonesia was now broadcasting in English to Europe at 2000-2100 GMT on 7125kHz, as well as on their long-standing frequencies of 11790 and 15150kHz.



A QSL card from Radio Singapore, heard broadcasting their national programme in English on 5052 and 5010kHz.

The 25 metre-band frequency is generally a couple of kHz off frequency, on 11788kHz. Other reports have the new transmitter operating variously on 7225, 7165 or 7160kHz, so it could be that it is still testing and hasn't settled down on to a particular frequency yet.

Certainly when I looked for the station there was no trace of it whatsoever, though as we get into winter propagation on the lower frequency bands should improve somewhat. Indeed, in the past, it has always been much easier to hear domestic Indonesian stations broadcasting in the 60 metre tropical band than it has

been to hear the external Voice of Indonesia service! — although with the new 250kW transmitter this may change, however. This is the time of year, for the next few months, to listen for the many Indonesian national and local stations broadcasting on the on the tropical bands, as well as other Far Eastern stations.

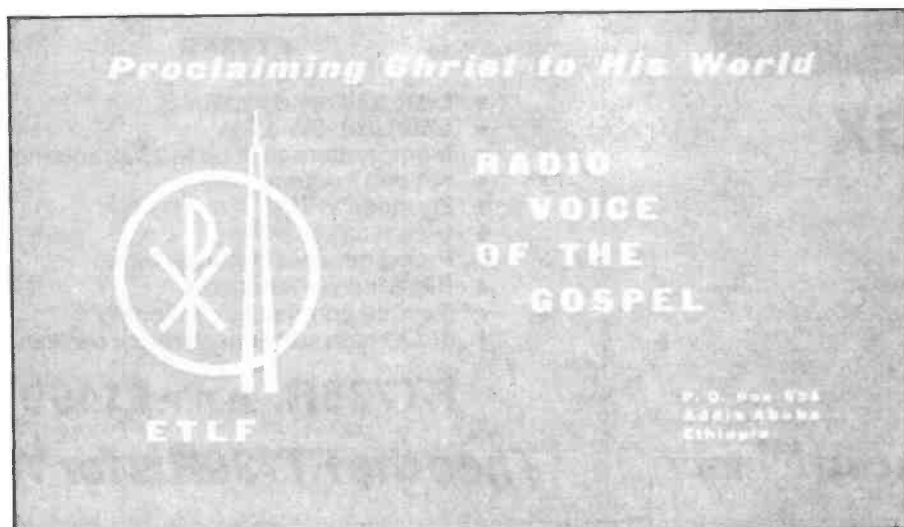
Far Eastern QRP

There are Indonesian stations, some of only a few watts power, broadcasting every few kHz in the 120 (2.4MHz) and 90 (3.2MHz) metre bands, but these are rarely

heard in Europe. Generally speaking, the more powerful stations use the 60 metre band for both local, regional and national broadcasting and most of the ones heard here belong to the government-controlled RRI (Radio Republik Indonesia) network. These include RRI Medan on 4764kHz, RRI Ambon on 4835kHz, RRI Palembang on 4856kHz, RRI Jambi on 4927kHz, RRI Banda Aceh on 4955kHz and RRI Yogyakarta on 5046kHz. A 50kW 'Nasional' station operates from Jakarta on 4774kHz and this is also often audible during the winter months in Europe. The best time to listen is from about 1430 GMT onwards (earlier still in Scotland and in mid-winter) until sign-off time. This varies from station to station, but is generally 1500, 1600 or 1700 GMT. Most stations use a tune called the 'Song of the Coconut Islands' as their signature tune, which they play before news bulletins and also at sign-off. This makes identifying Indonesian stations quite easy, as once heard it is very distinctive, bringing to mind visions of swaying palm trees and blue surf crashing on to golden sands! If propagation conditions are really good, and some of the above stations are quite strong, you could take a look for RRI Denpasar, in Bali, on 3945kHz. This uses a power of about 10kW (maximum) and signs-off at around 1700, or just before.

Tropical Band Goodies

As you are tuning around the 60 metre band for Indonesian stations, you will no doubt hear other Far Eastern stations. There are many Chinese stations, national, regional and even local which come in well when conditions are good. Other countries you should be able to hear include Radio Nepal on 5005kHz, Radio Malaysia from Kuala Lumpur on 4845kHz and from Kota Kinabalu (Sabah, East Malaysia) on 4970kHz, and Radio Singapore on both 5052 and 5010kHz. This latter station broadcasts in English until sign-off at 1630. One thing that should perhaps be stressed is that not all these exotic stations will be audible every day. A lot depends on propagation conditions and a station that is strong one day may be completely inaudible the next. This is one of the factors that makes DXing such a fascinating hobby.



Radio Station ETLF is no more — its transmitters have been nationalised and now broadcast programmes of the Voice of Ethiopia, which now broadcasts test transmissions to Europe.

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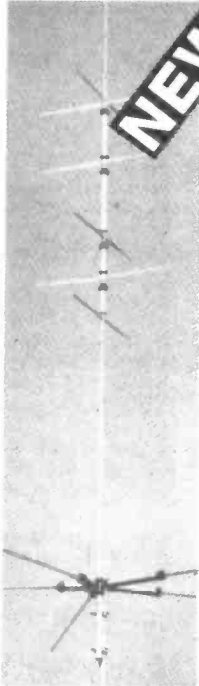
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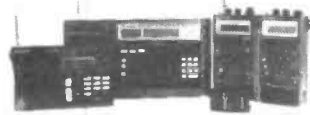
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SMC are pleased to be able to offer the SONY range of Multiband Receivers. They feature all the latest technology allowing unequalled coverage of both broadcast and short wave bands, yet remaining both compact and easy to use. All the models illustrated cover VHF Broadcast, SW Broadcast and some SW or Air bands (only on certain models).

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ICFPRO80 Compact, handheld scanning receiver covering 150 KHz to 108 MHz and 115.15 to 223 MHz SSB, FM (V&N) and AM modes. 40 memories and PRO80 8 way timing system.	AIR-7 Compact, handheld scanning receiver AM/FM reception covering VHF broadcast airband and AM modes. 40 memories and PRO80 8 way timing memory and Keypad entry system.

ICF7600DS	£159
ICF2001D	£299
ICFPRO80	£299
AIR-7	£229

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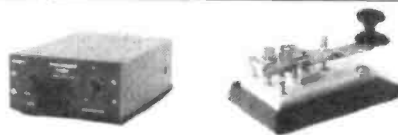
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MK705	Squeeze Key	£32.78	A
MK706	Squeeze Key	£30.48	A
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HK803	De Luxe Brass Key	£104.50	B
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— SMC

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Alinco DJ-100 Portable REVIEW

Alinco have in the past earned a solid reputation of bringing out amateur radio equipment offering the usual variety of features given by many of the big-name rigs but at a very eco-

nomie price. Certainly the Alinco mobiles I have tested for HRT in the past have given very cost-effective performance, and it was with pleasure that I received their latest offering, the tiny DJ-100E portable, to put through its paces.

Chris Lorek G4HCL puts this tiny portable in his pocket and finds that it gives big-transceiver performance in most conditions

nomie price. Certainly the Alinco mobiles I have tested for HRT in the past have given very cost-effective performance, and it was with pleasure that I received their latest offering, the tiny DJ-100E portable, to put through its paces.

Features

For your £219 you get a 2m FM portable covering the band in 12.5kHz steps, the UK importers also offer an optional extended receive coverage to 140MHz – 170MHz for an extra cost of £10, for the more inquisitive amongst us. The set comes supplied with a 7.2V 500mAh nicad, using this voltage the transmitter gives a nominal 3W RF output on high power, with a switchable low power facility down to 250mW. Further optional battery packs are available, giving 9.6V and 12V with corresponding increases in the nominal output power to 4W and 6.5W respectively. A plug-in 2-pin mains charger is provided as standard, together with a compact helical aerial, belt clip, carrying strap, and a basic user instruction booklet. Further optional accessories include a 12V DC lead, a speaker microphone, and a protective carrying case.

Operation

Ten memory channels are provided, each of which may independently be used as separate digital VFOs. A row of small push buttons on the top panel are used in combination to control selection of the memory channels together with the operational frequency of each. In normal use, the Up and Down buttons step the opera-

tion frequency in 12.5kHz increments, when these are pressed while holding the Function button down the step size is increased to 100kHz for a faster shift. The Memo key steps through the ten memory channels, numbered 0 through to 9, again when used in conjunction with the Function button this increments the operational frequency in 1MHz steps letting you get from one part of the band to another quickly. A front panel Shift button, when used in combination with the Function button allows you to program a plus or minus 600kHz transmit offset in for repeater use, during normal use pressing this key gives you a listen on input facility for reverse-repeater checking.

A side-mounted PTT bar controls TX keying, a smaller bar just beneath this also keys the transmitter while generating a constant 1750Hz tone for repeater access whenever the 600kHz shift is in use. On the rear of the case a small slide switch is used to select either high and low transmitter power, this feature helping you conserve your battery life when in QSO with a nearby station.

Adjacent to the set-top BNC aerial connector are two further push buttons, one a latching type that defeats the set's internally pre-set squelch, the other coloured bright orange allowing quick selection of memory channel 0 as a call channel, a further press of this reverting to the previously selected memory. A large sliding bar on the front of the set locks all the frequency and channel change controls to save accidental QSYs. An LCD panel shows the memory number plus the operation frequency in 10MHz, 1MHz, 100MHz and 10kHz digits, a smaller marker indicating the further 2.5kHz, 5kHz, and 7.5kHz increments. A curved bargraph is used as an S-meter on



receive, and to give an indication of power output on transmit.

A standard BNC connector is used to mount the supplied helical, this also allowing external aerials to be connected if required, a 2.5mm 3-way jack socket is used for an optional speaker-microphone connector. The set when fitted with the supplied nicad measures 60mm (W) x 29mm (D) x 169mm (H), and weighs 250g.

In Use

I had seen photographs of the set; it was only when unpacking it that I actually found how small and light it really was. It did indeed very comfortably fit into the palm of my hand, and fitted into any of my pockets discreetly. The supplied battery is actually the same length as the radio, showing how tightly Alinco have managed to pack all the radio electronics in. My next surprise came when switching the set on; even with its short 10cm long helical the receiver managed to pull in distant repeaters very well indeed. I was impressed! The set did receive noticeably better when being held, due to the added ground plane effect from my hand.

It took me a while to get used to operating the extremely small buttons, but once mastered I could move around with relative ease. Due to the number of second functions used for frequency control, Alinco supply a small matching button command label to stick on the set as a memory jogger if required, this could be rather useful in some circumstances I feel. A battery economiser is used to extend the battery life when in receive mode in the absence of signals, this may be inhibited if required, for instance when you need a quick response time such as with packet radio use.

Going Portable

When walking around one of the local radio rallies, in close proximity to the operational talk-in station, I was pleased to find I could listen away merrily to the local repeater without problems from desensitisation. I was indeed rather pleased to find this level of performance for what is effect a low cost portable. Audio reports on my transmission varied from 'good, very readable' to 'sounds rather woolly', but on the whole the audio



was generally not as clear as that from a mobile rig with its purpose-designed mic. This could certainly be put down to the small case size affecting the acoustics, likewise on receive the tiny internal speaker limited the amount of volume obtained without gross distortion. There was enough level for indoor or quiet outdoor use,



but when walking at the side of a busy road I needed to carry the set up next to my ear to be able to understand anything at all.

For some markets where the 1750Hz tone facility is not required, the 1750Hz tone bar is used as an LCD backlight switch, unfortunately this backlight is disabled on UK models, meaning that QSYing at night gets rather difficult apart from the one-button call channel access. Oh dear, what an oversight! I'd be tempted to wire this in with the squelch defeat button, but then one can't have everything I suppose. I did also manage to find one funny in that after switching the set on, the first press of the TX PTT had no effect, only the second and subsequent presses give transmission, this I quickly got used to though.

The batteries lasted far longer than I would have expected, I found I could use the set all day with long periods of transmission without the nicad needing a recharge. Due to the set's light weight and tiny proportions, I found myself instinctively popping it into my pocket when going out. Even earlier today when walking in an unfamiliar area searching for a particular shop I found it very handy, a quick call on 2m bringing several responses, a clear demonstration! I also found myself carrying the set around the house with me, earwigging on activity from my two semi-local (45km distant) repeaters which the set received with ease, again

being affected little from my 2m packet station automatically transmitting 25W bursts of carrier from time to time.

At home when the charger was plugged in, the battery voltage was unfortunately automatically disconnected from the set, meaning it couldn't be used to monitor while on charge. One can plug a 12V source into the battery if required when it isn't being charged, a DC-DC converter being fitted integral to the battery case for this purpose.

Laboratory Tests

The measured receiver sensitivity confirmed the set should indeed be good at pulling in weak signals, but possibly more surprising in view of this was the very good strong signal handling capability. Manufacturers often have to trade one against the other in this respect, rather than have the best of both worlds. The adjacent

channel rejection of 12.5kHz spaced signals was very good for a small portable, the 25kHz rejection quite reasonable. The small amount of current drawn confirms the set should be capable of long periods of operation, if you're thinking of getting another battery as a spare I'd be quite tempted to opt for the smaller one to lighten the set further. On transmit the power achieved for the amount of current drawn showed a reasonable overall efficiency, the deviation was however a little on the low side which could explain one or two of the on-air reports received. In all, quite a reasonable performance, especially so in view of the set's small size and economic cost.

Opening the set up shows a very compact assembly consisting of several printed circuit boards and a multitude of sub-miniature components. Not surprisingly there are no servicing or adjustment information provid-

ed in the instruction manual, I would therefore advise you make sure of the service backup facilities available from the dealer when buying one!

Conclusions

The DJ-100E is a lovely little transceiver, with a very impressive technical performance. It may not have enough receiver audio output to suit all conditions without resorting to an earphone, a result of its small size and light weight. It also lacks an LCD backlight. However, for many amateurs it could prove ideal; I certainly found it very compact and very easy to carry around with me, in fact almost instinctively so. If you're a scanner enthusiast, the optional extended receive coverage may also prove interesting, pity there's no scan facility though!

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

LABORATORY RESULTS

Receiver

Sensitivity:

Input level required to give 12dB SINAD

144MHz	0.142µV pd
145MHz	0.141µV pd
146MHz	0.141µV pd

Pre-set Squelch Sensitivity

0.196µV pd (15dB SINAD)

Adjacent Channel Selectivity:

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

+ 12.5kHz	42.5dB
- 12.5kHz	45.5dB
+ 25kHz	63.5dB
- 25kHz	63.0dB

Blocking

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

+ 100kHz	76.5dB
- 100kHz	77.5dB
+ 1MHz	94.0dB
- 1MHz	92.0dB
+ 10MHz	100.5dB
- 10MHz	101.0dB

Intermodulation Rejection

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

25/50kHz spacing	70.5dB
50/100kHz spacing	70.5dB

Maximum Audio Output

Measured at 1kHz on the onset of clipping

3ohm load	63mW RMS
8ohm load	175mW RMS
15ohmload	125mW RMS

S-Meter Linearity

Indication	Sig.Level	Rel.Level
0	1.41µVpd	- 9.9dB
S1	2.05µV pd	- 5.6dB
S3	2.51µV pd	- 3.9dB
S5	3.17µV pd	- 1.8dB
S7	3.49µV pd	- 1.0dB
S9	3.92µV pd	0dB ref
Full	4.23µV pd	+ 0.7dB

Current Consumption:

Standby, Economiser Operating	13mA average
Receive, Mid Volume	84mA
Receive, Max Volume	109mA

Image Rejection

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

76.0dB

Transmitter

TX Power and Current Consumption

	72.V Supply	9.6V Supply	12.0V Supply
Power High	1.70W/680mA	3.30W/930mA	4.81W/1.12A
Power Low	210mW/277mA	240mW/308mA	380mW/338mA

Peak Deviation

3.76kHz

Toneburst Deviation

3.40kHz

ALINCO

2M FM

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MUCH
MORE

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NO EXTRAS
REQUIRED!

DJ100E

MICRO SIZE:
168x60x30mm
Weight: 250g.



FEATURES:

- * 144-146MHz
- * 3 Watts output
- * 13 mA Battery saver
- * 10 Memories + Call
- * Reverse Repeater

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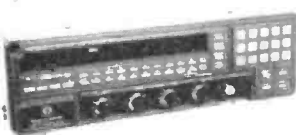
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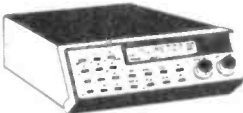
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- * AM & FM all bands
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- * Measures only 2.5" x 5.5" x 2"
- * Nicads, charger & BNC whip antenna included in the price



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- * 16 memories
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Packet Radio

Part 3

Chris Lorek
G4HCL continues
his guide to packet
radio by checking
out the 'network'.

Because Packet Radio is purely digital, it offers the possibility of multiple 'hop-by-hop' connections over a long distance, without any degradation in quality whatsoever giving 100% error-free communication.

This month I will briefly show how Digipeaters and Nodes operate, but more importantly how to use the rapidly evolving packet 'network' to its full advantage when using intermediate relay stations.

Digipeaters

In part one I showed how to use an intermediate station as a 'Digipeater', to relay your packets automatically onto the next station in line. Every station's TNC has the capability of being used as an automatic digipeater, and the AX25 protocol that we use on packet allows for up to eight intermediate digipeater stations to be used.

For example if I wish to CONNECT to G1ABC, but cannot do so direct, I can use an intermediate station, G1XYX, as a digipeater, by typing the command:
CONNECT G1ABC VIA G1XYZ
Alternatively, if G1XYZ is also out of range, I can extend the link by using a nearer station as an extra digipeater in the 'chain', eg.

CONNECT G1ABC VIA G4DEF,G1XYZ

where I enter the callsigns of each intended digipeater, separated by a comma, in the required order of path 'hop'. Upon a satisfactory connection, my TNC displays:

★★★CONNECT TO G1ABC VIA G4DEF,G1XYZ

RECONNECT Facility

If I am in QSO with a station, but the path becomes erratic due to signal fading or whatever, the capability exists whereby, without going through the routine of disconnecting (and possibly losing text already waiting in my TNC), to 'RECONNECT' via an intermediate digipeater station. While in QSO with say, G4RQN, I may enter 'Command' mode (by first entering CTRL-C), then entering:
RECONNECT G1XYZ VIA G4XYZ

at which my TNC will automatically do so if possible, showing:

★★★CONNECTED TO G1XYZ VIA G4XYZ

and entering 'Converse' mode, automatically continuing the QSO without loss of data.

Acknowledgments

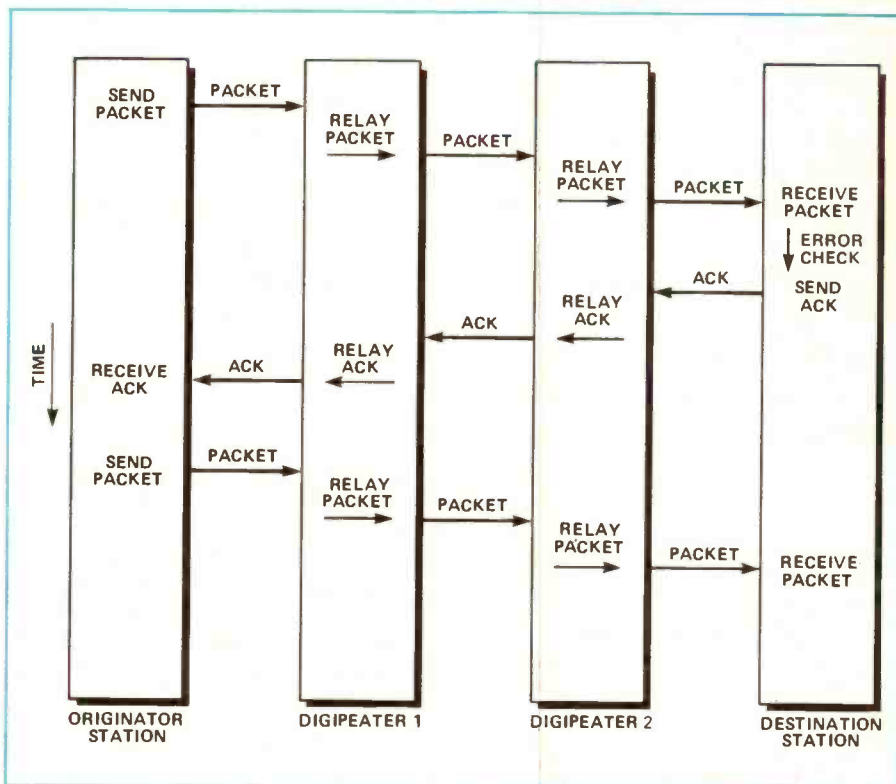
To enable error-free transfer, an error 'frame check' operation is carried out at the final destination station, with a resultant 'Acknowledgment' or 'Frame Reject' packet being sent back, the latter automatically initiating a re-transmission request to the originating station. Note that it is *only* the destination station that carries out this error check,

intermediate digipeaters re-transmit packets with no error checking being carried out along the 'chain'. Fig.1 shows how this operates. On a clear band, with no other stations in QSO, all is well, it just takes a little longer to get your message through.

However on a crowded band, the more 'hops' that take place along the path, the greater are the chances for a packet 'collision' to take place with other transmissions. Although in theory you may use eight digipeaters 'en-route', the chances of your message getting through using more than two or three digipeaters becomes progressively worse to the point of being hopeless! It is for this reason that many mailboxes give only limited access, if any at all, to signals received over a large number of digipeater 'hops' to prevent undue channel congestion.

The Real World

On a dedicated channel, digipeaters can be very useful. In an emergency situation a single handheld radio coupled to a battery-operated TNC in a well-sited location, will provide fast error-free communica-



tion between all stations involved. If however you listen to 145.650MHz in an area of high population, you'll see how crowded it can become; using an intermediate digipeater is still of course far more useful than no communication at all.

The chances of 'collisions' increase somewhat, but a single digipeat hop may often cause only a tolerable slowing-down of message transfer. There are of course rapidly changing improvements in the world of packet, the most important of which are Nodes.

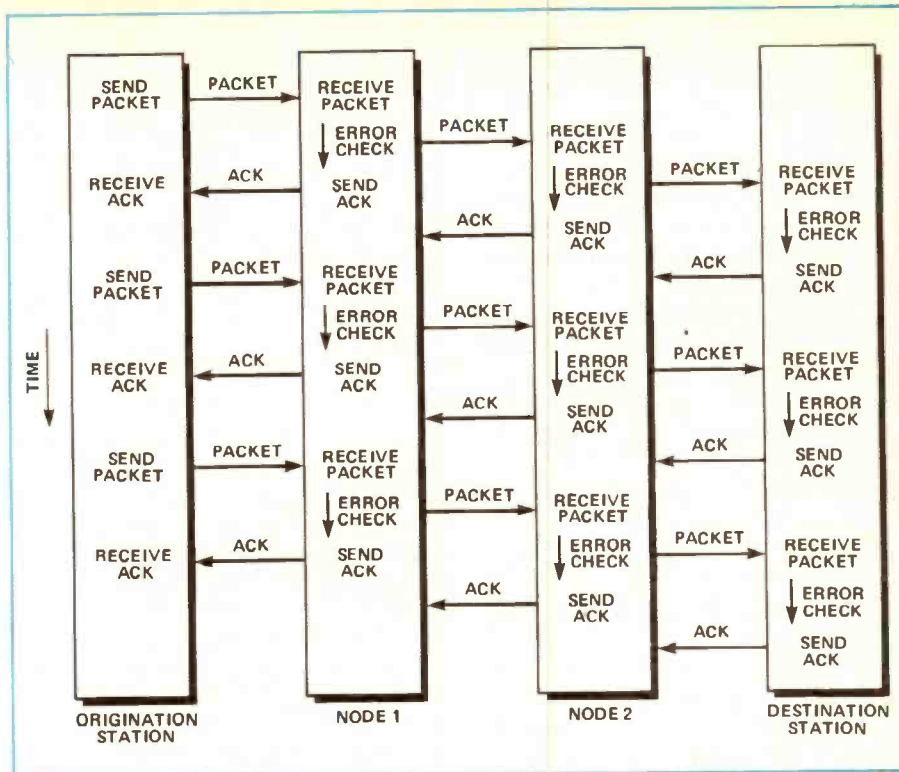
Nodes Vs. Digipeaters

A Node differs from a digipeater in that it provides local error checking *before* relaying your packets on to the next station in line. Because of this, any errors introduced due to 'collisions' are instantly recognised, and a 'local' request for re-transmission is automatically given. Fig. 2 shows the general arrangement, whereby a 'collision' along the line causes a request for re-transmission only from the preceding Node and not from the entire 'chain'. The throughput of information can be substantially increased and the overall spectrum congestion is reduced.

There are several types of Nodes, by far the most common in the UK being those using the built-in EPROM-based software found in Kantronics TNCs, these being called 'KA-Nodes'. They reside in the 'background' of the TNCs, in a similar manner to the TNC digipeater function, and may be similarly switched on or off by the station user as required. A further type (potentially more powerful due to its 'linking' capabilities) is the Network Node. These are designed primarily for unattended use to provide a dedicated service, ie not as an end-user TNC and mainly installed by repeater groups.

KA-Nodes

These are resident in Version 2.82 onwards of the EPROM software built into Kantronics TNCs. In the UK, an SSID (Secondary Station Identifier) of -8 is normally used for these by the users, hence identifying and separating them from the station's main operator callsign, G1ABC-8 for example identifies



G1ABC's KA-Node. Most are single-band nodes, ie units giving connections on the same frequency while others offer simultaneous twin-band capability as well as a cross-band connect facility, for example linking 2m with 70cm or even the HF bands.

On connecting to KA-Node, following your TNC's connection indication you are greeted with a short message followed by a brief menu of possible commands:

```
###CONNECTED TO NODE
G4HCL-8(G4HCL) CHANNEL A
Fenland Mult-Band Node, Located in
March, North Cambs.
ENTER COMMAND: BYE, CONNECT,
HELP, JHEARD, NODES, X CONNECT
?
```

These commands will give options shown in Table 1.

An example of a stations heard request ('JHEARD LONG <CR>' or simply 'J L <CR>') gives a listing of the last sixteen stations besides yourself received, a typical response being shown in Table 2.

Here the received callsign plus any SSID is given, followed by a '/V' or '/H' indicating reception on the 1200 baud VHF port or the 300 baud HF port respectively, alternatively a '/1' or '/2' indicates reception on 'Port 1' or 'Port 2' of the remote TNC. Note that your callsign is *always* the final one indicated, showing you which port you are using in case of any difficulty identifying Ports 1 and 2. A '*' shows that a digipeater route was involved, a further '*' preceding the actual callsign of the relayed pat. A '>' followed by the call of station

Table 1.

B(ye)	NODE WILL DISCONNECT
C(onnect) callsign	CONNECT TO ANOTHER NODE OR END USER
J(heard)	LIST OF HEARD CALLSIGNS WITH DAYSTAMP
J(heard) S(hort)	LIST OF HEARD CALLSIGNS ONLY
J(heard) L(ong)	LIST OF HEARD CALLSIGNS WITH DAYSTAMP AND VIAS
N(odes)	LIST OF HEARD NODE CALLSIGNS WITH DAYSTAMP
N(odes) S(hort)	LIST OF HEARD NODE CALLSIGNS ONLY
N(odes) L(ong)	LIST OF HEARD NODE CALLSIGNS WITH DAYSTAMP AND VIAS
X(onnect) callsign	CONNECT TO ANOTHER NODE OR END USER ON OTHER BAND

Table 2

G0DQW-8/V★ VIA FPV7,★FPV	> G8ADH-2	06-08-88	10:36:09
G4AJJ-15/V	> G0GDR-2	06-08-88	10:36:10
G4WRW/V★ VIA ★GB3TA	> ID	06-08-88	10:37:13
G0DFP-2/V	> G4MTP-9	06-08-88	10:38:32
G4WRW-2/V★ VIA ★GB3TA	> G3ILO	06-08-88	10:38:42
IN3VRR/H	> MAIL	06-08-88	10:38:52
G1APC-2/V★ VIA ★BG3TA	> G1PVR-2	06-08-88	10:38:56
GB4NP/V	> GB7EA-2	06-08-88	10:39:12
G4SPV-2/V★ VIA ★PX2	> MAIL	06-08-88	10:39:18
G1PVR-2/V★ VIA ★GB3TA	> GB3RA-2	06-08-88	10:39:22
GB3PX/V	> G4HCL	06-08-88	10:39:32
G4MTP-9/V	> G0DFP-2	06-08-88	10:39:33
G4WIM-2/V	> GB7EA-2	06-08-88	10:39:40
F5LO/H	> EA4PE	06-08-88	10:39:41
GB7EA-2/V	> ID	06-08-88	10:39:43
EA4PE/H	> F5LO	06-08-88	10:39:43
G4HCL-15/V	> G4HCL-8	06-08-88	10:39:44

ENTER COMMAND: BYE, CONNECT, HELP, JHEARD, NODES, XCONNECT ?

addressed comes next, then the date and time.

Entering the command 'NODES' gives you a listing of the last sixteen KA or Network nodes received by the Node you have connected to, ie 'NODES LONG <CR>' or 'N L <CR>' typically giving the output shown in Table 3.

The callsign of the Node is given first, followed by the main station callsign, a '★' again indicating that it was received over a digipeated route rather than direct, the relevant digipeat path also being indicated with a further '★' preceding the actual received path. A 'X' following the Node callsign indicates the Node was

Table 3

GHT2 ★(G4GHT) VIA ★G3WCS	06-08-88	06:20:29
G3STG-8 (G3STG) VIA LRG2	06-08-88	07:04:27
G0DQI-8 ★(G0DQI) VIA ★G6ZAA-8	06-08-88	07:53:52
SF2 (G8POT-2)	06-08-88	08:07:34
LRG2 (G0GDR-2)	06-08-88	08:11:27
G8AYC-8 ★(G8AYC) VIA ★TA2,MK2,DV2	06-08-88	08:51:31
G4RON-8 (G4RON)	06-08-88	09:08:54
G4DIW-8 (G4DIW)	06-08-88	09:29:28
G8NBR-8 (G8NBR)	06-08-88	09:30:02
DK7AT-4/X (DK7AT)	06-08-88	09:34:17
EA4DYX-5/X (EA4DYX)	06-08-88	09:36:47
DV2 (G4RFG)	06-08-88	10:29:50
GB3TA-8 (GB3TA)	06-08-88	10:33:04
MK2 (G4WIM-2)	06-08-88	10:35:32
G4WRW-8 ★(G4WRW) VIA ★GB3TA	06-08-88	10:37:13
RP2 (G4KLX-1)	06-08-88	10:40:57

ENTER COMMAND: BYE, CONNECT, HELP, JHEARD, NODES, XCONNECT ?

received via the cross-band 'XCONNECT' facility if present. The date and time of reception of each Node then follows. You may of course CONNECT or XCONNECT onto the next Node or Station as required, the KA-Node giving you a '###LINK MADE' indicating successful connection, or '###RETIRED OUT' followed by a further command menu and prompt if no response was achieved.

When you connect on to the next station in line, your SSID is automatically reduced by one digit. In normal cases, you will 'emerge' from the node with an SSID of -15, this representing zero (no SSID) minus one. If you Connect again through another KA-Node, your SSID will again change from -15 to -14 and so on. The reason for this is that if a direct path existed between you and the destination station, that station would be receiving identical packet frames from the same callsign with no digipeat path being given in the address field, and hence a degree of confusion would result with eventual Disconnect. Note that early versions of KA-Nodes will give a shorter menu followed by a '>' in place of the '?' inviting you to enter your next command.

Network Nodes

These, as the name suggests, form part of the 'Network' of formal Nodes in the UK, many of these are in the process of being allocated 'GB7##-##' callsigns, currently with an SSID of -2 for 2m and -7 for 70cm. the software for these is normally also programmed into a plug-in EPROM, this entirely replacing the existing TNC software. To use the system, you first CONNECT to your local Network Node, either direct or via any KA-Node or Digipeater if required and from then on you are in the intelligent Network 'System', each Node linking to the other automatically, irrespective of frequency band, until you reach the required destination Node.

There are various types of Network Node in existence, the most common in recent time being 'Net/ROM' nodes. Other experimental versions such as TCP/IP have also been used, however lately many are either coming on-air, or existing ones being replaced, with 'TheNet' soft-

ware.

Net/ROM was developed commercially in the USA by Software 2000, each EPROM being custom programmed with the inevitable development and programming costs borne by the end user. Recently a pair of German amateurs, DF2AU and DC4OX, have developed a compatible program which they have released as 'Public Domain' for amateur use, ie freely available and hence increasingly very much in popularity. Net/ROM and TheNet have broadly similar commands, and link with each other quite happily.

Automatic Routing

Throughout day and night, these Nodes send out their Identifications for storage in the memories of other Network Nodes, constantly updating themselves with routing path information between themselves. Nodes may be linked via a radio path, or by a local hard-wired RD232 connection between individual TNCs each coupled to transceivers on different frequencies to perform a crossband, link facility. Network Nodes also use a 'shortform' call in addition to their normal one, for instance GB7EA-2 has the shortform 'BSE2' (Bury St. Edmunds, 2m). If you like the hectic life and are running multiple streams on your TNC you can indeed connect to both Node calls at the same time if you wish.

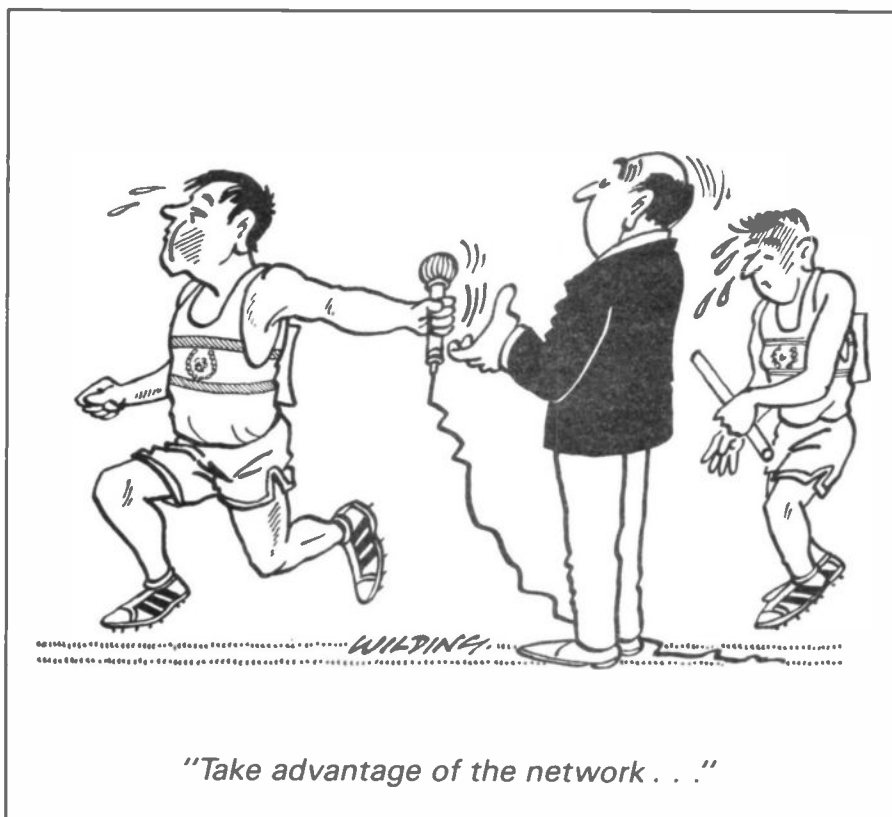
On connecting to a Network Node, no menu is given but you may enter one of several commands, for example:

CONNECT, USERS, NODES, CQ, INFO, or ROUTES

With TheNet version 1.0, these varying slightly depending upon whether you are using a Net/ROM or TheNet Node, together with installed software version. Don't worry if you enter an invalid command, you will just get a response telling you so followed by a line of the actual commands available with the installed software.

Connecting In

Because routine information between the Nodes is automatic, if you wish to connect to a distant station whose local Network Node is, say, GB7YZ-2, you CONNECT to your Local Network Node (eg GB7AB-2)



and simply type 'CONNECT GB7YZ-2' and the network does the work for you. It creates a 'Circuit' along the Node route with you emerging at the destination with an altered SSID, -0 (none) becoming -15, -1 becoming -14, -2 becoming -13 and so on. Note that this SSID does *not* change with each intermediate Network Node hop in the 'Circuit'.

At present, attempting a long-haul path on 2m becomes rather difficult due to the high amount of activity present because links between 2m Nodes are currently all carried out on the same frequency of 144.650MHz using 1200baud. So don't be surprised if your multiple hop link fails, even with the advantages of Node operation. This is rapidly changing though with high speed links planned, more about this next month!

Linking Up

To give an operating example, let's see what happens in a typical link, connecting first to the GB7EA-2 Network Node:

```
cmd:CONNECT GB7EA-2
cmd:*** CONNECTED to GB7EA-2
```

I then request a Nodes listing by typing 'NODES' or simply 'N' GB7EA-2 replies with the display shown in Table 4.

It first replies with its own shortform callsign 'BSE2', followed by its normal one, then a list of Nodes it recognises again with shortform/normal callsigns being shown. I then connect onto GB3NP, this time using its shortform callsign of NP2 for simplicity, by typing 'CONNECT NP2' or 'C NP2'.

It replies with:
BSE2:GB7EA-2> Connected to NP2:GB3PN

Table 4

BSE2:BG7EA-2> Nodes:

APL7:G4APL-7	AXE2:GB3DB	BM1:G7AXC-1	BM2:G7AXC-2
BM7:G7AXC-7	BSL:GB3BP	DV2:G4RFG	DV4:G4RFG-2T
DV6:G4RFG-3	DV7:G4RFG-1	HX2:GB3HX	LONDN2:GB3XP
LONDN7:G8GGI-1	LRG7:G0GDR-1	MK2:G4WIM-2	MK6:G4WIM
MK7:G4WIM-7	NP2:GB3NP	PX2:GB3PX	ROCH2:G4LZV-2
RP2:G4KLX-1	RY7:GB3RY-1	SF2:G8POT-2	SY2:G3UQH-2
SY4:G3UQH-1	SY7:G3UQH-7	WEY2:GB3DP	WOK2:G4LJF-1

To see what I'm connected to, I type 'INFO' or 'I', the Node replies with:
NP2:GB3NP> NORFOLK PACKET REPEATER GROUP [J0020K] SYSOP:For [GB3NP] Paul G4VLS @ G4VLS-2.

To see who is using it, I enter 'USERS' or 'U', it replies with:

NP2:GB3NP> TheNet Version 1.0 (684)

Circuit(BSE2:GB7EA-2 G4SPV-2) <- -> Downlink(G4SPV-13 G4VLS-2)

Circuit(BSE2:GB7EA-2 G4HCL)

Note that the left hand side of the <- -> always shows the 'Uplink' or incoming circuits, the right hand side always shows the 'Downlink' or outgoing circuits. In this case I see that I am coming in on a 'Circuit' from BSE2, and not yet connecting on further from the Node, another circuit is coming in from GB7EA-2 carrying G4SPV-2, and this emerges from GB3NP as a downlink to G4VLS-2.

If I then wish to connect onto G6XYZ-8 from NP2, I simply type 'CONNECT G6XYZ-8', the Node if successful replying with:

NP2:G3NP> Connected to G6XYZ-8

otherwise eventually replying with 'Failure with G6XYZ-8'

CQ, CQ

I may instead issue a 'CQ' by typing 'CQ' followed by up to 77 characters of text, the distant Network Node (if it has this recently-added facility) then sends out a single 'CQ' packet with my call sign and decremented SSID, the 'USERS' listing then also showing a CQ against my call sign/SSID. To cancel this, I type any other command, or to issue a further CQ packet from the Node I simply type 'CQ' again. If you see a CQ either when connected to the Node or when monitoring locally, in practice you simply need to type 'CONNECT G6ABC-15' or whatever to answer, the Network node then linking you automatically in QSO.

Further commands such as ROUTES and PARMS (Parameters on Net/ROM nodes) are mainly for the Node system operators' use and are beyond the scope of this beginner's guide. For the interested 'buff' though, complete files of the operation of these exist on a selection

of the various national 'Packet Mailboxes', often typing 'W NETWORK' (as described in last month's article) will give you a listing of available files you may download during a quiet period. Remember that Network Nodes are often placed in operation by local Packet or Repeater Groups, who themselves bear the entire cost of equipment, maintenance, site rent and electricity. These costs are *not* paid for as part of your licence fee or RSGB subscription, so you know the moral.

Disconnection

So there we are, the world, or at least the UK, is your oyster. To see how the world can be at your fingertips on Packet, watch out for the final part of this series in next month's *HRT*. We shall then see how Packet Radio's horizons are being expanded with high speed microwave Network links, store and forward worldwide satellite packet communication (all originated from your 2m handheld and TNC), HF and meteor scatter communication, and what the future holds.

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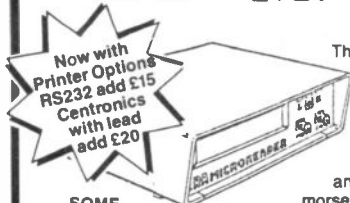
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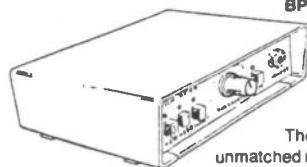


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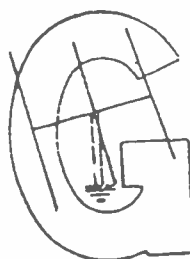
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The TS-790E from Kenwood



The Kenwood tradition of multi band VHF/UHF base stations goes back to the original TS-770, which created a real sensation when it appeared for the first time in September 1979. As with most Kenwood designs, the TS-770 represented a significant step forwards both in design and performance, and again in Kenwood tradition it presented the operator with a wide range of operating facilities which were perfectly engineered for ease of use.

The TS-770 was eventually superseded by the TS-780, which also set new standards in performance and operating convenience, and the TS-780 has gained a reputation for being the very best multi band VHF/UHF station one could wish for. However, in the very nature of electronic technology, advances continue to be made, and the time has come to introduce the all new multi band base station from Kenwood; the TS-790E.

It goes without saying that the TS-790E will once again improve on standards of RF performance, because the design draws on all Kenwood's experience in the use of advanced assembly techniques and the latest semiconductor devices. The real excitement comes from the operational features of the TS-790E which include full duplex operation, two band simultaneous monitoring, cross band repeater operation (for those allowed to use it), and the fact that the TS-790E comes as a two band transceiver for 2 metres and 70 centimetres, but can be fitted with an internal 23 centimetre unit making it into a three bander.

In line with current demands, the power output is 45 watts on 2, 40 watts on 70, and 10 watts on 23: with all mode USB, LSB, CW, CW (narrow), and FM. The CW (narrow) facility includes a fitted 500Hz CW filter as standard.

For use with satellites, the TS-790E provides full facilities, including Doppler shift correction (an industry first), and the 23 centimetre band has automatic frequency shift correction.

As one might expect these days, the TS-790E can be fitted with an interface to allow computer control via any RS-232C control system. Packet radio has not been forgotten, the TS-790E having a dedicated "packet" port.

Add to these features all the memory and scan facilities at which Kenwood excel, the provision for fitting a voice synthesiser to help partially sighted operators, direct keyboard entry of frequency as well as the usual "nice feel" Kenwood tuning control, IF passband tuning, speech processing, noise blanker, and so on and so on. You then have what must be the finest multi band VHF/UHF all mode base station it is possible to build today: the TS-790E from Kenwood.

At the time of writing this text, the descriptive brochures for the TS-790E had not arrived. However, if you send a stamped addressed envelope requesting further data, we will certainly let you have a detailed summary of the TS-790E. If you send £1 we will send back the full Kenwood catalogue and the current complete product listing. We handle a great deal more than people realise, and try to select our products so as to give you the best that money can buy. What we also give you is that all important level of service and back-up which is acknowledged to be probably the best in Europe.

Finally, I have had a hectic year and I am looking forward to spending Christmas peacefully with my family. In this first year back in the advertising saddle, I have written the text as I see things. Sometimes it has been controversial, but I hope always honest and sincerely felt. On behalf of all of us at Lowe Electronics may I wish all our friends out there an equally peaceful Christmas and a harmonious New Year in 1989.

73

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TM221E ... £317.30 (carr. £8) TM421E ... £352.84



TS711E Called by many "The perfect 2 metre Base station", the TS711E is as close to perfection as state of the art can make it. All mode operation, full band coverage, continuous tuning or step tuning for FM channels. Two separate VFOs, 40 memories storing frequency, mode, repeater shifts, even whether or not you need a tone burst. Optional voice synthesiser, the list of features is almost endless. (And it too has a 70 cm brother, the TS811E).

TS711E ... £898 (carr. £8) TS811E ... £998



TR751E Versatile 2 metre multi mode mobile or fixed station, the TR751E again shows that Kenwood magic touch in making a complex transceiver so easy to use. Virtually a miniature version of the TS711E, the TR751E set new standards of performance at its introduction, and has continued to win friends ever since, continuing as it did the line started by the TR9000 and TR9130. (And, you guessed, it has a 70cm counterpart, the TR851E).

TR751E ... £599 (carr. £8) TR851E ... £699



RZ1 To be perfectly honest, the RZ1 came as a surprise to most people. Kenwood have come up with a mobile monitor receiver covering 500 kHz to 950 MHz designed to fit in a standard car radio slot, and the RZ1 seems to have everything. Direct frequency entry, manual tuning, 100 memories, readout of station name on display, scanning, stepping, AM/FM modes, unbelievable ... Of course this level of facilities does not come cheaply, but the RZ1 really adds a new dimension to the wide range monitor market.

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TS940S Top of the range, the TS940S has everything the discerning HF operator requires. Amateur bands from 160 to 10 metres, together with a general coverage receiver tuning from 150kHz to 30MHz. Operating modes USB, LSB, CW, AM, FM, FSK. Forty memory channels, each effectively a separate VFO. Easy keyboard frequency entry. Leadership in the field. The TS940S is the transceiver everyone wants to own one day.

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R5000 Virtually the receive section of a TS940S, the R5000 is probably the best HF receiver available right now. Notice the family resemblance to the TS440S which gives it a clean, easy to operate look, and of course Kenwood have applied all their ergonomic skills to make you "at home" the moment you begin to use the R5000. All mode of course, and has an optional internal VHF converter which extends you to 108-174MHz.

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SWR

Meter Techniques

Over the years the SWR meter or reflectometer has occurred as a constructional article with monotonous regularity. Not only that, but we have read numerous debates on whether SWR really is that magic indicator of

correct. All we can say for sure is that if the meter doesn't move at all, then the SWR is one:one (for all non-zero power levels), and that if the meter suddenly starts kicking violently after no apparent change then something

first sight this may seem a strange thing to do until it is realised that this ratio and VSWR are related by a non-linear function. This means that by applying the correct non-linear scale to the meter movement, it can be made to read VSWR. Nevertheless, the instrument still needs to carry out the division of two voltages. Electronic circuits to carry out division have traditionally been complicated and difficult to set up and this fact alone is responsible for the death of direct reading SWR meters. With the availability of both analogue and digital ICs, this has ceased to be a problem and over the past decade or so the occasional direct reading instrument has appeared. The purpose of this article is to investigate the various techniques which have been used or suggested and culminate in the design of such an instrument which gives the reading on a pair of 7-segment LEDs and uses a novel approach.

Advances in electronics have made direct-reading SWR meters practical again. *Mike Bedford G4AEE*

the worth of an aerial, theoretical articles have considered the effect of feeder losses on the measurement of SWR, and so the list goes on. This being the case, some people could be excused for groaning "On no, not another article on SWR!". But please don't turn the page, because this article takes a look at an entirely different aspect of the topic.

Reflectometer vs Direct Reading Meters

The vast majority of SWR meter designs published, and all those up to about 10 years ago, have been of the reflectometer type. These employ some type of pickup, often formed by threading wires through air spaced coax, and a metering system with a sensitivity control which can display the current induced in these wires both in the forward and the reverse directions. At the expense of stating the obvious, these are operated by switching the meter to forward, adjusting the sensitivity control give full scale deflection, then switching to reflected and reading the SWR off a specially calibrated meter scale. Once normal transmission begins, however, even if switched to reflected power, the meter no longer reads SWR. It is only at those instants when the transmitted power is the same as it was when the sensitivity control was adjusted that the reading will be

has gone wrong with the aerial or feeder. Most people would consider this situation less than ideal, so why have SWR meter which give a correct reading for all power levels without the need for re-adjustment (normally called direct reading SWR meters) been so rare?

Let's recap a bit on the mathematics of calculating SWR — this is defined by the following formula:

$$VSWR = \frac{V_f - V_r}{V_f + V_r}$$

where V_f is the forward voltage and V_r is the reverse voltage.

Actually, a meter designed to display this ratio would be prone to damage at high SWRs since it can take an infinite value, and the meter could therefore have its needle violently pinned against the end stop. Instead, meters are normally designed to display the ratio V_r/V_f . At

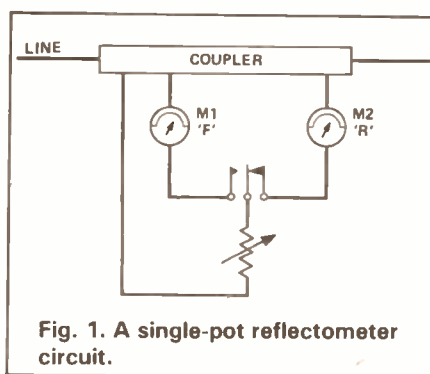


Fig. 1. A single-pot reflectometer circuit.

Time Shared Servo Approach

The earliest direct reading SWR meter discovered during research for this article must be my all time favourite, a wonderfully Heath Robinsonish design. [1] I don't mean this to be derogatory, but to emphasise the ingenuity of the design which, although it did use one IC, could have been built without at the expense of only slightly greater complexity. Essentially it uses an analogy of the familiar reflectometer principle to carry out the division process. Most people probably don't realise it, but in adjusting the sensitivity control on such an instrument to give FSD they are in fact carrying out a division manually. Clearly if a reflectometer with two meters instead of the more common one meter and a switch were used, and human reactions were quick enough to continually

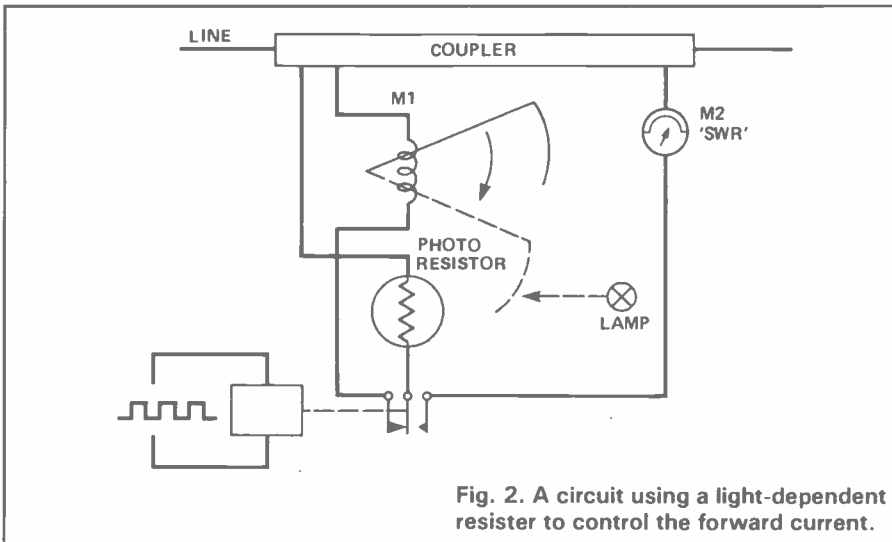


Fig. 2. A circuit using a light-dependent resistor to control the forward current.

adjust the sensitivity control to give FSD on the forward meter, the reflected power meter would give a correct VSWR reading at all times. This is essentially the technique used in the time shared servo SWR meter.

The two meter types of reflectometer generally employ a ganged potentiometer as the sensitivity control, one gang for the forward and the other gang for the reflected meter. Fig. 1 shows an alternative arrangement in which only a single potentiometer is required. The relay contact is made to oscillate rapidly between its normally open and normally closed contacts, hence time sharing the potentiometer between the two meters. Except for the fact that the meter readings will be halved (assuming that there is a 50% duty cycle and that the frequency of oscillation is high compared to the time constant of the meter) this will operate in the same way as the ganged device and the factor of 0.5 can be corrected for on the meter

scales. The final SWR meter design is shown in Fig. 2. The variable resistor is replaced by a light dependant resistor and the forward power meter is modified by the addition of a piece of black paper which comes between the LDR and its light source as the meter needle advances. The result of this is a closed loop control circuit which regulates the forward current and in so doing causes the reverse meter to give a constant SWR reading.

The Dual Needle Meter

The first commercial direct reading meter (I believe) circumvented the need for electronic division by use of another rather ingenious technique. Launched in about 1988, the Daiwa CN-620 was really a traditional reflectometer but displaying both forward and reflected signals simultaneously on a specially developed meter movement with two needles. This is undoubtedly an instance where a picture is worth a

thousand words, so Fig. 3 illustrates the concept. It is probably fairly clear how it works. Although there are an infinite number of combinations of forward and reflected power (represented by the point of intersection of the two needles) for a particular value of SWR, they all lie on a straight line across the face of the meter. So, although the two needles will clearly move around with speech peaks and troughs during transmission, so long as the SWR remains constant, the point of intersection will stay on the one line and it is comparatively easy to read off the value. It is nevertheless somewhat disconcerting to have to read off the point of intersection of two moving needles, and since the lines converge at zero power, the reading accuracy decreases in speech troughs.

Logarithmic Amplifiers

Please excuse the brief maths lesson but an understanding of the following formula is essential to an appreciation of this section:

$$\log (V_r/V_f) = \log (V_r) - \log (V_f)$$

This means that as long as we are able to generate the log of V_f and V_r , then all that is necessary to calculate their ratio is a subtraction which can easily be carried out by use of a couple of op-amps. Actually to generate the true ratio an anti-log function is also needed but since the scale of any such meter is already non-linear, it is probably as well to simplify the circuitry by omitting this and combining the two non-linearities on the meter scale. But how do we calculate a logarithm electronically? Isn't it just

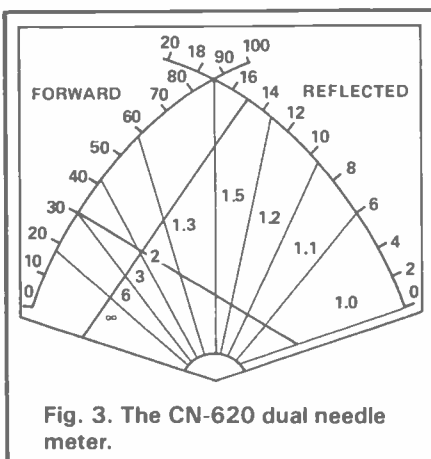


Fig. 3. The CN-620 dual needle meter.

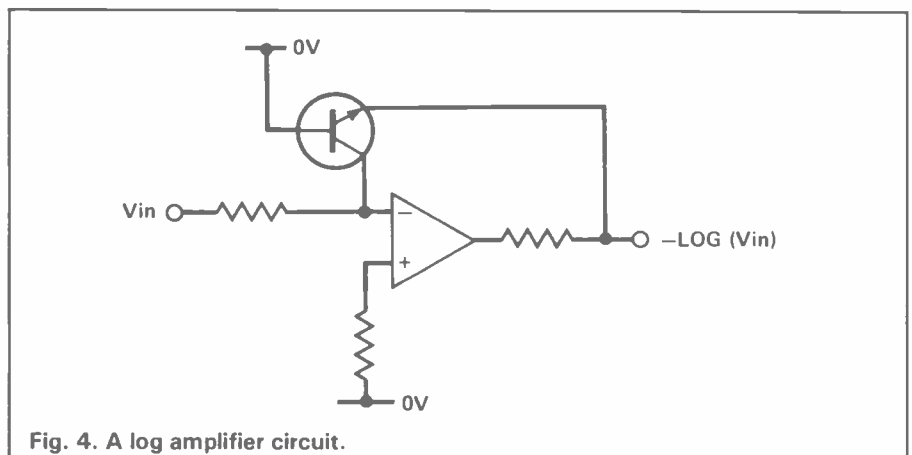


Fig. 4. A log amplifier circuit.

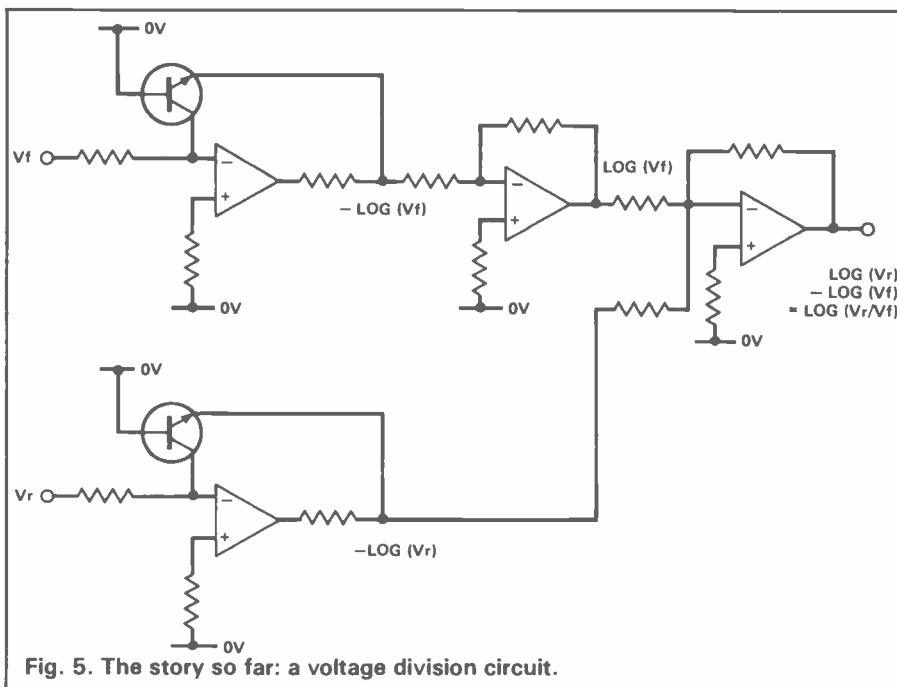


Fig. 5. The story so far: a voltage division circuit.

as difficult as doing the division? Well, fortunately the answer is no! The base emitter voltage and the collector current of a transistor have a logarithmic relationship over a quite a number of decades of voltage which means that by incorporating a transistor into the feedback loop of an op-amp as shown in Fig. 4 a log amplifier is created. So, by combining all the facts so far covered in this section we derive the division circuit shown as Fig. 5, the output of which can drive a meter calibrated to give readings of SWR. Actually the one design I have seen using this technique didn't use a meter but instead drove a variable frequency audio oscillator,

making the instrument useable by blind operators. [2]

The one possible stumbling block with this method is that the log amplifier is very sensitive to transistor characteristics and even temperature. Samples of the same type of transistor could be sufficiently different to cause gross errors, and this is aggravated if one transistor is allowed to get warmer than the other. Fortunately chip manufacturers came to the rescue with a DIL package containing a number of individual, matched transistors etched onto the same substrate, removing the dangers of temperature differences.

At this point it is worth recalling

another difficulty in designing direct reading SWR meters. Assuming that the transmission being monitored is either CW or SSB, then the signal level regularly drops to zero for short periods of time. When this happens, the division required is 0/0 which has no defined answer. In other words, any circuitry designed to evaluate a division will give a meaningless result during speech troughs. If we take the logarithmic simplifier method of division as an example, since $\log(0) = -(\text{infinity})$ the log amps will both saturate and the output will be virtually equal to the supply rail. When the two outputs are combined by subtraction, the final result depends on slight differences between the two amplifiers which influence how far each one saturates. Clearly it isn't very satisfactory to let the meter go just anywhere during troughs, so the absolute minimum requirement is for this situation to be detected and the meter to be forced to a known state — either 0 or FSD. It still isn't very satisfactory, however, for the meter to fluctuate rapidly during transmission — it is still only possible to read SWR by holding down the key or speaking a dreaded "Aaaah-lo" into the microphone. A better solution is to damp the forward and reverse signals into the division circuitry so that the 0/0 condition only applies a few seconds after transmission stops. It is important, however, to ensure that the two signals are accurately damped to the same extent or else the reading will become inaccurate. If the division circuitry is feeding something other

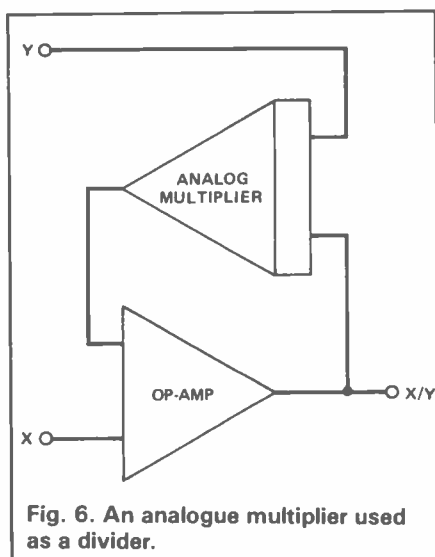


Fig. 6. An analogue multiplier used as a divider.

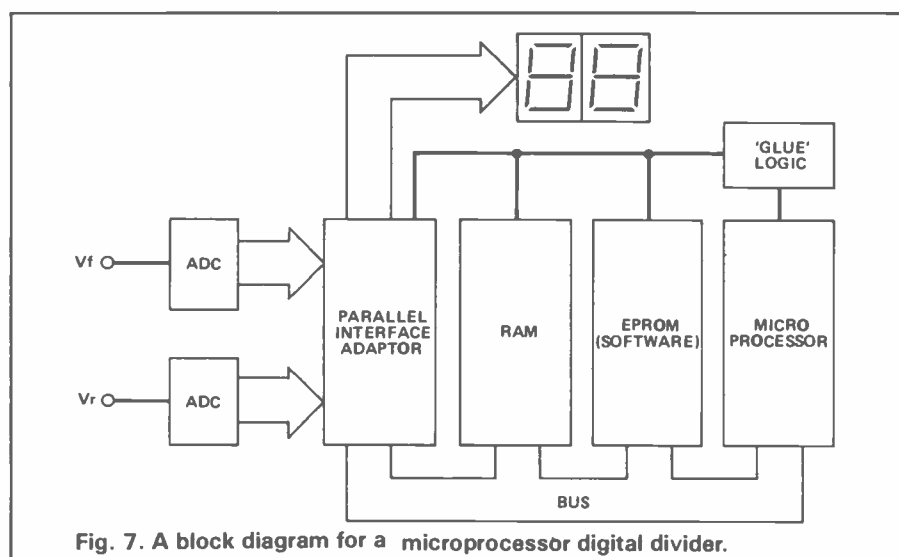


Fig. 7. A block diagram for a microprocessor digital divider.

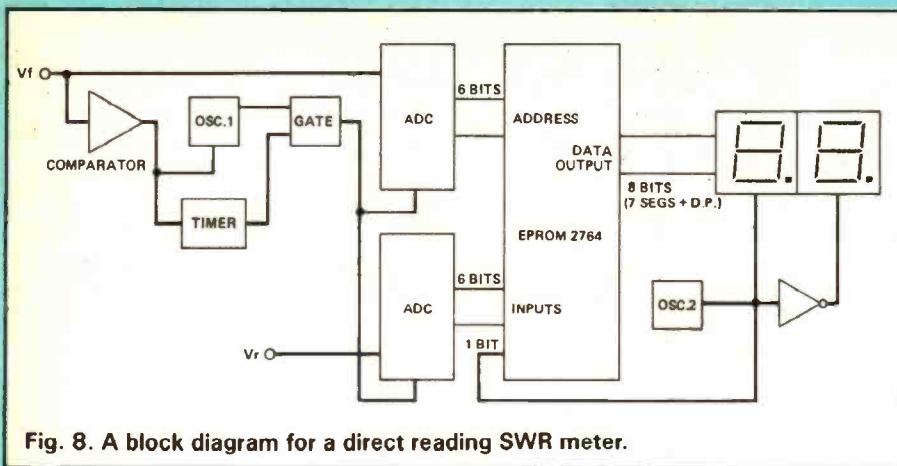


Fig. 8. A block diagram for a direct reading SWR meter.

than a meter, say a bar graph type display, the problem is nowhere near as severe. It would be quite acceptable for the display just to blank during troughs.

Specific Analogue Dividers

Yes, there are chips around which carry out analogue division. In fact, they probably incorporate circuitry of the type outlined in the previous section, but go far beyond this. Firstly, they often achieve much greater accuracy than would be needed for an SWR meter, and secondly they tend to be four quadrant dividers. This

means that they don't just divide two signals of the same polarity but can evaluate $+ve/+ve$, $+ve/-ve$, $-ve/+ve$ and $-ve/-ve$, once again in excess of SWR meter requirements. As always, the result of using a device which does far more than is actually necessary for a given application is that the price is prohibitive. For this reason, I don't believe that any designs for direct reading SWR meters using such a chip have been published.

Analogue multipliers are also available, and whereas once again many are very sophisticated with a correspondingly high price tag, there are cheap and cheerful versions. At

first sight this may not seem too useful since it is a division which is required but by putting a multiplying element in the feedback loop of an op-amp as shown in Fig. 6, a divider is created. This is the technique used to provide the SWR meter portion of the Antennalab published in Rad Com a few years ago. [3] In this design the output of the division circuit was fed into a bar graph driver chip which drove a number of LEDs varying in colour from green through yellow to red, each indicating a range of SWR values.

Digital Division

If the forward and reverse voltage signals are converted to digital form by use of ADCs, digital division may be carried out. The most obvious such solution would be to use a microprocessor, this resulting in the piece of equipment shown in block diagram form as Fig. 7. Such a circuit was actually proposed a few years ago as an example of microprocessor applications within amateur radio but to the best of my knowledge it had never been put into practice. Although integration of microprocessor components is increasing with corresponding size and price advan-

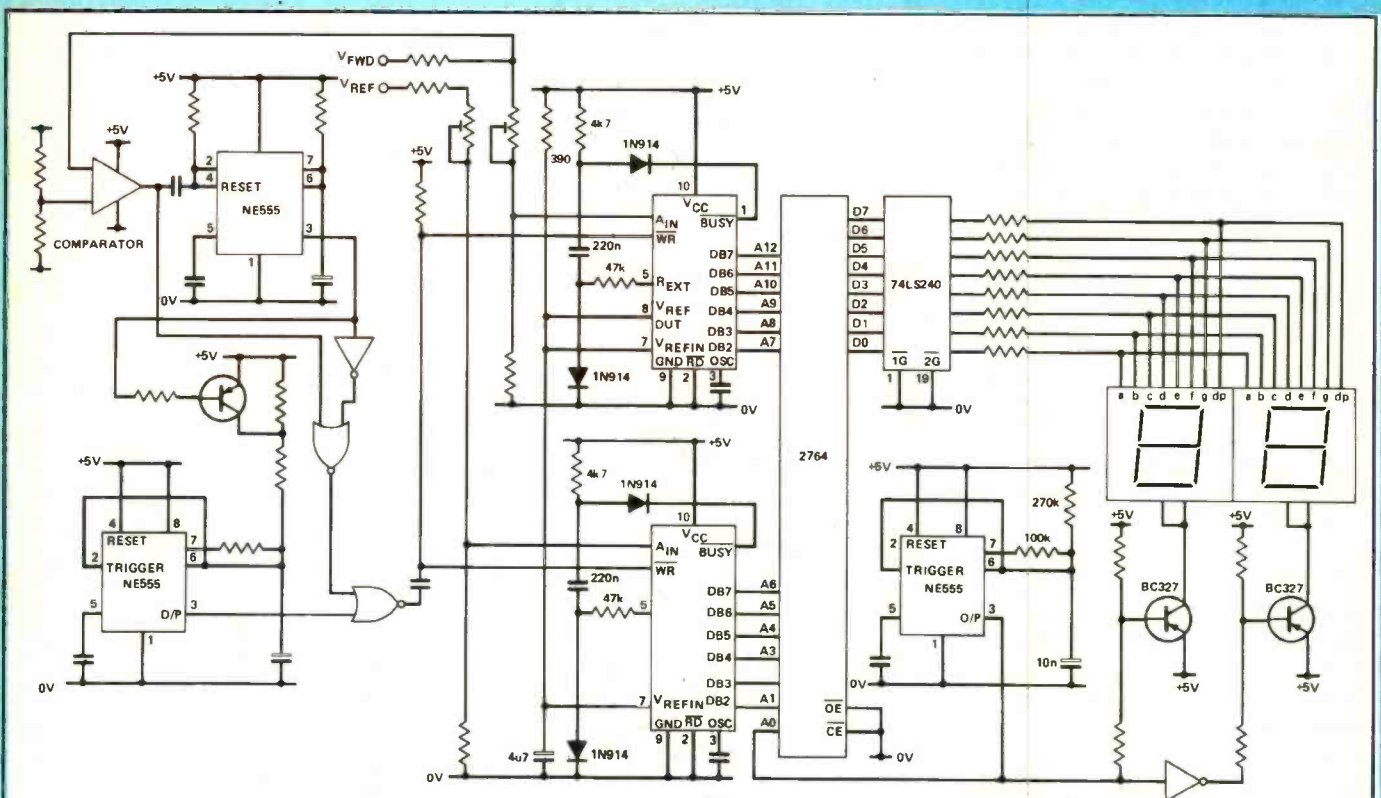


Fig. 9. The experimental SWR meter circuit based on Fig. 8.

tages, it is probably still something of an overkill. Most of the less expensive processors don't actually have a divide function, so this would have to be done with a specially written routine utilising multiple subtractions and shifts.

Alternatively, the division could be carried out using a look-up table. If a look-up table was used for an application like this, there really wouldn't be much point in including the processor, since it had very little else to do and the look-up table could be implemented using an Eprom alone. The only difficulty with this approach is that the functions of triggering the ADCs and of holding the display for a short while after loss of signal (to avoid display blanking during short speech troughs) would have to be carried out by a bit of extra circuitry. A complete direct reading SWR meter using such a technique is shown as Fig. 8 in block form.

In basic terms, the two ADCs convert the forward and reverse signals to digital form these being presented to the Eprom as address inputs. The Eprom outputs 8 bits of data for each address (each combination of forward and reverse voltages) which are applied to the 7-segment LEDs, the eighth bit driving the decimal point. Clearly drivers are used, since the Eprom does not have the drive capability to illuminate LEDs. Things are slightly complicated by the fact that two LEDs are used to give a range of 0.1 to 99 with resolution of 0.1 for values up to 9.9 and a resolution of 1 for values above this. The two LEDs are alternately driven via their common anode (or cathode) at such a frequency that both appear to be continuously illuminated. In order to cause the Eprom to output the appropriate digit as that LED is selected, the oscillator signal which multiplexes the LEDs is also presented to the Eprom as a further address bit. The ADCs are regularly triggered by oscillator 1, probably at about 1Hz so that the display does not fluctuate too rapidly. The comparator monitors the forward signal, triggering the timer once the level drops below that which will give an accurate result. While the timer is timing (and the forward signal is still low), the trigger signal to the ADCs is inhibited. This ensures that short breaks in transmission during speech troughs do not

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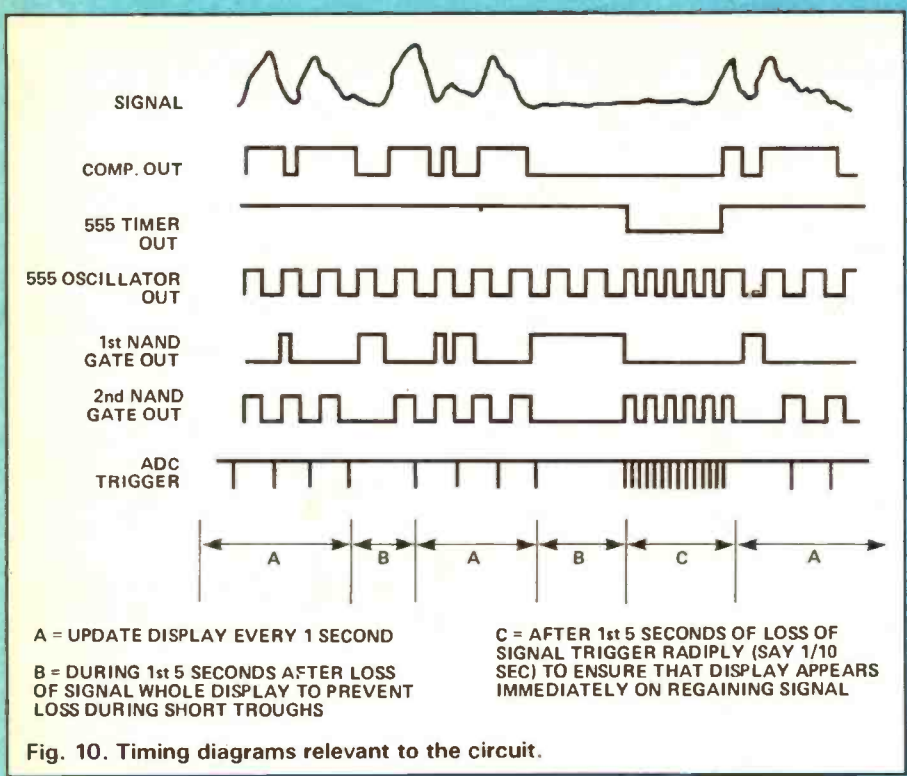
100 REM Program to calculate EPROM contents for Digital SWR Meter
110 REM Mike Bedford, G4AEE
120 REM
130 REM LED Segments as follows
140 REM
150 REM     a = LSB (bit 0)           a
160 REM     g =                     _____
170 REM     dp = bit 7             f | g | b
180 REM
190 REM                               e | | c
200 REM
201 REM                               _____
220 REM                               d
300 DIM EPROM(8192) , SEGS(9)
310 DATA 63,6,91,79,102,109,125,7,127,103 : REM Figures 0-9 on
LEDs
320 FOR N=0 TO 9
330 READ SEGS(N)
340 NEXT N
400 FOR N=0 TO 8191
410 EPROM(N)=0 :REM Clear to 0 so that low values don't light LEDs
420 NEXT N
500 THRESHOLD=8 REM Select by experiment - set comparator
accordingly
510 FOR F = THRESHOLD TO 63
520 FOR R = 0 TO F
530 IF F=R THEN SWR=100 ELSE SWR=(F+R)/(F-R) :REM 100
Represents infinity
540 GOSUB 1000
550 NEXT R
560 NEXT F
600 REM At this point put in code to write contents of array EPROM to
610 REM EPROM Programmer etc.
800 GOTO 2000
1000 REM Calculate LED values
1010 IF SWR >=10 THEN 1050
1020 SWR=SWR*10
1030 DP=1
1040 GOTO 1060
1050 DP=0
1060 IF SWR <=10 THEN 1120
1070 TENS=INT(SWR/10)
1080 UNITS=INT(SWR-10*TENS)
1090 EPROM(F*128+2*R) = SEGS(UNITS)
1100 EPROM(F*128+2*R+1) = SEGS(TENS) + 128*DP
1110 GOTO 1140
1120 EPROM(F*128+2*R)=6
1130 EPROM(F*128+2*R+1)=118 :REM Spells HI (High) for infinity
(ie >99)
1140 RETURN
2000 END

```

Listing one. A basic program to calculate values for the Eprom.

cause the display to be lost. The period of the timer should probably be about 5 seconds. Once this period had expired the ADCs start triggering again and under zero signal conditions the Eprom will be programmed to output nothing at all (as distinct from zero!). Under these conditions the comparator output modifies the frequency of oscillator 1 to at least 10Hz to ensure that there is not a delay of potentially 1 second after the signal is regained before the display is updated.

We believe this to be a totally novel approach and present it here as a bare bones design which can become the basis of an experimental constructional project. Clearly the circuitry for sensing forward and reverse signals in the feeder would need adding and it is suggested that something similar to that in the Antennalab is used. For those people interested in investigating the possibilities, we present a circuit diagram (Fig. 9) and the associated timing diagrams (Fig.



programmed into the Eprom. The circuit diagram and program assume that a 2764 Eprom is used. It could be that the constructor decides that more than 6 bits are required for forward and reverse voltage, in which case a 27256 would be required for 7 bits each, or a 27 for the full 8 bits of the ADCs. This decision might become necessary if the point at which the comparator would have to be set to prevent errors in the reading was too high a percentage of the full scale.

References

1. A time-shared servo SWR meter. C. MacKeand, WA3ZKZ/G4ARR. *Radio Communication*. April 1978. p307-309.
2. An audio SWR meter. R. Bowden, G4JOU and A. Watson, G4DZS. *Radio Communication*. January 1982. p32-34.
3. The Antennalab. A. L. Bailey, G3WPO. *Radio Communication*. August 1983. p692-697.

10). It must be stressed that the circuit is totally untested, and some of the component values have not been calculated. We also give a Basic program listing for calculating the values to be

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REPEATER REPEATS

Right at the end of the national society's annual general meeting a December ago, a question which was put by a member must have caused dismay to metrowave aficionados. The questioner drew attention to the

All of which may cause amazement to hams who live in the smaller conurbations or out in the countryside where repeater abuse rarely if ever occurs. Primarily, the problem is an inner city one, like so many others

by discussing repeater use logically in a magazine like HRT; many of the offenders, are incapable of digesting the printed word because they belong to that 51% stratum of the British population who are barely literate. To hear what goes on over some of the London repeaters you would think our sociologist friends were sadly all too accurate. You marvel at how the offenders ever managed to pass the RAE.

Repeaters are a valuable asset, but they are not treated with the respect they deserve, says Jack Hum

abuse of the repeater system on 145MHz and the poor reputation which the amateur radio movement suffered as a consequence. The possibility of better education — no, not that word: let's say information — for newcomers to the band was touched upon at the agm but not fully deployed because there wasn't time.

One troubling thought is that information about the effective use of repeaters has been appearing in HRT (and elsewhere) for several years with little apparent effect, judging by the flagrant abuse evident on some of the repeaters sited in large conurbations. Why has one been spending time talking about repeaters and all their works and how marvellous they are (the biggest collective technical effort ever to occur in amateur radio, remember?) only to find that there is still so much to say? How many people have been taking any notice? The thought obtrudes.

The fact is that a lot of people *do* take notice, and do use repeaters as they are intended to be used. But there are thousands of others who have not yet got the message simply because they have come into ham radio since it was last printed. There is a continuing job to do the keep the newer comers informed about the how of operating through the box — and it is a job made more urgent by the fact that many of these newcomers get the wrong idea about how to use repeaters when they hear some of the things that go on through some of them. Abuse could be regarded by some as the norm.

outside amateur radio. Just as graffiti is (or are) an inner urban problem, so by and large is repeater abuse (electronic graffiti if you like).

Job For A Sociologist?

If you turned a sociologist on to this problem he or she would probably tell you that there is little you can do about it because it *is* an inner city phenomenon and as incapable of a cure as are other inner city phenomena. They would not doubt go on to tell you that it is no use trying to cure people of their bad electronic habits

Perhaps the most notorious of the London repeaters was the South London one. When its sponsorship lapsed it was quite a long time before a new group would agree to take responsibility for it. As one young G6 in North London remarked to your G5UM: 'That's what you'd expect from South Londoners!' In more serious vein he (and many others too) expressed relief when GB3SL was recommissioned because, as they put it: 'It keeps all the dirt in one place: there was danger that some of it might be flung at the other repeaters'.



Which are hard words for the earnest sponsors of GB3SL to hear, for their wish is to see their particular box used with the restraint and intelligence that are evident on most others.

Well may the country cousin enquire just what is heard through the more polluted repeaters. The answer: bad language, coarse manners of speech, and overlong overs from exhibitionist types who have yet to learn that the art of conversation whether via an electronic link or face to face is to keep it brief. That's called common courtesy, but it is something which repeater abusers seem never to have heard of.

What is also evident is the over-use of forenames in place of callsigns. In quick-exchange overs this practice has something to commend it and hardly comes within the orbit of repeater abuse. Yet it is worth remembering that at any one time there are probably six Johns, four Petes, not to mention the occasional Ethelbald. These are not callsigns and should not be used as such.

It is worth reiterating that your callsign is unique, deserving of respect because there is none other like it in the world.

Some of the callsigns heard through repeaters deserve *little* respect: what their owners say and how they say it can only bring them into disrepute. The word soon gets around: 'Don't answer old so-and-so; he goes rabbiting on with no thought for others who want to use the box.' Or 'Don't Answer: young so-and-so: You'll only get a mouthful of foul talk.'

Catching The Offenders

Something else the country cousin may ask is: what is being done to curb repeater abuse? Answer: quite a lot. The national society has its own methods of identifying offenders. The Radio Regulatory Division of the DTI has caught many of them, and heavy fines with costs have resulted. It says it '... welcomes evidence of serious abuse of the amateur bands and takes action against offenders.'

To say, cannot abuses be curbed at the source? cannot more be done in RAE classes teach would-be licensees how to operate? is a counsel of perfection unlikely to be realised in a society where graffiti of all kinds is rife. What after all can you

do about persons who play music over repeaters without identifying themselves? Obviously, you should check them on the input and D/F them if you can. That is the panacea of the moment, but in the longer term there is clearly much to be done to ensure that people do use the devices sensibly — remembering, by the way, that through-repeater operation is only a secondary mode of communication, and that direct contact ('real QSOs') should be attempted whenever possible.

Tiny Minority

It is dangerous when discussing repeater abuse to blow the problem up out of all proportion and make it seem more important than it is. In fact, it represents only a tiny amount of total repeater up-time. But its existence poses a threat to amateur radio on two levels.

One is that people newly come to the metrewave spectrum will, after

hearing repeater abuse, be tempted to join the so-called 'anti-repeater brigade' (a platoon, rather: it is very small but it could grow). Indeed, Class A operators venturing on to vhf may find themselves so disgusted with what they hear that they return to their hf bands for good.

More serious is the regard with which the Authority holds the amateur radio service. Frivolous — or filthy — use of our frequencies could cause the Authority to say to itself that there are better ways of using that commodity called frequency spectrum than the way we use it. And, not inconceivably, it might bow to the pressure from professional interests, always clamouring for more channels, and say 'Yes, you can have them. They are not being put to good use by the Amateur service.' Unlikely, but still worth bearing in mind when it comes to presenting a favourable image of ham radio to the outside world.

Ten-Point Guide to Repeater Use

1. To access a required repeater, assuming you are within range, offer it a brief tone-burst. If it fails to open . . .
2. Offer it a brief tone-burst plus a few syllables of speech: some repeater logic is designed to open only by this means, which dissuades phantom beepers and often identifies the speaker.
3. Keep overs brief and to the point. Other operators will be waiting to get in. If the repeater emits a bleep or K as an invitation to transmit, don't press your mike button until it does so.
4. If you wish to tail-end on an existing conversation utter your callsign once when a pause occurs. Never, but NEVER say 'Break'.
5. Never laugh at your own jokes.
6. If you consistently use a given repeater ask which group runs it and who the subscription secretary is. Then join it. No repeater 'comes for free'. All cost money to design, build and run — especially to run, for many consume much electricity to keep them dry and warm in season.
7. Repeaters are for the disadvantaged, meaning mobiles, but it is perfectly legitimate for fixed stations to use them if communication is not possible by other means — but they should take secondary user status compared with mobiles.
8. If your vehicle will carry a 70cm transceiver as well as a 2m one, then install one. If you are a fixed station operator you should have 70cm fm in any case.
9. Use 70cm repeaters as much as you can. National coverage on 70cm is comparable with that on 2m.
10. Never send a QSL for a through-repeater contact: you were in QSO with the repeater, not the other party, and although the repeater can listen and talk it cannot write. If you receive a QSL for a through-repeater exchange send it back with a polite suggestion of date, time and frequency for a real QSO, if need be in the DX end of the band.

Icom IC-228E Mobile Transceiver



Veteran 2m FM operators may well remember the IC2F, one of the very first 2m FM black boxes to hit our shores, manufactured by the company of Inoue, later to become Icom. Crystallised up on frequencies such as 144.48 and 144.60MHz it started a

use, the large display area being very easy to read when on the move.

In the usual tradition, the set covers the 2m band in either 12.5kHz or 25kHz steps as required, and has the usual selectable repeater shift coupled with single button-push

otherwise engaged around the house (watching TV etc.) or in the car (talking to passengers). Some repeaters also have the facility for sub-tone control, for instance to provide squelch switching under lift conditions. With this option fitted, a user-selectable feature of the IC-228 is a sub-tone alert bleep, where the rig may be set to bleep at you for 30 seconds, together with a flashing LCD indicator following reception of a signal with the selected sub-tone frequency superimposed on it.

Chris Lorek G4HCL meets a colourful customer from Icom

new breed of rigs, to be followed by the IC21, IC22, IC225, IC22E and then the IC240. As 2M FM grew more and more popular, nearly every amateur to be heard seemed to be using one of the latter modules! Following their pioneering history, the latest rig from Icom is the IC228, taking over from where the IC28E left off. Could this be the next 'standard' 2m rig to be heard on the air?

Multicoloured Mobiling

The IC-228E offers 25W maximum transmit output with a low power facility of 5W, the matching IC-228H giving the same facilities but with a 45W output power, the sets being priced at £365 and £385 respectively. The first thing that strikes you when switching the set on is the bright, multi-coloured display, certainly making the rig stand out in

reverse repeater checking. You can manually tune up or down in the selected steps either by a twist of the main click-step tuning knob or by using the up/down buttons mounted on the supplied mobile fist microphone. On the rear of the mic is a small push-button for 1750Hz repeater tone activation, together with a slide switch to lock out the operation of the up/down buttons if required.

Sub-Tone

An optional CTCSS (Continuous Tone Controlled Squelch System) module is available at a cost of £31, as an internal plug-in unit. In many areas of the country, including my own, groups of amateurs have found this facility of use when monitoring a busy channel such as S20 or the local sub-tone equipped repeater, to listen out for other group members while

Memories

Twenty memory channels, numbered 0-19, are provided, each storing the usual frequency, memory channel number, any selected repeater offset, scan status and sub-tone setting. The contents of any of the memory channels may quickly be transferred to VFO mode by keeping the MW button pressed for half a second, hence providing a quick 'QSY from memory' facility when your QSO partner asks you to go up another channel. To get to your favourite channel quickly, the set allows you to program a Call channel which is stored in the set's memory for one-button access.

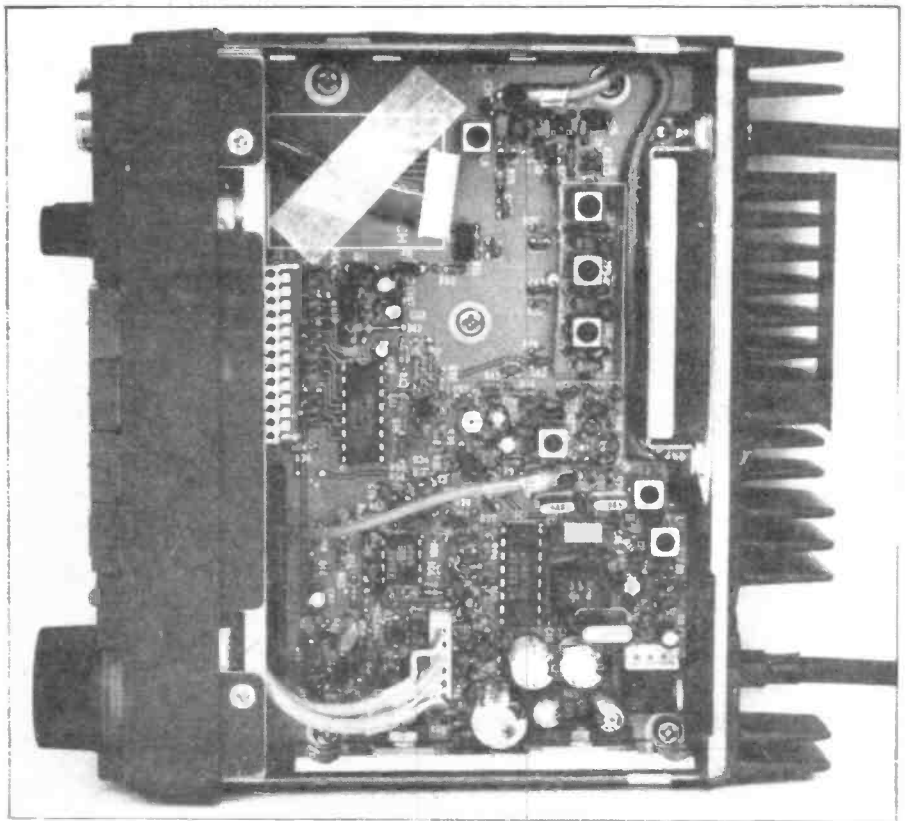
The standard memory channels may be scanned for activity by

keeping one of the mic up/down buttons pressed for over half a second, any number of these may of course be locked out of scan mode as you wish to save the set locking up on, say, weak distant repeaters. Alternatively, any pre-programmed section of the band may be scanned in VFO mode, for when you never want to miss a thing. A further priority scan automatically checks any memory channel, a sequence of memory channels, or your Call channel once every five seconds during VFO operation, for when you'd like to keep track of what's happening on other frequencies while you're listening to the latest gossip on your local repeater or whatever.

Switches and Buttons

The front panel of the set sports an uncluttered array of controls, with large push buttons selecting VFO or Memory operation, call channel access, function set mode, small/large tuning steps, priority channel check operation, and high/low transmit power. Further buttons control repeater shift, sub-tone operation, memory channel programming and a lock function to prevent unwanted frequency shifts when in use.

The large LCD gives an indication of the usual frequency, memory channel, repeater shift etc, together with a bargraph S-meter, in the function set mode the display is used in conjunction with the rotary tuning knob to set the tuning step size, sub-tone frequency, display backlight intensity in four levels, the pre-programmed limits of VFO scan mode, and keypress bleep on or off.



The front panel rotary knobs are all backlit for recognition at night, and small green and red LEDs give an indication of receive or transmit mode.

The IC-228E measures 140mm (W) x 50mm (H) x 137mm (D), the IC228H having an increased depth of 159mm due to its larger heatsink. An internal speaker is housed on the lower case lid, a rear panel mounted 3.5mm socket being fitted to allow an external speaker to be plugged in. Also on the rear panel are flying leads for the aerial connector and DC power, the IC228E requiring 13.8V at

6A with the IC-228H requiring 9.5A. Each set comes supplied with a mobile mounting bracket and fixing hardware, a fused DC power lead with spare fuses, mobile fist mic and hanging bracket, external speaker plug, and a user instruction manual with a full circuit diagram. Optional extras include the UT-40 sub-tone unit, an external speaker and flexible boom microphone for mobile use, and various desk microphones and 13.8V mains power supplies for base use.

On The Road

The set was very easy to fit in even the shortest nook or cranny in my car due to its small depth, due to this I found it possible to place it on the centre top section of my dashboard, the flying leads routed neatly behind the set. The set's grey non-reflecting case would match nicely with many car interiors.

Operating the set, as with the set's predecessor the IC28E, was simplicity itself. The twenty memory



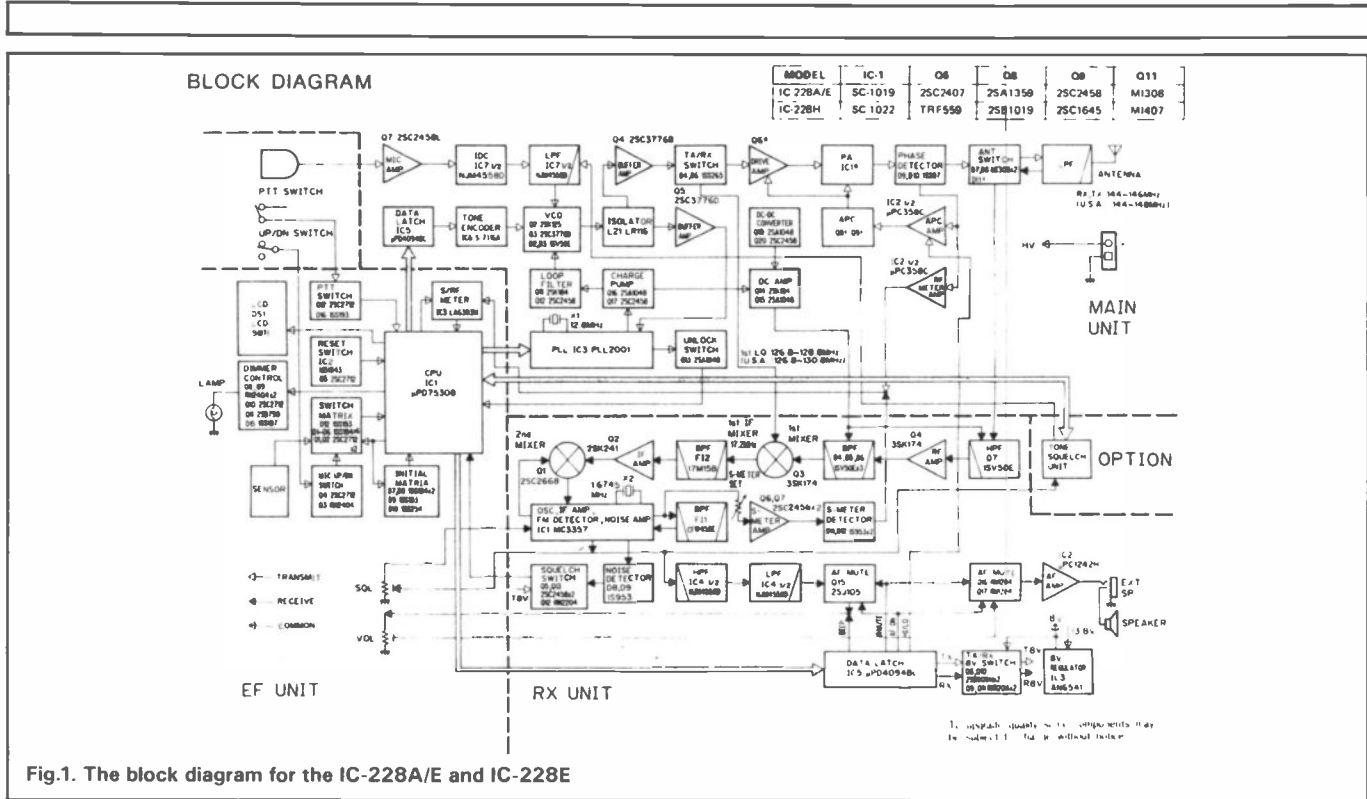


Fig.1. The block diagram for the IC-228A/E and IC-228E

channels were sufficient to store all the repeater channels as well as the simplex channels used in my area both in the 144 and 145MHz range. Setting the program scan limits to 145.200MHz and 145.575MHz then allowed a quick scan to be made of the simplex channels either to search out for activity or to find a free channel to QSY to from the calling channel. The VFO/M switch, which toggles between VFO and memory operation and hence being the button most often used, was placed in an easy-to-locate position on the set making operation possible by feel alone while driving.

QSYing either in Memory or VFO mode by using the up/down buttons on the microphone was confirmed by audible beeps from the set's speaker (this facility may be turned off if required). I preferred this method with its positive operation rather than using the rotary tuning control which seemed flimsy and was a little indeterminate in use. I found the microphone mounted toneburst very handy, this being easier to operate than fumbling around pressing buttons on a mobile set's fascia, but note that if you substitute a boom microphone or suchlike you will lose the supplied mic's 1750Hz tone generation circuit. When the odd glance at the LCD was required to see what the set was up to, I found the display gave a sensible indication of

only what was necessary, ie if the sub-tone was on it displayed SUB, otherwise nothing. This is contrasted with other sets that place an LCD marker next to each function to show whether it is in operation or not, in my view requiring far more time looking at the set's display rather than the road ahead, this aspect being far more important than the use of mobile mics or whatever.

Readability

The small internal speaker was perfectly adequate for use in a normal family-type car when the set was placed in this position, however, when I tried the set beneath my dashboard I found that an external speaker helped during noisy driving conditions, ie going along with all the windows open! With both the internal and external speakers, I found the received audio a little topky in common with some other Icom mobile transceivers I have used, some operators may not dislike this of course but it took my ears only a short while to adjust. The receiver sensitivity was adequate to match the 25W transmitter power provided, I could always hear my QSO partners for instance, but I felt it was not quite as sensitive as I would have liked when contacting stations using low powers. The S-meter gave a very limited indication, this quite often being the case with FM rigs now-

adays, leaping up and down with only small variations in signal strength.

On transmit, once I had learned to speak at least 20cm away from the mic, received audio reports were complimentary if sometimes accompanied by indications of what the back seat passengers were also saying, ie the mic gain was very sensitive. This did give a punchy, well-clipped transmission but I would have been tempted to go inside the set with my screwdriver to reduce the mic gain if it was to be a permanent installation. The user instruction manual is very good in this respect giving clear details of the internal mic gain, S-meter sensitivity, high and low TX power adjustments and so on.

Insides

A sturdy die-cast chassis is used to house the two main analogue circuit boards, which are easily unplugged and removed for servicing. Surprisingly, discrete components (ie not surface-mounts or chips) are used here, making servicing and repair that bit easier. The digital control board, mounted on the plastic front panel of the set, does however use a large number of surface mounted ICs and the like to get everything in!

The accompanying block diagram shows that the receiver uses a 3SK174 front end followed by a varicap-tuned bandpass filter, sug-

gesting the potential coverage range is wider than that of 2m, a further 3SK174 mixer providing the first IF of 17.8MHz giving a well-removed image frequency. On transmit, the usual final-frequency VCO is modulated and amplified, a modular PA block providing the final 25W RF output power.

Laboratory Tests

Overall the receiver performance was fairly reasonable, the adjacent channel rejection of both 12.5kHz and 25kHz separated signals being quite good as was strong-signal

handling in general. The sensitivity was adequate although I would have felt a slightly better figure would not have gone amiss. The S-meter often indicated S1 or S3 with no input signal, and the remainder of the dynamic range was rather limited, as found on-air. On transmit the higher-order harmonic outputs were extremely well suppressed, with no other spuri found. The power output and deviation levels were accurately set, the high toneburst level from microphone, this being well into audio limiting, confirmed my on-air thoughts of a high microphone gain being set.

The newcomer to 2m FM mobile operation, or the amateur seeking an

upgrade from an older rig, should not be disappointed with the IC228E. It offers a reasonable all-round performance, and is very easy to use when mobile, its short depth allowing it to be placed in a variety of mounting positions in the car. If you operate mainly in fringe areas, or would in general like the capability of higher power when needed, the 45W IC228H I feel could offer good value for just £20 extra. If, however you fancy 70cm operation as well, the new dual band IC3210 could very well tempt you, so do your sums carefully!

My thanks go to Icom (UK) for the loan of the review transceiver.

LABORATORY RESULTS:

Receiver:

Adjacent Channel Selectivity

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

+12.5kHz	32.5dB
-12.5kHz	53.0dB
+25kHz	77.0dB
-25kHz	79.5dB

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

+100kHz	91.5dB
-100kHz	92.0dB
+1MHz	102dB
-1MHz	101dB
+10MHz	>110dB
-10MHz	>110dB

Harmonics/Spurii

2nd Harmonic	-70dBc
3rd Harmonic	-91dBc
4th Harmonic	<-100dBc
5th Harmonic	<-100dBc
6th Harmonic	<-100dBc
7th Harmonic	<-100dBc
Spurii	<-100dBc

Squelch Sensitivity

Threshold 0.13uV pd (4dB SINAD)
Maximum 0.357uV pd (>20dB SINAD)

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

81.0 dB

S-Meter Linearity

Indication	Sig. Level	Rel. Level
S1	0	
S3	0	
S5	0.164uV pd	-2.7dB
S7	0.198uV pd	-1.0dB
S9	0.223uV pd	0dB Ref.
S9+	0.329uV pd	+3.4dB
S9++	0.396uV pd	+5.0dB

Transmitter

TX Power and Current Consumption

Freq MHz	Power	10.8V Supply	13.8V Supply	15.6V Supply
144MHz	High	21.2W/4.40A	24.7W/5.45A	24.9W/5.45A
	Low	5.10W/2.40A	5.10W/2.60A	5.10W/2.60A
145MHz	High	20.5W/4.30A	24.9W/5.35A	25.1W/5.35A
	Low	5.10W/2.35A	5.10W/2.50A	5.10W/2.50A
146MHz	High	19.8W/4.20A	24.6W/5.35A	24.8W/5.35A
	Low	5.00W/2.25A	5.00W/2.45A	5.00W/2.45A

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

25/50kHz spacing	71.5dB
50/100kHz spacing	71.5dB

Sensitivity:

144MHz	0.231uV pd
145MHz	0.216uV pd
146MHz	0.221uV pd

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

3ohm load	2.55W RMS
8ohm load	1.50W RMS
15ohm load	990W RMS

Peak Deviation

4.98kHz

Toneburst Deviation

4.46kHz

RADIO Tomorrow

- 1 Nov** Fylde ARS: Equipment sale. The Kite Club, Blackpool Airport.
Stevenage ARS: Computer evening.
Worksop ARS: Natter night.
South Powys ARC: HF Propagation.
- 2 Nov** Wirral ARS: Chairman's night.
Willenhall DARS: Night on the air.
Norfolk ARC: Informal meeting 7.30pm at 'The Norfolk Dumpling', The Livestock Market, Harford, Norwich.
Cheshunt DARC: Talk by David Evans, G3OUF. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.
- 3 Nov** Mid-Sussex ARS: Fireworks on the air.
Pontefract DARS: Talk 'Contest Operating' by Dave G4OSY. 8pm. Carleton Community Centre, Carleton Rd, Pontefract.
Vale of Evesham RAC: 'St Kilda — the island on the edge of the world' by G3WBR.
Horsham ARC: Talk 'Know your sporadic E' by G3NAQ. 8pm. The Guide Hall, Denne Road, Horsham, Sussex. Details from Phil Godbold on Steyning 814516.
Yeovil ARC: Talk 'The Full Wave Dipole' by G3MYM. 7.30pm at The Recreation Centre, Chilton Grove, Yeovil. Details from David Bailey G1MNM, 7 Thatchem Close, Yeovil BA21 3BS.
- 4 Nov** Loughton DARS: Rainbow & Dove Field weekend planning night. Loughton Hall, Rectory Lane, Loughton, Essex.
- 5 Nov** Rugby ATS: Fireworks and Barbecue, details from G8TWH QTHR.
BARTG: AGM Issues included will be possible name change of group. Refreshments provided and further info from Ian Brothwell, G4EAN, 56 Arnot Hill Road, Arnold, Nottingham NG5 6LQ. Tel: (0602) 262369. 2pm at the Churchill Room, London House, Mecklenburgh Square, London WC1.
- 5/6 Nov** 2nd North Wales Radio Rally at Canolfan Abercony Centre, Llandudno, N. Wales. Further details from Tony Wilkinson GWPVU, 1 Langly Close, Penrhyn By. Llandudno LL3 3LN on (0492) 49121 or 75666/ Edward Shipton GWODSJ on (0745) 36939.
- 7 Nov** Todmorden DARS: Visit & Demo by Lowe Electronics. 8pm. Queen Hotel, Todmorden.
Welwyn-Hatfield ARC: Construction competition. Lemsford Village Hall, Brocket Rd, Lemsford.
Stourbridge & DARS: Natter/On Air night. Robin Woods Centre, Beauty Bank, Stourbridge.
- 8 Nov** Rugby ATS: Activity night. 7.30pm. Cricket Pavilion, BTI Radio Station, 'B' building entrance, A5 Trunk Rd, Hillmorton, Rugby.
Dorking DRS: Talk 'Antennas for HF' by Graham G4WOT.
- Reading DARC: Berkshire Downs Repeaters, by G4CCC and G8DOR.
Verulam ARC (St. Albans): Activity evening to promote amateur radio to the youth of south-west Herts and north London.
Worksop ARS! 'Call my Bluff' Maltby visit Workshop.
- 9 Nov** Cheshunt DARC: Natter evening. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.
Norfolk ARC: In trivial pursuit of radio — a quiz. 7.30pm at 'The Norfolk Dumpling', The Livestock Market, Harford, Norwich.
Farnborough DRS: 23rd AGM. 7.30pm. Railway Enthusiasts Club, Hawley Lane, Farnborough. Details from Tim Fitzgerald, G4UQE, on Camberley 29321.
South Bristol ARC: 2m cw evening.
Stockport Radio Society: Construction competition.
Wirral DARC: Club Tech Topics. 8pm. Irby Cricket Club, Irby Mill Rd, Irby, Wirral.
- 10 Nov** Mid-Sussex ARS: Talk.
Pontefract DARS: Committee Meeting. 8pm. Carleton Community Centre, Carleton Rd, Pontefract.
Salop ARS: natter night.
Southgate ARC: talk about the RSGB BY Dave Evans G3OUF.
Construction judging for the C6QM trophy. Club activity video.
- 11 Nov** Mansfield ARS: video evening.
Wimbledon DARS: Talk 'The Noise bridge and its use' by George Cripps, G3DWW. 7.30pm in St. Andrews Church Hall, Herbert Rd, Wimbledon, London SW19. Details from Tom Mansfield, G3ESH, 16 Fir Grove, New Malden, Surrey KT3 6RH. Tel: 01-942-1418.
- 15 Nov** Fylde ARS: Informal meeting. The Kite Club, Blackpool Airport.
Rugby ATS: Talk & live demo of Packet Radio by John Theodorson G4MT & Neal Rimmer G4JTY. 7.30pm. Cricket Pavilion, BTI Radio station, 'B' building entrance, A5 Trunk Rd, Hillmorton, Rugby.
Worksop ARS: Natter night.
South Powys ARC: Social evening.
Willenhall DARS: CW night on the air.
- 16 Nov** Norfolk ARC: Informal meeting. 7.30pm at 'The Norfolk Dumpling', The Livestock Market, Harford, Norwich.
South Bristol ARC: Top band activity evening.
- 17 Nov** Mid-Sussex ARS: Informal meeting.
Pontefract DARS: Talk 'PCBs' by Dave Wilcox. 8pm. Carleton Community Centre, Carleton Rd, Pontefract.
Salop ARS: The Great Welsh Heiress Station: historical lecture by GW3MZU.

18 Nov Loughton and District ARS: Film show: films and video from past years of the club, and 1988 field weekends. Hosts are Jack Atkinson G3OPA and John Short G1DJL. Loughton Hall, Rectory Lane, Loughton, Essex.

20 Nov **Bridgend DARC: Rally. Bring & buy, morse tests, bar. Talk-in on S22. 11am onwards (10.30am for disabled persons) at Bridgend Recreation Centre, Angel St, Bridgend, Mid-Glamorgan. Details from Mike Butler GW6XCG on (0656) 724041.**
Braintree and District ARS: Informal evening.

21 Nov Todmorden DARS: Natter night. 8pm. Queen Hotel, Todmorden.
 Welwyn-Hatfield ARC: Member soap-box.
 Knightsfield Scout HQ, opp. Ingles, Welwyn Garden City.
 Stourbridge & DARS: Winter surplus sale. Robin Woods Centre, Beauty Bank, Stourbridge.

22 Nov Stevenage ARS: Committee meeting.
 Dorking DRS: Illustrated talk 'John's travels - 2nd edition' by G3AEZ at Ashcombe School.
 Wirral DARC: Talk 'Thank God for the Diesel' by Dr D Postlethwaite. 8pm. Irby Cricket Club, Irby Mill Rd, Irby, Wirral.
 Reading DARC: AGM.
 Verulam ARC (St. Albans): Inter-club Annual Great Erg Race.

23 Nov Cheshunt DARC: Natter evening. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.
 Norfolk ARC: Talk 'Early Days of SSB' by Ken Thompson G3AMF. 7.30pm at 'The Norfolk Dumpling', The Livestock Market, Harford, Norwich.
 Farnborough DRS: Chairman's evening. 7.30pm. Railway Enthusiasts Club, Hawley Lane, Farnborough. Details from Tim Fitzgerald G4UQE on Camberley 29321.
 South Bristol ARC: Free ice cream evening.
 Stockport Radio Society: Underwater DXing by G4SYE. (*We presume this is a talk rather than a demonstration.*)

24 Nov Pontefract DRAS: On the air night. 8pm. Carleton Community Centre, Carleton Rd, Pontefract.
 Salop ARS: HF on the air night.
 Southgate ARC: Demo RTTY station by club member.

25 Nov Mansfield ARS: Contest Operating, by D Cree G3TEK.

27 Nov **Verulam ARC (St. Albans): 4th Verulam Amateur Radio Rally at St. Albans City Hall from 11am to 5.30pm. Club and trade stands, talk-in on 2m, bring and buy, prize draw, food and bar. Easy access from London and M25. Entrance £1.00. Details from Hilary, G4JKS, St. Albans 59318 or Walter G3PMF, Kings Langley 62180.**

28 Nov RSGB City of Bristol Group: Annual home construction contest together with ballot for best lecture of 1988. 7.30pm. Small Lecture Theatre, Queens Building, University of Bristol.

29 Nov Rugby ATS: Test gear night. Radio station, 'B' building entrance, A5 Trunk Rd, Hillmorton, Rugby.
 Worksop ARS: Natter night.

30 Nov Norfolk ARC: Informal & Committee Meeting. 7.30pm at 'The Norfolk Dumpling', The Livestock Market, Harford, Norwich.
 Wirral DARC: Social & Presentation evening. 8pm. Irby Cricket Club, Irby Mill Rd, Irby, Wirral.
 South Bristol ARC: Bring and Buy sale.

1 Dec Pontefract DARS: Talk 'Logic Gates' by Bill G4ZVB 8pm. Carleton Community Centre,



Carleton Road, Pontefract.
 Vale of Evesham RAC: 3rd annual club dinner at 'Chequers Inn', Fladbury.
 Horsham ARC: AGM 8pm. The Guild Hall, Denne Road, Horsham, Sussex. Details from Phil Godbold on Steyning 814516.
 Salop ARS: used equipment (not junk) sale.
 Yeovil ARC: Open wire feeders.

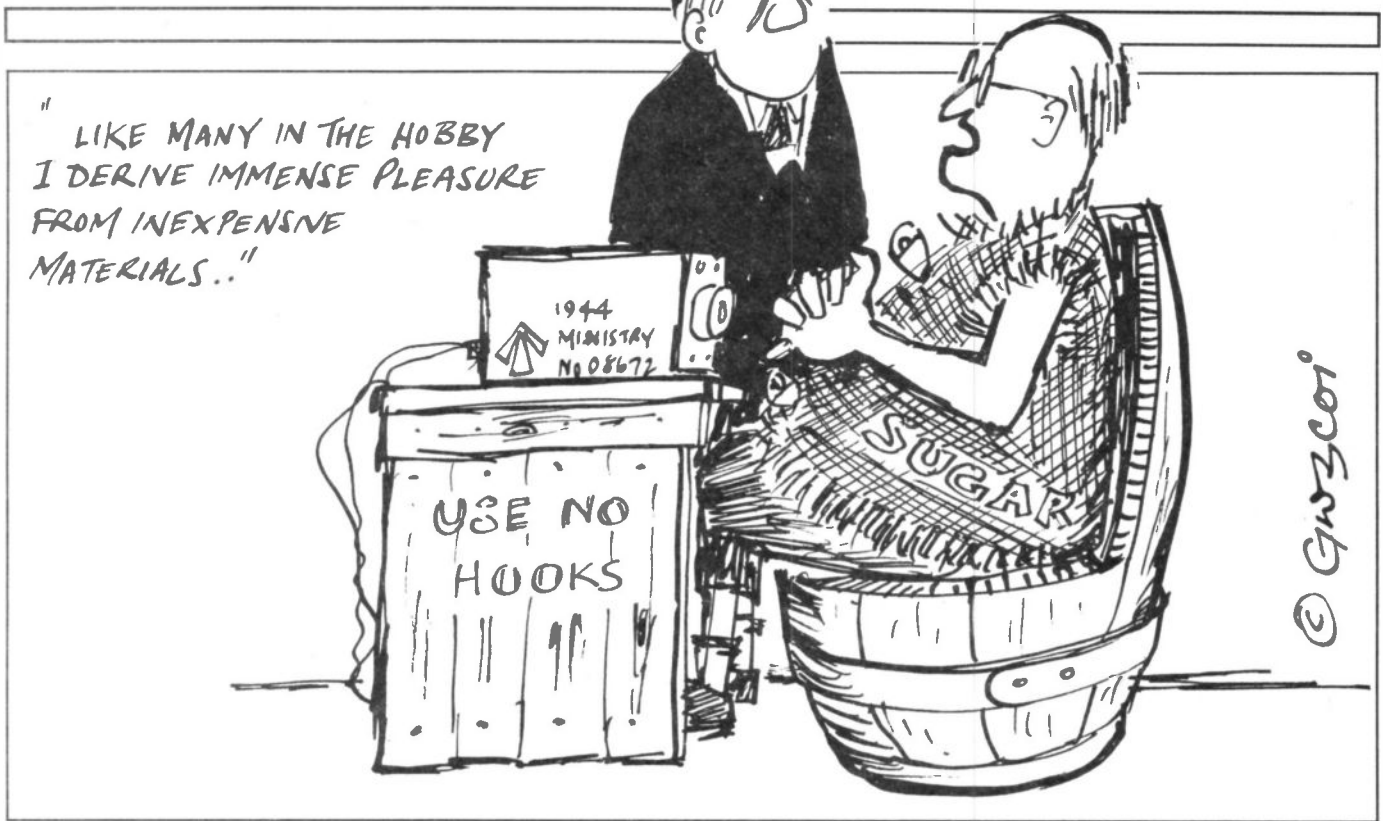
2 Dec Loughton DARS: Night on the air on club callsign C4ONP. Loughton Hall, Rectory Lane, Loughton, Essex.

5 Dec Braintree and DARS: Cheese and Wine Christmass party.
 Todmorden DARS: George Dobbs Annual Christmas Lecture. 8pm. Queen Hotel, Todmorden.
 Welwyn-Hatfield ARC: AGM. Lemsford Village Hall, Brocket Road, Lemsford.
 Stourbridge & DARS: Natter/On-air night. Robin Woods Centre, Beauty Bank, Stourbridge.

6 Dec Fylde ARS: Construction competition. The Kite Club, Blackpool Airport.
 Midland ARS: Christmas party.
 Reading and DARC: Constructional contest.
 Stevenage ARS: Junk sale.
 Worksop ARS: Video night.
 South Powys ARC: Talk 'Plugs and sockets - getting power into/out of units - safely!'

7 Dec Cheshunt DARC: Natter evening. Church Room, Church Lane, Wormley, Nr Cheshunt, Herts. 8pm.
 Derby DARS: Junk sale.
 South Bristol ARC: Judging for Terry Dunsford Trophy.
 Willenhall DARS: Night on the air.

8 Dec Pontefract DARS: Committee meeting. 8pm. Carleton Community Centre, Carleton Road, Pontefract.
 Salop ARS: natter night.
 Southgate ARC: AGM and Club awards.
 Yeovil ARC: The new licence conditions.



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| <p>9 Dec Mansfield ARS: Quiz.</p> <p>12 Dec RSGB City of Bristol Group: Christmas party.</p> <p>13 Dec Malvern Hills RAC: AGM 8pm. Red Lion, St Annes Road, Malvern, Worcs.
Dorking DRS: Informal meeting.
Worksop ARS: Natter night.
Reading and District ARS: Christmas Dinner.</p> <p>14 Dec Cheshunt DARC: Christmas Cabaret by Roy and Karen. Church Lane, Wormley, Nr Cheshunt, Herts. 8pm.
Farnborough DRS: Christmas Social 7.30pm. Railway Enthusiasts Club, Hawley Lane, Farnborough. Details from Tim Fitzgerald G4UQE on Camberley 29321.
Derby and District ARS: Christmas Party in the club room.
South Bristol ARC: Christmas Carol Evening.
Stockport Radio Society: AGM</p> <p>15 Dec Pontefract DARS: Christmas Party. 8pm. Carleton Community Centre, Carleton Road, Pontefract.
Vale of Evesham RAC: Christmas drink and get-together.
Salop ARS: Video night: sixth in a series on electronic tuition.
Yeovil ARC: Circular polarisation.</p> <p>16 Dec Loughton DARS: Rainbow & Dove Field weekend planning night. Loughton Hall, Rectory Lane, Loughton, Essex.</p> <p>17 Dec Worksop ARS: Annual dinner and dance.</p> <p>19 Dec Todmorden DARS: Natter night. 8pm. Queen Hotel, Todmorden.
Welwyn-Hatfield ARC: Christmas social.
Braintree DARS: Informal evening.</p> <p>20 Dec Fylde ARS: Hot Pot supper. The Kite Club, Blackpool Airport.
Reading DARC: Informal evening in the bar.
Rugby ATS: Sherry & mince pie evening. Details from G8TWH QTHR.
Stevenage ARS: Quiz night.
Worksop ARS: A night on the air.
South Powys ARC: Social evening.</p> | <p>21 Dec Cheshunt DARC: Natter evening. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.</p> <p>22 Dec Pontefract DARS: On the air night. 8pm. Carleton Community Centre, Carleton Road, Pontefract.
Derby DARS: Constructors' contest.
Salop ARS: Christmas social.
Yeovil ARC: Mince pies on the air.</p> <p>23 Dec Rugby ATS: Annual Christmas dinner at the Hunstman, Dunchurch. Details from G8TWH QTHR.</p> <p>27 Dec Rugby ATS: No meeting, however members are invited for informal evening at 'The Bull', Clifton.</p> <p>29 Dec Yeovil ARC: Operating and natter night.</p> <p>30 Dec Loughton DARS: Early New Year drinks. Victoria Tavern, Loughton.</p> <p style="text-align: center;">1989</p> <p>2 Jan Todmorden DARS: Construction competition. 8pm. Queen Hotel, Todmorden.</p> <p>3 Jan Reading DARC: Packet Radio by G3WGV.</p> <p>9 Jan Stourbridge & DARS: Natter/On-air night. Robin Woods Centre, Beauty Bank, Stourbridge.</p> <p>13 Jan Mansfield ARS: Antenna construction.</p> <p>16 Jan Todmorden DARS: Natter night. 8pm. Queen Hotel, Todmorden.</p> <p>27 Dec Mansfield ARS: Junk Sale</p> <p>29 Jan NARSA: Norbreck Radio & Electronics 1989 Exhibition at the Norbreck Castle Exhibition Centre, Blackpool. Details from Peter Denton, G6CGF on 051-630 5790.</p> <p>6 Feb Todmorden DARS: AGM. 8pm. Queen Hotel, Todmorden.
Stourbridge & DARS: Natter/On-air night. Robin Woods Centre, Beauty Bank, Stourbridge.</p> <p>20 Feb Stourbridge & DARS: Constructors competition. Robin Woods Centre, Beauty Bank, Stourbridge.</p> <p>6 Mar Stourbridge & DARS: Natter/On-air night. Robin Woods Centre, Beauty Bank, Stourbridge.</p> <p>20 Mar Stourbridge & DARS: AGM. Robin Woods Centre, Beauty Bank, Stourbridge.</p> |
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CONTACTS CONTACTS

Aberdeen ARS	Don	04676251	Lagan Valley ARS	Jim, G14TCS	0846 682474
Abergavenny & NH ARC	GW4XQH	0873 4655	Leeds DARS	G1EBS	0274 665355
Aberporth ARC	GWODPR	023987 274	Leighton Linlade RC	Pete Brazier	052 523 270
Aire Valley RS	G6NPT	0532 44597	Lincoln SWC	Pam, G4STO	0427 788356
Alyn and Deeside ARS	GW4RKX	0244 660066	Lothians RS	Robin	0506 890177
Amateur Radio & CC	Trevor	04895 81032	Louth DARC	G1I2B	047286 595
AMRAC	Phil, G6DLJ	0703 847754	Loughborough ARC	Philip	0509 412043
Armagh & Dungannon DARC	J. A. Murphy	0861 522153	Lough Erne ARC	Bill	0365 24905
Atherstone ARC	Roy	0203 393518	Loughton DARC	G4FKI	0525 714591
Axe Vale ARC	Bob	029 74 5282	Macclesfield DRS	G1NUS	0625 24534
Ayr ARG	GM3THI	Ayr 42313	Maidenhead DARC	John	0628 28463
Barking RES	R. Woodberry	01 594 4009	Maidstone YMCA ARS	GOBUW	0622 30544
Barry College RS	John	065679 710	Maltby ARS	Keith, G1PQW	0709 814135
Basingstoke ARC	Dave	07356 5185	Mansfield ARS	G4GYU	0623 27257
Bath DARC	G4UMN	Frome 63939	Medway ARTS	Tony	0634 578647
Biggin Hill ARC	GOAMP	0689 57848	Midland ARS	G8BHE	021 422 9787
Borehamwood Elstree ARS	Tony	01 207 3809	Mid Sussex ARS	GOGMC	07918 2937
Braintree ARS	Pub Sec	0376 28714	Mid Ulster ARC	Sam	07622 22855
Bredhurst RTS	Kelvin GOAMZ	0634 376991	Mid Warwickshire ARS	G4TIL	Southam 4765
Bridgend DARC	Dave	0656 723508	Milton Keynes DARS	Mike, G0ERE	0234 750629
Brighton DARS	Peter	0273 607737	Morecambe Bay ARS	G4ZJL	0524 52042
Binstead ARS	Douglas	Ryde 67665	N. Bristol ARC	Alan Booth	0272 690404
Bristol ARC	G4YOC	Bitton 4116	N. Cornwall RS	J. West	0288 4916
Bristol (Shirehampton) ARC	Ron Ford	0272 770504	N. Staffs ARS	G6MLI	0782 332657
Burnham Beeches RC	G6EIL	0628 25720	N. Wakefield RC	Steve	0532 536633
BT (Reading) ARC	G4MUT	0734 693766	Newbury DARS	G3VOW	0635 43048
Bury RS	Allan	0204 706191	Newport ARS	GW6ZUQ	02912 6867
Cambridge DARC	D. Wilcox	0954 50597	Norfolk ARC	Andy	Norwich 610874
Chesham DARS	Liz	09278 3911	Oswestry DARC	Brian	0691 831023
Cheshunt DARC	G4VMR/G4VSL	092084 250	Peterborough RES	Peter	G4PNW QTHR
Chester DRS	Dave	0244 336639	Plymouth ARC	G4SCA	0752 337980
Chichester DARC	C. Bryan	0243 789587	Pontefract DARS	Colin, G0AAG	0977 43101
Clafton ARS	Reg	0255 430466	Poole ARS	G0EQV	0202 674802
Chiltern ARC	Ron, G3NCL	0494 712020	Preston ARS	George	0772 718175
Clifton ARS	RA Hinton	01 301 1864	Reading DARC	Steve, G4YFB	Reading 867820
Conwy Valley ARC	GW4KGI	0745 823674	Rhyl DARC	GW1PLI	097 888 621
Coulsdon ATS	Alan	01 684 0610	Salisbury RES	Neil	0980 22809
Coventry ARS	Bill, G3UOL	0203 414684	Saiof ARS	Simon	0743 67799
Crawley ARC	Jack	0293 28612	Sheffield ARC	John	Sheffield 581766
Darenth Valley RC	Sec	0322 63368	Sheffield DARS	Alan, G4PSO	Hitchin 57946
Dartford Heath DFC	Pete	0322 844467	S. Bristol ARS	Len Baker	0272 834282
Denby Dale DARC	G3SDY	0484 602905	S. Cheshire	Chris	07816 73185
Derwentside ARC	G1AAJ	0207 520477	S. Lakeland ARS	G4VKE	0229 65359
Donegal ARC	E13BOB	074 57155	S. Manchester RC	Dave Holland	061 973 1837
Dorking DRS	John	0306 77236	S. Tyneside ARS	G4XWR	S. Shields 543955
Droitwich DARC	G4HFP	0299 33818	S. E. Kent (YMCA) ARC	John	0304 211638
Dudley ARC	John	0384 278300	Southdown ARS	P. Henly	0323 763123
Dunfermline RS	GMODYD	0383 413440	Southampton: See Waterside.		
Dunstable Downs RC	Phil Morris	0582 607623	Southgate ARC	Dave	0992 30051
Eastbourne EARC	G1BRC	0323 29913	Spn Valley ARS	G4MLW	0924 409739
East Kent ARS	Stuart	0227 68913	Stevenage DARS	G6EDA	0438 724991
East Lancashire ARC	Stuart	0254 887385	Stockton DARS	John Walker	0642 582578
Edgware DRS	G4IUZ	0707 65707	Stockport RS	Mel	061 224 7880
Exeter ARS	Roger Tipper	0392 68065	Stourbridge DARS	K/ford	288900
Fareham DARC	Alan, G3CCB	0329 288139	Stowmarket DARS	M. Goodrum	0449 676288
Farnborough DRS	Mr Taylor	0252 837581	St Helens DARC	A. Riley	051 430 9227
Felixstowe DARS	G4YQC	0473 642595	Surrey RCC	John	01 657 0454
Fishguard DARS	Bernard	0348 872671	Swale ARC	B. Hancock	0795 873147
Fylde ARS	F. Whitehead	0253 737680	Taunton DARC	Peter	0823 75973
Galashiels DARS	GM3DAR	0896 56027	Telford DARS	Tom Crosbie	0952 597506
Glossop DARG	G4GNQ	QTHR	Three Counties ARC	Keith, GOBTU	0730 66489
Gt. Lumley ARES	G4MSF	091 4693955	Tiverton SWRC	Alan	0392 881569
G. Peterborough ARC	Stan	0733 69822	Todmorden DARS	G1GZB	070 681 7572
Halifax DARS	D. Moss	0422 202306	Trowbridge DARC	Ian	0380 830383
Harpندن ARC	G1BJC	05827 2455	V of Evesham RAC	Paul	Evesham 831508
Harrow RS	Tony	01 861 0419	V White Horse ARS	Ian White	Abingdon 31559
Hastings ERC	Dave Shirley	0424 420608	Verulam ARC	Gerry	St Albans 52003
Haverhill DARS	Rob Proctor	0787 281359	WACRAL	G4NPM	0795 873147
Havering DARC	GOBOI	04024 41532	Wakefield DRS	G4VRY	0532 820198
Hillingdon ARC	Howard, G6SII	01 561 2917	Warrington ARC	Paul, GOCBN	0925 814005
Hornsea ARC	Richard	0401 62498	Waterside SWC	Bernie Lyford	0703 893937
Horsham ARC	Paul, G4YFY	0403 87 404	Welland Valley ARS	J. Day	0858 32109
Inverness ARC	Brian	0463 242463	Welwyn Hatfield ARC	Kevin, G4WLW	0707 335162
Itchen Valley RC	G1IPQ	S'oton 736784	West Kent ARS	B. Guinness	0892 32877
Keighley ARS	G1IGH	0274 496222	Westmorland ARS	G. Chapman	0539 28491
Kidderminster DARS	Tony	0562 751584	White Rose ARS	G4ATZ	0937 842790
Kingston DARS	G3ODH	Epsom 26005	Wigton ARC	G6HAJ	Leicester 403105
			Willenhall ARS	G4LWI	0902 782036
			Wimbledon DARS	George	01 540 2180
			Winchester ARC	Gordon	0703 772191
			Wirral DARC	Peter	051 677 7376
			Wolverhampton ARS	Keith	0902 24870
			Worcester DARC	D. Batchelor	0905 641733
			Worksop ARS	G4ZUN	0909 486614
			Wythall RC	G1MEE	0546 824705
			Yeovil ARS	Eric Godfrey	Yeovil 75533
			308 ARC (Surbiton)	Bob	01 391 0788

MORSE FORUM

The past couple of months have been very interesting down at the CW end of the bands. There has been a variety of good contests and to add to this the bands have been in good shape. It is also encouraging to see the

ing that not all the stockists have the complete range so it pays to look around. Of this range I have used the HK 708 and found it quite acceptable. It has a reasonably heavy base and a strip of rubber round the edge to stop

musician she loves the sound of it, especially if it is well sent high speed morse. In fact Angie, who wrote an article which appeared in the Autumn '88 issue of *Morsum Magnificat*, is now a member of HSC (High Speed Club). In spite of this she is still more than willing to slow down and send at the same speed as the other operators when the need arises.

Ian Poole G3YWX finds more morse wherever he goes

number of new GO calls which have been appearing on CW working DX and also chatting. Hopefully this will be a continuing trend and it is one which all CW users should encourage. It very much goes to show that CW can be enjoyed by newcomers as well as old hands.

But to start with something which affects all CW users from time to time.

Which Key?

When the time comes to buy a key the choice is not always as simple as it may appear at first. Part of the reason is because there is a very wide choice. There are all sorts of government surplus keys on the second-hand market. Then there is an enormous choice in new keys. These ones range from the very cheap at around £5 or less, through the middle of the range at around £25 to the top of the range keys at £100 or more.

The government surplus type keys can sometimes be very good. Unfortunately these ones tend to fetch high prices these days as they are becoming collectors items.

Turning to the new keys the first piece of advice is to forget the cheap end of the market. Keys costing £5 or less are very flimsy and will not be easy or comfortable to operate.

Moving up the price range to the £25 bracket there are the Hi-Mound keys. This range is quite wide and they offer keys with different handles, different base weights and so forth. If one of these is being considered it might be worth taking a trip to the local stockist, or seeing them at a rally to find out which suits you best. It is also worth remember-

ing that not all the stockists have the complete range so it pays to look around. Of this range I have used the HK 708 and found it quite acceptable. It has a reasonably heavy base and a strip of rubber round the edge to stop

it slipping around the table. The handle, or knob, is about the right height and it is very easy to use. At the top end of the price scale there are a number of hand crafted keys. As one would expect, they are nice to own and use, but may not be worth the cost if they are not going to be used frequently. Even so, it would be interesting to take a closer look at some of them in a future issue of HRT.

The Mail

Angie Sitton G0HGA wrote a very interesting and long letter about her reasons for enjoying CW. Being a

Another person who wrote in with his reasons for liking morse was Eddie Renny G4RWP. He says that he used HFSSB when he was first licenced but quickly became disillusioned with it because of the lack of replies. Turning to CW he found that contacts were more plentiful and just as rewarding, if not more so. In many ways it is not surprising that CW brings more replies because it is possible to read it at much lower signal strengths. This means that it is not necessary to have a six element tribander and a kilowatt to contact someone. Another reason may be that CW stations do not seem as intent on contacting only DX as do

Royal Naval Amateur Radio Society

.....

Proficiency Award for International Morse Code

By this Certificate & any appended endorsements duly signed, the Headquarters Station of the R.N.A.R.S. recognises the proficiency of

..... I.A.N. POOLE G3YWX.....


who has copied for at least 3 minutes by ear the International Morse Code at a speed of 20 words per minute with 100% accuracy by virtue of the copy submitted, averaging five characters to the word.

Date of transmission from
G3BZU 1-6-71

in Patrick G3WIK BRD Manager
P.p. Secretary

ENDORSEMENTS		
to be submitted for endorsement		

J.M.S. Mercury, Seabene, Petersfield, Hants



660

many of the sideband stations.

D. Lennard G4ZHK was another correspondent. In his letter he reminds us of some of the QRQ transmissions which can be heard on the bands. He mentions that W1AW run by the ARRL sends a number of transmissions during the week. Unfortunately the times change occasionally so it is best to consult a recent copy of QST. Another QRQ run is transmitted by VERUN, the Dutch Amateur Radio Society. They transmit on 3.6MHz from PAOAA every Friday at 1930 GMT. On the last Friday of every month they transmit a proficiency test with speed from 15 to 40 words per minute. They do not award certificates. Nearer home, the Royal Naval Amateur Radio Society organise a QRQ run on the first Tuesday of each month on 3.62MHz at local time, ie GMT or BST. There are several two minute runs with speeds ranging from 15 to 40 words per minute. It is also possible to obtain a certificate for submitting a passage with no errors. The details for this are transmitted prior to the actual QRQ runs themselves. My own view is that

a certificate for this is far more worthwhile than some of the other operating awards which are available today.

News and Events

The CW Fists Club is still growing rapidly. Every time I receive the newsletter the list of members grows. In fact the number has risen to over 300 and rising, and there are still more who are interested. The person to contact is Geo Longden G3ZQS, 119 Cemetery Road, Darwen, Lancs BB3 2LZ.

Recently Fists, along with a number of other CW groups and individuals, have been writing to the RSGB about a proposed Amtor mail box on 7.03MHz. As everyone knows, this is inside the CW section of 40 metres, which is small enough as it is. On top of this it is the 40 metre QRP calling frequency. Fortunately it now appears that the people who were proposing this have now seen sense and it will probably not come to fruition. It does go to show that we must be very watchful not to allow


the CW ends of the bands to be cluttered up with a whole host of sundry signals, especially on frequencies which are already allocated.

A reminder for those interested in contests that the CW section of the OQ World Wide contest is on the weekend of the 26th and 27th of November. This event is normally very good, and with the current upsurge in band conditions it should be better than ever. In fact it would be well worth having a good look around ten metres, which is very lively at the moment.

Another contest for those with space for big aerials: the ARRL 160 metre contest is to be held on the weekend of 3rd and 4th of December.

Sign Off

That's it for this time. Thanks for all the letters which have been sent in. Please remember to keep them coming in. My address is 144 Worple Road, Staines, Middlesex TW18 1EQ, or if you don't have this copy of the magazine to hand it is QTHR. So 'till next time BCNU es 73 de lan.



**COMPACT
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Our own unique design that WORKS

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Special features:

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- Selectively detuned for optimum performance and gain (no gimmick quad needed)
- Easy trim spokes with lock nuts and spares
- Minimized wind load and weight
- Double insulated elements

As reviewed by G4HCL in HRT APR 87

Typical performance

Antenna model	AQ-20/2E	AQ6-20/3E	AQ6-20/4E
Forward Gain Dbd	3.8 to 4.8	5.5 to 7.5	7 to 8
Front to Back Db	13 to 15	16 to 18	18 to 20
Side Null Db	-28	-32	-35
VSWR (typical)	1.1:1	1.1:1	1.1:1
Weight	7.5lb	12lb	16lb
Wind load	2ft ² 0.18M ²	3ft ² 0.27M ²	4FT ² 0.37m ²
Turning radius	76"/1930mm	96"/2438mm	117"/2971mm

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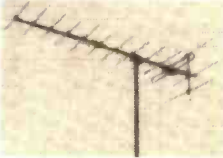
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The Autumn Tropospheric period should now have arrived. Aerial Techniques are again offering this superb High Gain Wideband VHF Band 3 Antenna at a very special price to all enthusiasts. The Fernseh-Antenna model S1814 is a 14 element array covering all VHF channels in Band 3, it has a peak forward gain of 11.5dB and a high front to back ratio of 25dB. For high resistance against extremes of weather, the aerial is gold lacquered for complete protection from corrosion, it also comes complete with a plated mast clamp which has a 2" maximum grasp capability. The array is light and weighs under 2kg, frequency coverage is a complete 175-230MHz, a folded dipole is employed for peak efficiency.


We are also offering the very popular Antiference UP 1300 amplifier at a special price. If purchased with the above Band 3 aerial, the price is only £16.30. This amplifier covers 40-230MHz, which means it covers all Band 3 frequencies, the gain is 19dB with a low noise figure of 2.5dB. This unit requires 12v DC @ 6mA from its power supply via the coaxial downlead.

FERNSEH-ANTENNA S1814 High Gain 14 element Wideband 3 Aerial	£29.50
(Carriage & Insurance on aerial £5.50)	
ANTIFERENCE UP 1300 amplifier, coverage 40-230MHz	£16.30
(price applies if purchased with aerial - normal price £18.25)	
ANTIFERENCE Matching 12v DC Power Supply (mains operated)	£14.25
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ICOM 290/H/D M/M two metre transceiver 1/25 watts incorporating microcomputer, memory scan two VFOs USB LSB noise blanker CW ECT complete with power cable microphone, brackets and manual used six hours ill health compels sale, £425. 08855 247 Herefordshire area.

70CM microwave modules MMT/432/285 transverter + Jaybeam MBM48/70 Antenna £100 ono. Jaybeam Q6/2M Antenna £20. Realistic DX160 receiver £40. or will exchange for 10M SSB transceiver, general coverage receiver FRG7 or WHV. Telephone: 03635/471 (Devon) evenings.

HAM International Concord II, suitable for conversion to 10MHz, £75 ovno. ATU Armtec 300 offers. Yyoko UHF/VHF B/G L french, cost £98. 2 months old, offers around £80. 0283 221870.

JAYBEAM 14ELE Parabeam Antenna for 145MHz used only 6 months, £19. Also 38ft telescopic tower with guy rope fittings, £25, excellent condition. MM 145MHz down to 28MHz converter with IF output, £9. Mike, G6MNX QTHR. York 0904 422773.

EDDYSTONE general coverage RX type 358X. Extremely aged but in working order. What offers? Heavy so buyer will have to collect. Chris Jordan, Poundgate Farm, Beguildy, Knighton, Powys. Phone 05477 273.

YAESU FT757GX transceiver, mint condition, plus manual original hand held mike plus Adonis compressor Mike model AM-601 home brew ATU SWR power meter all patch leads etc 40 watt power supply unit G5RV Antenna with split. Phone Swindon 31662.

LARKSPUR SUR30 mains PSU C11/R210. New swap for C45, C42, similar. SUTR24V Rotary PSU sell, swap WHY. R1116 receiver, WS18 transmitter only, sell swap, offers. Wanted cases for MKII 770R Eddystone, Hammerlund

SP600. Telephone Jim G4XWD evenings Kidderminster (0562) 823674.

32K Datapack, £150. Wanted AR88D or AR88LF, exchange possible. Contact Graham G6SUQ, QTHR 01-845 9261.

ATLAS 215X 100W HF mobile rig 160M-15M excellent with safety mobile microphone seven Yaesu mobile whips and gutter mount speaker and handbook, £300 also 10M multimode full coverage SSB, CW, AM, FM ideal mobile and transverting, handbook, £120 or WHY Ring Andy GOAYZ 0705 589560.

FOR SALE, FT790R Nicads and charger, 9 months old, £225 or swap for FRG7700 / RZ000 or BBC 'B' computer, or consider older HF transceiver. Write K. Argyle, No 3, Gregory Close, Barlestone, Nuneaton, Warks, CV13-0EP. All letters answered.

FOR SALE, valves 812A (1) KT88 (6) QVO5-25 (3) TYZ-125 (3), receiver hallicrafters S72 monitor Pye 19inch B/W offers. Phone Wokingham 782236.

YAESU FRG-7 communications receiver, as new, mint condition, instruction booklet and workshop manual. No modifications, all complete. £130 ono. Tel: Wigan (0942) 712691.

GRUNDIG Sattelite 300 3.9 to 22MHz LW MW SW VHF digital readout keyboard or manual tuning clock batt mains C/W manuals memory for all frequencies, £100. Belcom VHF/FM Marine transceiver Prestine condition only used for RX channels 1.28-60.88 continues monitor Channel 16 all mounting hardware reason for sale Venture fell through one month old. £150. 051 521 7794 ask for Eddie.

MIRAGE B108 Linear amp 2½ watts input 25 watts output or 10 watts input 80 watts output, used only 5 times, so have decided that it is not needed FM or SSB capability mint condition, bargain at £88. Mike, York 0904 422773.

1155A receiver Zenith 19 set unmoded excellent condition, Zenith transonic mains / battery 1940 7 model good condition, 88 sets - 2 + amplifiers. Phone Mike working offers Kidderminster 752068 send for list of values and equipment for sale.

TRIO 1000R plus FM. 28/2m TNSVTR. SMC 10m FM. FT790 VHF. 30w/70 Linear. 143/149MHz TNCVR. Variable output. HM4001KT RTTY, hardly used. IC2E H/H H/D Bicad H/D case FT902 mobile power leads. IDAWE 610B output meter. Trio MC35S N/C mike. New. H/Duty bracket for 6WIP/HF to car towing bracket. — Tel: (0473) 830147 anytime.

1155 with 6V6 output stage built in separate PSV with speaker inbuilt, £55. Pye F460 VHF base station requires tuning from 456MHz to 432MHz 12MHz Xtals in RXETX £35. Buyer collects. — 290 Priory Road, St Denys, Southampton SO2 ILS.

FT290R Nicads, charger, base use only, mint condition, £270. Also Tono 2m-40G all mode Linear amp/pre-amp 1-3w in 30-40w out. Mint condition, £50 or £310 both. Would accept IC201 or similar PT/Ex. — Dover 0304 821790.

2 METERS FM mobile rig, standard C8900, 10 watts, excellent condition, only 1 inch high, with mobile mount and manuale. — Chas 764 6767.

WIRELESS World, 1946-49, all 48 editions, £25. Practical Wireless, 1960-70, all 120 editions, £35. Practical Television, May 1961 to December 1971, 128 editions, £35. — 01 462 4614, all inc. P & P.

FOR sale TS520 VFO520 SPS20, £350. Wanted TS830S plus outboard UFO also aerial rotator medium to heavy duty G4FMO. — Burton Upon Trent 0283 840667.

JAYBEAM C5 Colin, £35. 2 x 19 element mets and power splitter, £50. One needs attention. G60WX QTHR. — 01 691 2040.

HEATHERLITE 2m explorer 4CX350A valve for sale, £450. G1HOW QTHR. — Tel: Bourneend 21131 with warantee.

FOR sale Yaesu FT290 with Mutek and Nicads. Plus charger, case and ¾ mobile Antenna. Also 30 watt Linear and 2 flexi-whip Antennas. The lot £225. — Tel: Mike, Leatherhead 373241.

JRC NRD515 receiver, NDH518 memory, speaker, all absolutely superb as new condition and boxed, the Rolls Royce of shortwave receivers, 96 memories, 5 modes inc RTTY, probably the finest equipment available, £1200 worth. Bargain for someone £650. — Brixham (08045) 2572.

FOR sale FL2100Z Linear amp, £475 or swap for similar priced equipment, W.H.Y. — K. Macleod, Hillhead Cottage, Ardersier, Inverness IV12QW. Tel: 0667 62828 evenings, weekend.

FOR sale WWII equipment 19 set Canadian and British and Ancillary equipment, 62 set, C12, A14, perfer buyer inspects and collects. — John, 0903 41810, after 7 pm and at weekends.

REALISTIC DX-302 as new, £150 ono. Any information on a FT707 FM board, new or secondhand or FP707YM35, FC707, FV707DM. — M. A. Thomas, PO Box 2, Aberdare, South Wales, CF44 7AD.

BELCOM LS102L 26 to 30 MHZS, £195. FDK MULI 750E, 2 meter multimode, £200. — Andy, 049481 3218.

RUSSIAN 8 bands AM/FM Selina radio, as new, £30. Also wanted RF8000 National Panasonic radio. — 0462 33690 evenings.

PORTABLE Commodore, 5 x 64 computer, built in monitor and disc drive, exchange for transceiver or receiver. Also 8 trap dipole, £20. — 01 592 7800 daytime, 0277 823434 evenings.

HEATH SB104A with HP1144 power supply, condition as new, £275. Prefer buyer collects. — ted, 0304 372094.

SCANNER SX200 AM/FM, good working order, £145. — Tel: Eric on Macclesfield 29180.

YAESU FT290 2 metre rig Nicads etc little used, £250. Microwave modules Linear 144/30LS £50. Swap with cash for HF Rig Seaton. — (Devon) 21016 G3RCO QTHR. **PLESSEY** type 72 switch 3 bank's of 30 way 3 pole all silver. Contact very highest Spec make before break, £25 each ono inc P & P. — S. P. Martin, 24 Collingwood Close, Weston-Super-Mare, Avon BS22 9PQ.

VALVES 500 at low prices. **OLTALS** 50L6GT 35L6GT 25L6GT 35Z5GT 35Z4GT 25Z5GT 25Z4GT 12K7GT 12K7GT 12Q7GT 12SQ7GT 12J7GT 12SJ7GT 6V same types, many others. All boxed unused. SAE please, sorry have sold all HRO types, prior to Oltal bases. — A. E. Jeffrey, 42 Dennis Road, Padstow, Cornwall. PL28 8DF. **FOR** sale 400 pounds Yaesu FRG 9600 MK2 with PA4C adaptor average 60-950 MHz also AKD to plug into Antenna socket to cover 100KHz - 60MHz. — 01 228 4835.

GARRARD 301 3 speed transcription motor, machined strobe markings on turntable with original packing, very good condition, £55. — 0703 466506.

COMMODORE VIC20, PSU, leads and cartridges, vgc, will swap for frequency counter, 11 meter transceiver and PSU, or £40 ono. — Cowes (0983) 293037, after 4.30 pm weekdays.

YAESU counter type YC500E top model .02PPM manual, mint boxed, £250 ono. **REG GEQS**. — Tel: York 768545. **YAESU FT726** only 2 metre fitted, vgc, exchange TS440S or similar general coverage HF transceiver or sell £650. Transverter MMT430/144 with shift, as new, £85. — 0606-43344 G1SBA Paul.

FT290R 144-148MHz Nicads charger case, boxed, as new, £280. No offers. G1WYR (0226) 716477.

TRIO 2300 2M FM portable, very good condition, plus ten Ni-cads, £100. — Tel: 0383 822206 (Fife).

CONVERTERS 144-146 MHz and 432-436 MHz. Microwave modules, 28 MHz

output. Archer (Tandy) 5 Element Discone aerial 50-512 MHz the lot for £50 ono. Wanted Trio 2300GX for cash or part exchange with above items, plus cash. — Tamworth (0827) 58004.

2 METRE "Slim Jim" Antenna almost new, tuned 145 MHz, £5. — 0422 53979.

FTONE Yaesu superb general coverage HF all mode transceiver, most filters fitted, including Curtis Keyer and FM, excellent example and performer, £895. G4GPL QTHR 01 953 6921 home. 953 9021 work. Newbrain computer boxed, as new, £45 including some programs.

EDDYSTONE EC958/7 professional high stab receiver 19KHz - 30MHz, 19inch rack mounting, £280. Datong active Antenna AD370 (outdoor) £40. TRS80 RTTY outfit, RX TX Radsoft TU, monitor TV, cassette, plus software, £85. — Tel: G3KLV Northampton 0604 48091, after 6 pm.

YAESU FT 290R Nicads charger 50ft case boxed, mint condition, £250 ono. Communications receiver, Realistic DX 302 digital read out 0-39MHz AC/DC battery, mint condition, boxed, £150 ono. — Stuart, (Knowle) 77370 (Birmingham area).

VINTAGE Military type 38 walkie talkie sets, vgc, £50 for pair. US army telephone test set EE-65-B, as new, £35. Taylor valve tester, in perfect condition, £40. Taylor Multi Range sig. gen. vgc, £25. — Tel: Bookham (0372 or 31) 52569.

YAESU FT 200 HF Bands 3.5 to 30 MHz FC902 Ant. tuner PS unit, £385 ono. Tel: 01 393896 or write to 16 Seapark Drive, Clontarf Dublin.

YAESU FT480 2 meter multimode vgc, in box with full manual, £300. — Tel: 04868 28915 ask for David.

FOR sale Sommerkamp FT2772DM Kill (1912D) with CW narrow filter fitted the rig, has only been used for SWL. G5RV full length included, £480. Kenwood AT230, never been used, boxed, excellent condition, £100 ono. — Tel: David (0703) 456 248.

FT101E recent professional overhaul, new PA valves covers 160, 10M FM discrim-

inator, £350. TS520 immaculate, CW filter, £325. Canon A1 plus lenses, winder, case. £300, will part exchange any or above for VHF/VHF gear 94FAT. — 06845 64854.

YAESU FT757GX FC700, vgc, 3 months old, never used HF offers around £750. FTU 700, £200 ono. FT 480R Scan mike mobile mount, £275 ono or exchange all for FT726 with 2m/6m/70. — Tel: GINXM 0274 570619.

COMPLETE basic electronic course comprising of 36 lessons, also components for experiments, £15 the lot. Buyer collects, Ken 061 748 6109, after 6 pm Manchester area.

FOR sale Sommerkamp FT2772KMK (1012D) built in CW narrow filter, only been used for SWC plus G5RW full length PKOTEL AM601 base mic offers around, £450. Kenwood AT230 boxed as new, never been used, offers around £100. — Dave on Southampton 456248.

WW2 German ex-service radio/radar equipments, parts, literature, etc wanted for museum purposes. No need for being in working condition. Also wanted British gear:

ws 65-66, "Electra" rcvr, R208 VHF rcvr, T1190 Transm. various remote controls, C-D-F-H. Collecting UK. For swap or sale: Collins Radio Co. 51 J 4 GC 0.5-30 MHz with all 3 mech. filters. Siemens GC rcvr Funk 745. Both in GWC. W.S. 19, 38, 58. OZ8RO R. Otterstad, Vejdammen 5, DK-2840 Holte, Denmark. Tel: 010-452-801875.

YAESU FT230R 2m FM transceiver, sun 3/4th mobile Antenna with gutter mount, Jaybeam LR1 Colinear base Antenna with mast, brackets, etc, regulated power supply, £150 for quick sale. — John 021-445-3577.

TEXAS T199/4A computer users manual, record, playback leads AC power pack. Exchange above for Spectrum 48K add-ons. J. Brown, 45 Marlborough Avenue, Falmouth, Cornwall TR11 4HS.

CDE AR40 rotator 70ft control cable, £50. Shure 201 mic, unused, £10. AVO 7 leather case, £20. Kenpro 1 to 1 balun, £12. Vibroplex Virbrokeyer, £30. KW107

Antenna tuning system, £75. Two unused 813S, £25. Pair IOW traps, £7. — Tel: 0494 30018.

SONY ICR480, 6 band, MW and 5 Shortwave bandspread; pocketable; LED tuning, indicator, case, £25. Hitachi WM20 shortwave Transverter, 13-19 metres, 9 band; all pushbuttons; for car radio or base use, £20. BSR 8 track stereodeck, £6. — G4IOF, QTHR. 01-722 7040.

GLOBAL AT1000 antenna tuner used once, brand new, still boxed, £60 inc P&P. Also four Airband Crystals 120.50, 124.20, 133.60 and 133.70, for DR600-R512 Scanners; all four £5 or £1.50 each. — Ring Walsall (9022) 644054.

YAESU FT790R Nicads and Charger, boxed as new, £300. Pye Olympic (FM) 12 channel, four channels fitted, speaker and mic converted to 4 mtr, £80. Tristar 747 multimode CB converted to 10mtr, £80. — Gravesend 357795.

COLOUR Genie Computer, RTTY/CW split screen type ahead, tunicator, b/w TV, recorder, ready to go on air. Hardly used, £120 ono. — Phone Noel 0473-49139, Ipswich, G3ZLN.

TELEQUIPMENT S32 Service-scope instruction manual, price £20. Wayne Kerr Autobalance universal bridge type B641 with service manual, operating manual and all leads. Price £50. APT regulated power supply type TCVO550 0-50V, price £10. — Phone 0235 816947.

TONNA 9 element crossed for 2 metres, £35. MM Transverter 28MHz-70cms, £69. QTHR. — Tel (daytime) 0423 68954, extn 262, G4IUF, Mike.

IC R70 Communications Receiver, 0-30MHz, AM/SSB/CW/RTTY/FM P.B.T.RIT, NOTCH R.F. gain, dual/AGC/VFO, N.B/M/Pre-Att, AD-270 active/A 0-30MHz, good condition, like new, £550 ono. — 49 Gaythorne Road, West Bowling, Bradford 5, BD5 7ES.

FOR SALE Electronic Components: 5v Regulators, Diodes, Transistors, Capacitors, Resistors, PCB Pin Connectors, Heatshinks, Fuses etc (several items available in bulk quantity). — For full details, Mr D Griffiths, 2 Lodge Hill, Caerleon, Newport, Gwent NP6 1DA (0633) 420218.

WANTED

WANTED, 1920s or 30s wireless parts (radio components) and shortwave or amateur receivers. Also interested in Collins equipment. Please phone 0904 794680.

HELP! Circuit diagram or manual wanted urgently for a Halicrafters 36A VHF Rx. Please write to Mark Whittington, G1VGK, PO Box 98, Hastings, East Sussex TN34 3QQ.

WANTED for Yaesu 7700, a MU7700 memory unit, good condition. Please phone A. G. Cheeseworth, Lau 5934, evenings/weekends.

WANTED, Yaesu FL2100Z H.F. linear amp. Must be in good condition. Ring Tony G4VTC QTHR, Dorking O306 885533.

WANTED, N type connectors for Cellflex HCF ½" 500hm coax (the correct ones, not Andrews 44ASW!) also wanted Andrews FSJ4-50B coax ½"-50ohm superflexible, any lengths considered. Contact Ian on 0676 40744 after 6 pm.

EDDYSTONE EC10 receiver wanted. Must be in good condition. Working preferred but receiver in non-working but undamaged condition considered. Offers to D. J. Hall, 97 Clearbrook Close, High Wycombe, Bucks HP13 7BS.

WANTED, British MK123 Tx-Rx in good working order, with accessories and manual. Also Class D wavemeter, preferably 240V mains, with manual. Wanted by much hospitalised O.A.P. Glynn, 41 Crossways Avenue, East Grinstead, Sussex. Tel. East Grinstead 22967.

WANTED, NATO 2000, must be in good condition. For sale, Trio R200 in mint condition, £400 ovno. 0283 221870.

WANTED, Dynamco oscilloscope, side panels, amplifier and timebase to suit display units, type 7100, 7110 and 7210 and any data for the above. Tel. Ron (Falkirk) 0324 483153.

WANTED, HF transceiver FT101ZD, IC 720, IC 740 or Trio 8205, FT757 and A.T.U. to match. 086-87 23808 after 6 pm.

WANTED, Service trader sheets on valve radios/wirelesses 1930-1960, also data and/or operating instructions

for Lafayette tube and transistor tester model TE-21. Contact Tom Valentine, 38 Grampian View, Montrose, Angus DD10 9SX. Tel. 0674-76503.

WANTED, ATV converter 70cms or 23cms microwave modules or similar, also any ATV computer programmes for Sinclair Spectrum. Phone evenings or weekends, Brian GIUWB, 0705 462699.

OMEGA transceiver by G3WPO. PCB patterns for VFO and CIFPU wanted, or boards already made or complete or incomplete transceiver or bits or instruction manual. Kenwood/Trio R-820 also wanted. Tel. Donald Anderson GM0BFT QTHR, Nairn (0667) 53256.

WANTED, Ham International Multimode or Jumbo for conversion to 6m. Telephone Jim 0467 22381 evenings.

WANTED for O.A.P. power pack for 19 set or for R1155 both sets unmodified must be reasonably priced. Grantham (0476) 61329.

WANTED, Yaesu 2100Z, 2100B, FT902DM, must be mint. For sale, GP432 x 70EMS Colinear, cost £37, accept £24, not used. Tel. Tony, Dorking O306 885533.

WANTED, base stand charger, 'ST2' or mobile charger, MS1, suitable Trio 25/3500, must be good condition, local if poss (R.A.I.B.C. member): linear preamp suitable 70cms TR3500. Details, price, Syd GOEZM QTHR, Bursledon (042121) 4333.

WANTED, service sheet and crystal formulae for Dymar Lynx low band AM six channel P.M.R. Tel. Chris on 0226 247167 or write 5 Cheviot Walk, Bogmoor, Barnsley, South Yorks S75 2HH.

AIRMEC 702 signal generator circuit diagram or any information on this equipment. Are Airmec still in business? Where are they Tom? 47B Warneford Street, London E9 7NG.

WANTED, Pye A200 P.M.R. RF amplifier E.O. for P.M.R. use 68-88MHz. Tel. Chris, 0226 247167 or write 5 Cheviot Walk, Pogmoor, Barnsley, South Yorks S75 2HH.

WANTED, Dressler ARA-500 active antenna in good condition please, also wanted any and all information on air

traffic routes/channel frequencies etc. All letters answered and postage reimbursed. Please write Brian Dudhill, 12 Eilam Road, Rotherham. Telephone (0709) 554665.

WANTED, Grundig 650 radio or Sony CRF330 ICF2001D. Icom RA71 etc. Cash offered, or exchange for VHS video with cash adjustment. Also require Panasonic RF9000 Rx. 0462 33690.

WANTED: Has anyone built solid receiver using Plessey, or Texas instrument chips circuit diagram wanted, also 144MHz, also 1930, 1960 Practical Wireless and Radio Constructor.

FT757GX wanted, with or without PSU or ATU. Please contact Michael on 0904 30883 most evenings, GIWTJ.

SCANNER wanted, also "A" type converter for FRG7700. Will collect. Tel. Leicester 774506.

WANTED, lattice tower in good condition, can collect within a reasonable distance, approx. 100 miles. Tel. Bath 24154, 9 am to 6 pm.

WANTED, any information to assist with putting HRO back into service, ie handbook, service info mods, etc. All letters replied to all postage refunded and any material returned. Any help very gratefully received. Thanks in anticipation. Bill, 10 Crompton Street, Swinton, Manchester M27 2BO.

WANTED, FT290R, collection possible. Phone Geoff 0484 645923.

R1481 and **R1132A** service data and/or circuit with I.F. frequency. Manual or photocopies. Cost and postage covered. G8BSK, 290 Priory Road, St. Denys, Southampton SO2 1LS.

WANTED, YAESU FC707 ATU and FP707 power supply. — Tel. 061 366 0130.

WANTED TS530S or similar equipment, in exchange deal for 3½" Myford Lathe plus many accessories. — Details, Geoff, 41 Penn Grove, Norwich NR3 3JZ. Telephone Norwich 406331.

WANTED, urgent, handbook for Yaesu FRG7 or copy will do. — Tel. Little Cherrington 202, Oxon, after 8pm. Also wanted ERA micro reader, will pay £70.

WANTED: W.W.2 German ex-service gear. Parts description, WHY? Swap or cash, will collect. For sale or swap BC-348 command TX & RX. W.S.58, W.S.38, W.S.19, 628R0. — Tel. 010-452-801875.

WANTED: Service manual or photocopy for ITT M5 Star Radio Telephone (3 CH UHF FM). — Please contact Andy 0604 48551, G6REG QTHR.

WANTED: R1155 case. 19 set 'B' set tank aerial base. Any 19 set parts: 38 set AFV and power supply. AR88 receiver. — G4DVH QTHR. Tel. 0229 54466.

WANTED: Circuit Diagram for Stalker IX multimode transceiver. Also wanted, all band ATU. — Phone 074 577 655.

WANTED: TX SSB to cover 3.5-3.8 M/cs, anything considered or WHY?. Must be cheap (but willing to pay carriage). — Contact Peter 0287-34397 (daytime).

WANTED: Sony CRF330 or Sony CRF320 for cash. Also RF9000, RF8000 world radios. — Tel. 0462 33690.

WANTED: YR-901 CW/RTTY reader. Also the SP-901 ex/speaker for the FRG7700, most urgent. — Contact M Dunn, 50 Coventry Avenue, Grimsby, Sth Humberside DN34 5EQ.

WANTED: HF transceiver FT77, FT707, TS120, TS130, Argosy would also consider FT101, TS530 or similar. Also interested in Heathkit HW7, Century 22 or similar. — GM4SVM (0786) 75834.

WANTED: Any Ham International TX/RX, preferably a multimode Mk1 or II. Must be in full working order and in good condition. Don't hesitate, call; cash waiting. — Tel. Gary on (0504) 46313, after 6pm.

WANTED: Yaesu FV707 DM (VFO), with leads and manual if poss. I have a DNT 40 CNL CB with in-built mains unit or cash. — Details: Syd, Bursledon (042121) 4333, evenings after 19.00 till m/night.

WANTED: Icom R71 for cash or part exchange Trio 2000 with VC10 VHF converter and cash. — 01-556 5131.

WANTED: Mobile car mounting bracket for Yaesu FT290 Mk1. If anyone has one to sell please telephone — Paul

Davis on 021-352-1378. Someone always in, so please leave a number for me to get back to you; thank you.

URGENTLY WANTED: 2 element 10mtr Yagi antenna, such as the HB10F2T by Tet or HB9CV or the G2BAR model also considered. Aerial must be in good condition, strong made etc. No CB antennas please. Your telephone calls most welcome. — Tel. Midcalder 880345.

WANTED: Ham Radio Today 1983/84 Jan 1983, March 1983, May 1983, June 1983, Aug 1983, Sep 1983, Oct 1983, Dec 1983, Jan 1984, May 1984, Nov 1984 and informatin on transverter for HF from 2 metres. Help. — Rick, 156 Runley Road, Luton. Phone 29329.

CIRCUIT DIAGRAMS or manuals required for National NCX-5 Tncvr. Photocopies welcomed. Basket case for spares would also be useful. — GU0JCI. Phil Horsepool. Le Petit Ruisseau, Vazon, Guernsey. 0481-57166.

WANTED: Circuit or manual on Han Internaitonal LA120 solid state linear, urgent. — Reg, 0904 768545.

EXCHANGE

EXCHANGE October '83 red Honda C90. Low mileage. Excellent condition worth £300+. Wanted 2 metre and /or 70cm multimode rig. G40JB QTHR. 0784 35737.

EXCHANGE Trio TS 900 HF. SEM. ATU audio filter. Low pass filter SWR meter etc. For screw cutting model engineers lathe. Tel: Cumbria 0657 4827 after 6pm.

SWOP RFG 9600 scanning receiver 60-960MHz all mode as new and boxed. For FT757 or FT77 or FT707 and ATU must be in full working order, cash adjustment either way. Tel: 0903 35689 evenings.

EXCHANGE Apple 2 Europlus computer with Epsom printer, 2 disc drives, green monitor, starter and Apple writer discs and manuals for FRG9600, dual band rig, or FT707. In good working condition. Javed, Tel: 061 792 6067.

EXCHANGE, Technics SXU50 electronic organ (cost new £1725), many features, voice setting computer, memory,

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EXCHANGE my HW8 QRP rig in vgc plus power pack for HF receiver or will exchange plus cash for FT290R 2 metre rig. Phone Geoff 0484 645923.

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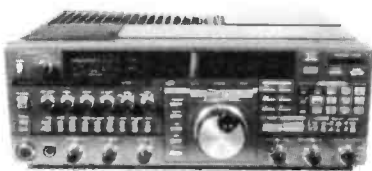
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Since our introduction of this remarkable transceiver last year, October 1987 to be precise, many of these are now in use throughout the U.K. From 160m to 10m, including the ever-popular 6m band and a General-Coverage Receiver. Price: £929.00 including MC43S microphone.



Kenwood TS440S HF Transceiver

Now available once again from ARE Communications the excellent Kenwood TS440S. General Coverage Receiver 100W output between Top band and 10m. FM fitted as standard. Auto Tuning Unit optional extra. Offered at a discount price of £1,039.00 or, with ATU £1,199.00.

ICOM

Icom IC32E Dual Band Handie

Direct competition to the STANDARD C500, the ICOM IC32E offers excellent facilities utilising all existing ICOM accessories. Ideal for the IC2E/O2E owner. Similar specification to the C500. Frequency range: 138-174MHz (RX only) and 410-455MHz (RX only).

Price: £389



Icom IC3210E Dual Bander 2m/70cm

Easy to use, easy to look at, the new Icom IC3210E. Just compare the uncluttered front panel lay-out with other dual banders, to see how simple it is to operate. Look at these features:

- * Frequency VHF: 138 to 174MHz (RX Only)† (Track tuned better than .3uV)
- * Frequency UHF: 400 to 479MHz (RH Only)†
- * TX/RX 144-146/430-440MHz
- * 12.5/25KHz Channel spacing
- * Full dual band duplex
- * Stand alone repeater operation (For Raynet)
- * Pocket beep via optional ctcss
- * Programmable ctcss UT40 (optional)
- * Priority watch
- * No duplexer required
- * 20 Double spaced memory channels
- * 25 Watts output on both bands

† Modified free if specified during order.
Available now at only £499.00

Opening Hours Mon/Fri 9.30 to 5.30 Saturday by appointment.

Now that Leicester is over, we can put our shop premises in London back together to display an even wider range of new and used Amateur Radio Equipment. Our direct Importing from our agents in Japan guarantees you excellent prices, together with our two fully equipped workshops, offering fast turn-around on repairs.

REMEMBER! A.R.E. can also offer competitive prices on Cellular Telephones and 2-Way PMR. Why not introduce your company and receive a minimum £25 intro-bonus! Phone for details. 73 Martin G4HKS



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that allows for correct mounting in any location

- A choice of models that doesn't force you to buy features you don't need.

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NAVICO

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