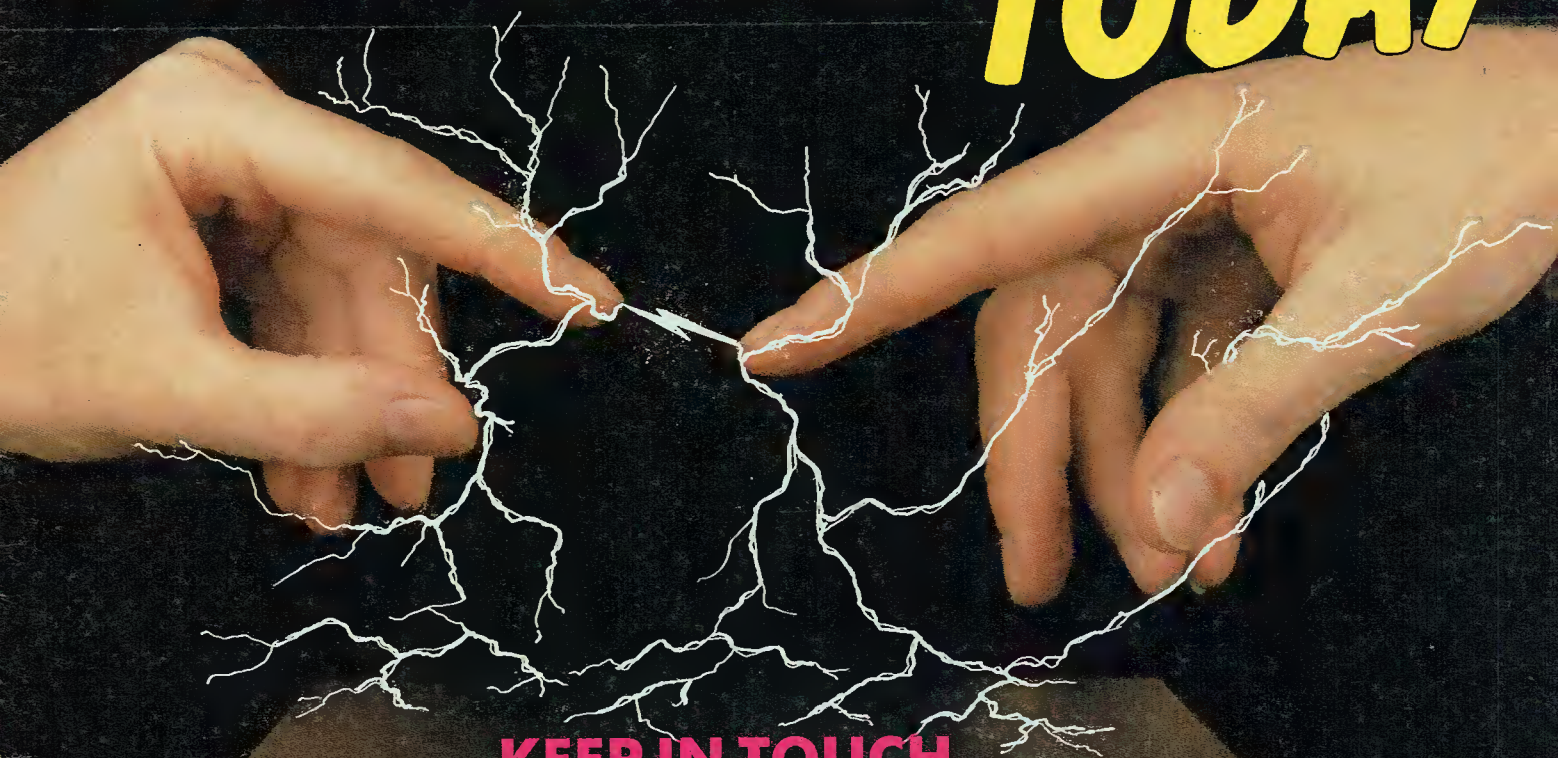


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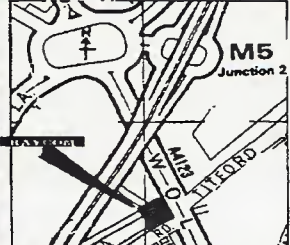
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TODAY

REGULAR COLUMNS

RADIO TODAY	6
New products, new awards, new groups	
READERS' LETTERS	12
RF — Radiation Fear?	
PACKET RADIO ROUNDUP	14
A new TNC, and new publications	
MORSE FORUM	36
Looking backward as well as forward	
RADIO TOMORROW	48
Club meetings everywhere	

FEATURES

QRZ	32
Support your DXpedition associations	
TECHNOLOGY ROUNDUP	36
Monolithic crystal filters	
50MHz BEACON LIST	38
Worldwide beacons for 'Six'	
VHF CONVENTION REPORT	39
Winners congregate at Sandown Racecourse	
PLANNING PERMISSION WITHOUT TEARS	42
Getting the mast up is easy if you go about it the right way.	

REVIEWS

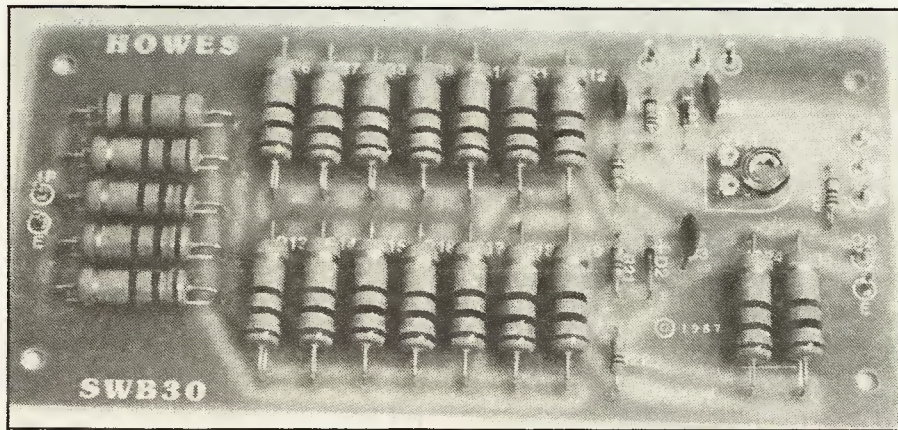
VSWR METER PBC KIT	4
A new kit from CM Howes meets their high standard	
TEN-TEC 229B AERIAL TUNER	22
'L' network matching gives this the edge	
BEARCAT 950XLT MOBILE SCANNER	26
A US scanner makes itself at home Over Here	

CONSTRUCTION

THE WORLD'S SMALLEST TRANSCEIVER?	16
The Kanga Gang's 'Oner' can be legally 'inched'	

PCB SERVICE	54
FREE READERS' ADVERTISEMENT	51
ADVERTISERS' INDEX	55
CLASSIFIED ADVERTISEMENTS	56

Howes VSWR Meter Review



*Ian Poole G3 YWX experiences a meter without tears
from C. M. Howes*

Homebrew gear seldom has the professional finish that makes commercial equipment look so good. The main reason for this is that the average amateur, how ever good at construction, simply does not have access to all the tools needed to give a one hundred percent finish. It takes a lot effort to finish a project properly and, as a result, many pieces of half-complete equipment adorn the average shack.

One way of overcoming this problem, at least in part, is to build a kit. It is an approach which I have found very successful in the past, as it offers many advantages. All the components will be selected by the designer, which will reduce problems of wrong tolerance or component. A ready made circuit board is usually provided, saving the effort of making one. It is also usually better than most home made ones! It is also common for a box or case to be provided.

Recently I was looking around with a view to making or buying another VSWR bridge. They can be picked up quite cheaply at rallies and the like, but I was intrigued by a kit version offered by C. M. Howes. As I had previously been impressed by their products, this one begged to be investigated further.

The SWB 30 is not just a VSWR bridge. It also functions as a dummy

load, attenuator and power indicator. As it acts as an attenuator while measuring a VSWR the transmitter is always presented with a good match while the antenna is being tuned. This means that antenna experiments can be carried out safely in the knowledge that the transmitter PA stage will be protected from high VSWR values. A further advantage is that the transmitted signal is attenuated so that annoyance to others will be minimised during tuning. In this mode it will handle 15 watts continuously or 30 watts at ten seconds on and ten seconds off. It also gives a full scale "SWR Cal" reading for less than one watt input.

The unit also acts as a power meter giving calibrated power readings up to 30 watts, but it can withstand operation up to 100 watts intermittent. For normal operation it acts as an output monitor without attenuating the signal. In this mode indication is only given of the output power.

The frequency response is quoted from 1MHz up to 200MHz giving it a nominally flat response from 160 metres to 2 metres.

Bubble Wrap

The kit arrived quickly and was neatly packed in a small cardboard box with bubble wrap inside to pre-

vent damage during transit.

On opening the package, the kit was found to consist of the circuit board, resistors, capacitors, diodes and pins. Then there was a potentiometer for adjusting the "SWR Cal" reading and the meter itself. Finally, there were instructions.

The printed circuit board was well made, single sided with silk screen ident on the top side to enable each component to be easily located.

The components included twenty one beefy two watt carbon film resistors. These were used to make up the attenuator and would dissipate the power. Apart from these resistors were two diodes, five other resistors, three capacitors and a pre-set potentiometer on the board. Pins were included so that connections could be made to the board.

The only components supplied with the kit which were not mounted on the board were the front panel mounted potentiometer and the meter. The meter is calibrated in RF power and SWR.

The connector, switch and case were not supplied with the kit, as they are up to the individual to choose. If required, however, suitable ones can be supplied.

The instructions are probably the last item to be looked at in any kit. In the standard Howes tradition they were very good, giving a brief description of the unit, progressing through the kit, soldering instructions and operating instructions. It must be said that in view of the quality of the instructions even a virtual beginner would be able to tackle the project.

Construction

This was straightforward. Even so, it was worth following the advice of the instructions to read the paperwork through twice. Having done this I settled down with a small soldering iron, some side cutters and a pair of long or round nosed pliers. Building the board did not take very long — less than an hour, in fact. Once this was done each component was

checked for mistakes. In spite of the simplicity of the unit errors can always be made, and it is best to cast one's eyes over any job again just to make sure nothing is wrong.

Having done this the wiring was completed on the bench to test the unit out. UHF type connections were used together with a fully robust switch out of the junk box. It is worth ensuring that the switch can easily withstand the power levels it is likely to see in use. If in doubt use a bigger one. In any case, guidelines are given in the instructions.

Once everything was complete it was ready for the acid test.

Testing, Testing

With the unit built up RF power was applied. First of all the full fifteen watts was applied continuously to the unit in SWR mode to check out the power handling capacity of the dummy load. After several minutes the resistors became acceptably warm proving that the load was adequately rated.

In addition to this the attenuation was checked. This proved to be 13dB

against the stated 12dB probably due as much to the measuring equipment as to the unit. In any case, the amount of attenuation is not particularly critical, serving to reduce the transmitted signal under tune up conditions.

With the unit switched to the SWR mode the scale accuracy was checked. Obviously an open circuit gave a full scale reading and fifty ohm load gave a 1:1 ratio. Other loads were also attached and gave readings which were more than acceptable. As an example, a load calculated to give an expected reading of 2:1 gave about 2.2:1.

The power scale was then checked. This proved to be quite accurate when checked against a professional absorption power meter. The response fell off slightly at two metres but this was quite acceptable.

Finally, the monitor level was set up. This position is intended only as a guide to the power output during transmit. Its accuracy and flatness is dependent very much on the lead lengths at high frequencies. Under test the response was found to drop

off at two metres again but more than in the normal power measurement mode. This is acceptable, because this position is only intended as a guide to the output power.

Conclusion

In line with all the other Howes kits I have seen, this unit was well worth the money. Thought had been given to its design so that it was not just another VSWR meter. It combined several useful functions in one unit without increasing the cost beyond that of an ordinary SWR bridge.

Overall, the unit performed well and anyone in need of a meter like this could easily find this kit fits the bill very well. At a cost of £12.50 for the kit or £17.30 for the built up board in is quite reasonable. Postage and packing is £1 extra. The address is C. M. Howes Communications, Eydon, Daventry, Northants NN11 6PT. Tel: 0327 60178.

My thanks to C. M. Howes for the kit for review.

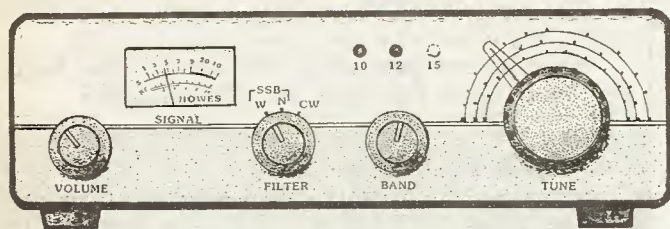
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TEL: 0327 60178**

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— catch the DX on 10, 12 & 15 metres!



Concept receiver featuring DXR10, DCS2 and CSL4 kits

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A brand new **HOWES** receiver, the **DXR10** has been developed to give the home constructor the opportunity to get in on the action. This is a three band receiver covering all of 10, 12 and 15 metres. The prototype I have been using certainly pulls in the stations in a most impressive manner!

Like the very popular **DcRx** single band receivers, the **DXR10** is designed to be easy to build and within the scope of the beginner, whilst offering an amazingly good level of performance for a simple set.

Technical features include a double balanced mixer, bandpass input filtering (which requires no tuning or set up adjustment), active AF filter, and plenty of audio output to drive a loudspeaker or headphones. Suitable for holiday, portable and home station use.

The price is still to be fixed at time of writing this advance information, but it should be **under £30 for the kit**. Ring or write for the exact figure, they should be in stock by the time this advert appears in print.

SOME OTHER HOWES KITS

ASL5 Dual Bandwidth Filter — worthwhile extra filtering and selectivity for virtually any receiver. Simply connects in line with external speaker or headphones.

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Assembled PCB: £22.50

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Assembled PCB: £33.90

DCS2 Relative Signal Strength Indicator — or "S meter" in common parlance! Special **HOWES** custom made meter (see picture). A two chip driver circuit for use with all our receiver kits. Adds a touch of "class"!

Kit: £7.90

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There are over thirty different kits in our range. We have receivers from **£14.80**, and **QRP transmitters from £13.80**. **HOWES KITS** interlink, so that you can start with, say, a simple receiver and if you wish, expand it into a full transceiver at a later date. Most kits are suitable for the inexperienced constructor, as well as the "old hand"!

If you would like more information on any item, or a copy of our catalogue showing our whole range of kits, simply drop us a line enclosing an SAE. Technical advice and sales are normally available by phone during office hours.

All **HOWES KITS** come with full, clear instructions, good quality PCB (drilled, tinned and screen printed with the parts locations), and all board mounted components. Delivery is normally within 7 days. **Please add £1.00 P&P** to your total order value.

73 from Dave G4KQH, Technical Manager.



RADIO TODAY

Ring a Rona Number

The Five Bells Group (G4SIV/G8ZHP) have this to say about their 1989 DXpedition.

"After visits to many rare Scottish squares over the past few years, we thought that we were qualified last year to state that St. Kilda (VR) was 'by far the most difficult Outer Hebridean island to activate'. The only claim that we shall make in advance this year is that our 1989 DXpedition will be harder."

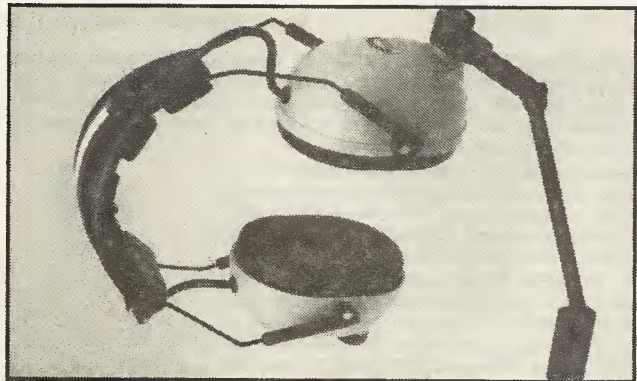
The Group have obtained permission to visit the island of North Rona, 45 miles north-west of Cape Wrath in QRA XT71b (WAB HW83). The island is inhabited by seabirds, seals and sheep, and the occasional DXer. The group are aiming to land on the cliff-bound island on July 11 and work the island from July 12 to July 19 inclusive. Because of the difficulty of getting to North Rona, no prior skeds are being taken. Listen on 14.345MHz. Details are to be confirmed, but operation is planned on 6m, 2m (144.028MHz CW, 144.215MHz SSB) and possibly 70cm (432.215MHz). GB4XT has been applied for. QSL G4NPH or G4ODA via the bureau.

High Class Earmuffs

Clement Clarke International, designers and manufacturers of the Airlite range of aviation and communication headsets, have added the new Airlite Delta to their range.

This headset was designed to provide high audio quality, comfort, reliability, and protection from high ambient noise levels. Primarily for use in helicopters, light aircraft and jet airliners, the headset incorporates a new style of clip-in microphone (electret or moving coil) complete with pre-amplifier, which takes advantage of the smaller size of up-to-date microphone inserts, individual volume controls, coiled downlead and noise-cancelling microphones.

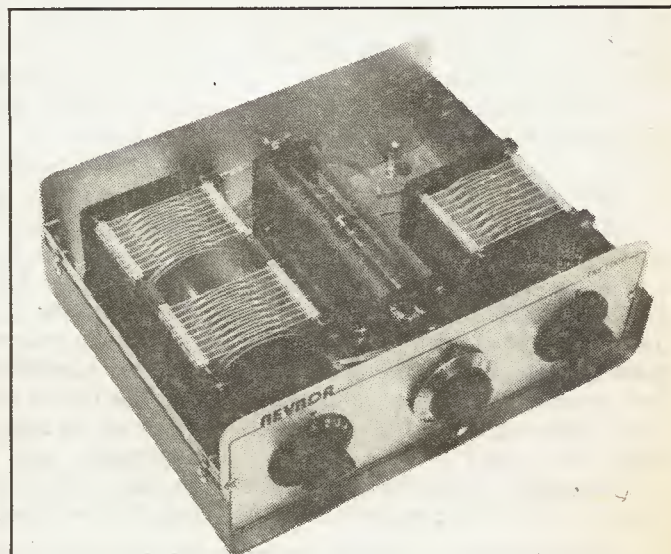
Clement Clarke International Ltd., 15 Wigmore Street, London W1H 9LA.



Low Power Let Looser?

As a footnote to letting us know that theatres and concert halls are to be allocated an extra 22 channels for radio microphones, in an effort to separate the thespians and axe heroes from the local cabco, the DTI state that "It is intended

that use of some low power radio microphones operating in frequencies authorised for this purpose and at present subject to licensing will shortly be exempted from the licensing requirement, together with a number of other low power radio devices." No further details at present.



More Power For Less

Nevada have invested in an upgrade of their Transmatch TM1000 broadband antenna tuner. This UK-made tuner matches a wide range of antenna impedancies on frequencies between 1.8MHz and 50MHz. The /B version incorporates a 4:1 1kW balun to match open wire or balanced feeder systems, and is available separately or can be fitted into the TM1000 case. The TM1000 is available in kit form.

The new TM1000 can now handle up to 2000 watts, and retails at a new lower price of £148.

Nevada Communications, 189 London Road, North End, Portsmouth PO2 9AE. Tel. 0705 662145.

Double Scotch at the Vic

The Scottish Tourist Board Radio Amateur Expedition Group have the following planned for June/July: on June 24/25, special event station GB2RBC at Royal Balmoral Castle, Crathie, Aberdeenshire, Queen Vic's old residence. On July 29/30, GB2NTS (National Trust Scotland) goes on the air from a National Trust property at the same time as NT stations in Ulster, England and Wales. Eire may also join in.

A special free certificate will be awarded. Overseas stations, contact any two stations. UK stations, contact any three stations. Send \$1US or equivalent return postage (overseas) or 19p SAE or stamped addressed label, with log extract or QSL card to PO Box 59, Hamilton, Scotland ML3 6QB, confirming contacts. SWLs welcome.

BT Will Compensate Customers

From April 1, British Telecom is instituting a compensation scheme covering telephone line installation and repair.

Full details will be reaching you with your quarterly bills. Customers will be able to claim compensation or a fixed penalty if they are without telephone service for more than two clear working days because of BT's failure to install a line on the agreed date, or repair a line promptly.

Customers can claim £5 for every working day the line is delayed beyond the second clear day. Compensation of up to £1,000 per line for residential customers, or £5,000 per line for business customers will be available where actual financial loss can be proved — after the second clear day. There is a limit of £20,000 for multi-line customers. Customers have two months to claim.

We enquired of British Telecom if "actual financial loss" included losses incurred by customers waiting at home for engineering appointments which were not kept. "Where the customer could demonstrate actual loss of earnings, I should think British Telecom would look upon this sympathetically," said a BT press spokesman.

We hope this marks another step in the gradual move by companies and the courts towards recognising the rights of customers to have business appointments honoured.

Young Amateur of the Year Award

The DTI's Young Amateur of the Year award is now under way. The DTI release came to HRT just too late to include in last month's Radio Today, so we will be brief: the award is for outstanding achievement by a young — under 18 — amateur radio enthusiast, who does not have to be a licensed amateur. Fields of achievement include DIY radio construction, working to gain operating skills, using radio for community service, encouraging interest in amateur radio, involvement in an amateur radio project, and so forth.

The prize of £250 and a visit to the DTI's Radio Monitoring Station at Baldock (plus a possible lucky dip of other desirables) is for the most outstanding achievement between April 1 1988 and July 31 1989. Entrants must be under 18 on July 31 1989, which is the closing date for applications, and resident in the UK, Channel Islands, or the Isle of Man. The award will be presented at the RSGB's HF Convention in October.

The address for applications, nominations or information is **The Secretary, RSGB, Lambda House, Cranbourne Road, Potters Bar, Herts EN6 3JE. Tel. 0707 59015.**

Time Cannot Wither It

The new Gunson's Speedplate pencil is almost identical to the old one — the only visible difference is that the adjuster is triangular instead of circular, and it is a few mm longer. The glass fibre cleaning

pencil is still invaluable for cleaning stubborn surfaces for soldering, and is said to allow accurate cleaning of stone chips on cars before touching up, along with its many other uses.

Gunson Ltd., Pudding Mill Lane, Stratford, London E15 2PJ. Tel. 01 555 7421.

BT Optical Goes Practical

British Telecom is conducting a trial run on its optical fibre pipeline system, which will carry stereo tv, hifi stereo radio, phone calls, information technology data and interactive services, on 500 business and residential customers in the Bishops Stortford area next year.

The trial will run for two

years and is expected to include a show house for residents and visitors to demonstrate the services which such systems will make available.

The purpose at this stage is to collect trial data to assist in planning future o/f communications networks. In the future, everything, darkly or otherwise, will be seen (and heard) through glass.

Arabian Knights

While the rest of us have been importing the odd box from the 'States and planning our stands at the NEC, Liverpool pro and amateur dealers Microwave Modules have been presenting the traditional 200W linear to its valued clients under Arabian skies.

Sales Director Mike Briggs presented the treasure to Abdul Razak Al Shahwarzi (A41JT for short), chairman of the Royal Omani ARS, on the event of the recent Britain In Omani exhibition.

The local radio society deserves the title "Royal" more than most. Its president is His Excellency Ahmed Bin Suwaidan Al Balushi (A41FK) who is government minister for Post, Telegraph and Telephones.

Another eminent local op. is His Majesty The Sultan of Oman.

Therefore, says MM, it is no surprise that they intend to maintain their amateur radio concerns no matter how well business develops in the professional market.

The Inside Story

The QSL card shown is historic. Ray Westmeckett G4MRW, who sent it to Ham Radio Today, tells us that the card was sent to the late Douglas Briggs G2QK from HM Prison, Sherwood, Nottingham. The note on the back of the card reads "Enjoyed your F/B history making QSO with us thru' Maurice's rig. The very first time a Tx has operated from a prison (legally) anywhere in the world. Best 73s, Dennis G.H., Club President". The QSL card tells its own story: President: Officer D.G. Hickling, and the legend: The Most Dedicated Short-Wave Listeners Club in the World. In the corner is a sketch of the antenna system.

THE MOST DEDICATED SHORT-WAVE LISTENERS CLUB IN THE WORLD

To: *DOUGLAS*
G2QK.....

From: *DENNIS G.H. G3S8W/1*

H.M. PRISON
SHERWOOD
NOTTM.

Sherwood Short-Wave Listeners Club

75 W.A. G-11006
PRESIDENT: OFFICER D. G. HICKLING

Heard on *80* Metres Date *23/5/84* Time *15:00*

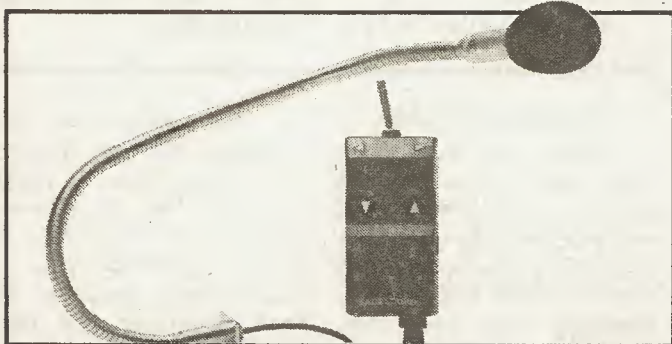
BEST *73* S Receiver: *54430 822*
Dennis Antenna: *132' A.W.*

RECEPTION: GOOD JAW 11/84
5/9

Radar Remembered

The Scarborough Special Events Group will be on the air from the Scarborough Air Show on Saturday July 1 to commemorate the 50th Anniversary of RAF Staxton Wold Radar Base, near the town.

RAF Staxton Wold was one of the first sites fitted with radar at the beginning of WW2 in 1939, and has remained operational. The Red Arrows will be performing, and a special QSL card will be issued. Operation will be around 3725 and 7055kHz HF and on 2 metres. More information from Roy Clayton G4SSH, QTHR.



Mic, Not Mortgage

We got a fright when a description of the latest Saldeta mobile microphone, the MM90, arrived at Argus Towers.

According to Nevada, the new hands-free mic cost a measly £498.95.

Then — by the very next post — came another epistle hurriedly informing us that there had been a typing error, and the MM90 costs just £49.95.

What a relief. We know the price of equipment is rocketing, but for £498.95, you expect a couple of feet of curly cable and a mono-

gram at the very least . . .

As it is, you get a uni-directional electret mic insert with a flexible stand and a control box which allows up/down control of the appropriate radios. The MM90 can be powered directly from the transceiver or the car battery. The spec. includes output impedance of 1.5kohms, output adjustable 0 to 2V pp, and frequency response from 150Hz to 8.5kHz.

No mortgage needed.

Nevada Communications, 198 London Road, North End, Portsmouth, Hants PO2 9AE. Tel. 0705 660036.

Beats Ads Second Hands Down?

Enthusiast and part-time dealer Steve Vaugham G4WXC spotted our letter page tail-ender in the May issue on the subject of small ads, and reckons he is offering an alternative service to amateurs wishing to trade their used gear.

"I trade from Abingdon near Oxford, having moved down from Lincolnshire last year", writes Steve. "I believe I am the only dealer in the Wilts/Oxon/Berks area

trading exclusively in used amateur equipment. I have no shop front, and callers must be by appointment. My stock list changes almost daily". Steve's list at the time of posting included gear by Yaesu, Icom, Trio, Lowe, Capco, Maplin and others. "Part exchange available — Access welcome — 7 days 9am to 10pm — overnight delivery available" it says here.

Steve trades as **Pro-comm UK** and can be reached on **0235 32653**.

Paper Round

The **Kent Repeater Group Newsletter**, Winter 1988/1989 carries the report of the Group's AGM, with detailed comments on the operation of the repeaters under its aegis. Editor Steven Reynolds G8NVH, 211 Ballens Rd., Lordswood, Chatham, Kent ME5 8PH. A5 12pp well duplicated.

The **Irish Radio Transmitters Society Newsletter** April 1989 carries forward information for its AGM, as well as the usual wide range of general topics. Always have a tough time finding the editorial address, and this time I've given up. Editor is Dave E14BZ. A4, 20pp, glossy and good.

Talkthrough, the newsletters of the UK FM Group. General features, including Raynet and Disasters, silly letter, operating reports, general good reading. A5, 32pp, well duplicated. Membership £4. PO Box 73, Crewe, Cheshire CW1 1GB. Excuse me while I read Aunt Rita.

Wirral ARS Newsletter April/May 1989. Mostly devoted to the successful up-getting of their £672 (so

far) tower. Some discussion on membership topics, including valuable comment "Maybe a smaller, more solid membership would be beneficial", and other articles of interest. A4, 10 pages, wordproc, stapled. Editor Brian Jordan, 42 Ben Nevis Rd. Tranmere L42 6QY.



British Amateur TV Club **CQ-TV**, February 1989. Many, many articles, including the convention preview and several projects. A5, 145 pages, card cover. Editor Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr. Rugby CV23 8UF. Tel. 0788 890365. They prefer phone calls. CQ-TV Index and advertising supplements also available.

Datacom, journal of the British Amateur Radio Teledata Group, Spring 1989. Articles on all radio teledata topics, membership survey, committee reports. A5, 100 pages, card cover. Editor Peter Adams G6LZB, 464 Whippendell Rd., Watford, Herts WD1 7PT.

Brighton DARC Newsletter January 1989. Club programme, morse, packet. A5, 8pp, well duplicated. Editor Mike Dixon G8IQX, 57 Northease Drive, Hove BN3 8PP.

CQ-TV MAGAZINE
No.145

BRITISH AMATEUR TELEVISION CLUB
FEBRUARY 1989



UNITED KINGDOM NEW ZEALAND
ATV THE
WORLD
OVER
AUSTRALIA UNITED STATES

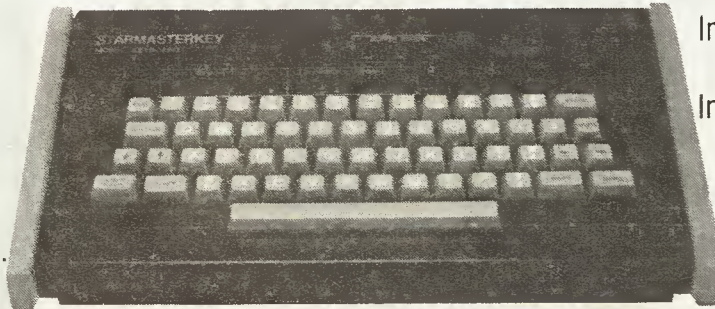
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From the makers of the world renowned STAR MASTERKEY a new MORSE KEYBOARD.

Send perfect morse as easily as typing a letter. It has never been as easy to send morse.

Variable transmission. Speed 1-99 wpm or 100-200-300-400 wpm for Meteor Scat operation.



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4 Message Memories each of 255 characters.
26 scratch pad memories each of 127 characters.
All memories stored on non volatile Ram. Messages stored for up to 5 years.

Indication of speed on 7 segment display.

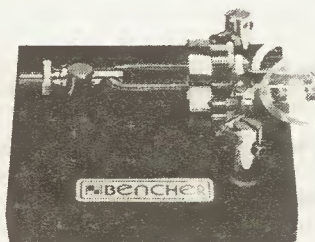
Indication of operating mode on leds.
Sidetone and relay output for all types of transmitter.

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8 MEMORIES, BEACON MODE, DIRECT & GRID BLOCK KEYING. FULL DETAILS IN PREVIOUS ADS. STILL ONLY **£95.00**



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We are also stockists of DAIWA—POCOM—JRC—TAR—TASCO TELEREADERS—MICROWAVE MODULES—B.N.O.S.

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Telephone: Stourbridge (0384) 390063/371228



Instant finance available subject to status. Written details on request.



ICOM

THE NEW IC-2SE, SIMPLE OR MULTI-FUNCTION 144 MHz FM TRANSCEIVER

Icom's tradition of building high quality, reliable handhelds continues with the IC-2SE an incredibly compact handheld designed with features that exceed larger, bulky handhelds. The IC-2SE proves that superior quality comes in all sizes.

Slim and unbelievably compact.

The IC-2SE measures only 49(W) x 103.5(H) x 33(D)* mm with the BP-82 Battery Pack. Hold the IC-2SE in your hand to truly appreciate its miniature size. Weighing just 270g† with the BP-82, the IC-2SE will easily fit anywhere – on belts in shirt pockets, handbags, etc. *1.9(W) x 4(H) x 1.3(D) in. † 9.5 oz.

Simple design for operating convenience.

Even with its tremendous versatility and a wide variety of functions, the IC-2SE is easy to use. All functions are performed by a total of just six switches and three controls. The IC2SE includes both simple and multi-function modes. The result is two transceivers in one: both an easy-operation and multi-function transceiver. Simple mode ensures totally error-free operations. Multi-function mode allows you a variety of function settings depending on your operating requirements.

Other advanced features:

Reduced size doesn't have to mean reduced quality. The IC-2SE proves this with a wide variety of advanced functions.

- Tuning control on the top panel for quick QSYing.
- Monitor function that allows checking of the input frequency of a repeater.
- Function display that clearly shows all information required for operations.
- Splash resistant design and durable aluminum die-cast rear panel for dependable outdoor operations.

Options

• **BA-11, Bottom Cap.** Protective cap for terminals on the base of the IC-2SE.

• Battery packs and case.

BP-81	7.2V, 110mAh
BP-82	7.2V, 300mAh
BP-83	7.2V, 600mAh
BP-84	7.2V, 1000mAh
BP-85	12V, 340mAh
BP-86	Case for six R6 (AA) size batteries

• BC-72E, AC Battery Charger.

Desk top charger for the BP-81 - BP-85.

• CP-12, Cigarette lighter cable with noise filter.

Allows you to use the IC-2SE through a 12V cigarette lighter socket. Also charges the BP-81 - BP-85.

• FA-140BB, 144MHz flexible antenna.

Flexible antenna for 144MHz band operation. Same type supplied with the IC-2SE.

• HM-46, Speaker/Microphone.

Combination speaker and microphone equipped with an earphone jack. Clips to your shirt or lapel.

• HS-51, Headset.

Headset with VOX function that allows you hands-free operation.

• Carrying Cases.

Carrying Case	Battery Packs, Battery Case
---------------	-----------------------------

LC-53	BP-81
LC-55	BP-81, BP-83 or BP-86
LC-56	BP-84 or BP-85

• MB-30, Mounting Bracket.

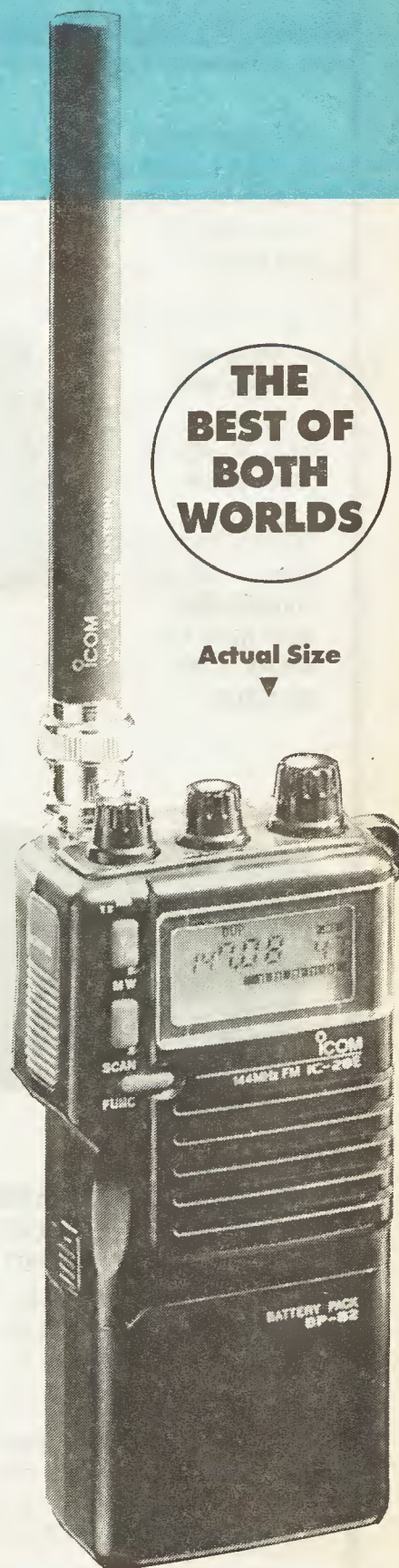
Mounts the IC-2SE in a vehicle or on a wall.

• OPC-235, Mini DC Power Cable.

For use with a 13.8V DC power supply

THE
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BOTH
WORLDS

Actual Size



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THE COMPACT HANDHELD WITH A ~~SPLIT~~ PERSONALITY

5 Watt Output Power.

Utilizing a specially designed ultra-small highly efficient power module, the IC-2SE delivers a full 5 W* of output power. Bring those distant repeaters into range.

* At 13.8V/DC

48 Memory Channels.

The IC-2SE has 48 fully-programmable memory channels and one call channel. Each memory and call channel stores an operating frequency and other information required for repeater operations.

Convenient Repeater Functions.

The IC-2SE is equipped with programmable offset frequencies for accessing repeaters. All memory channels and a call channel store repeater information for your convenience. The IC-2SE includes a newly designed 1750 Hz tone call transmit function. A 1750 Hz tone call transmits when the PTT switch is pushed twice quickly.

Power Saver for longer operating time.

The power saver ensures lower current flow during standby conditions. Operating times are much longer than with older, more conventional transceivers.

Built-in Clock with timer functions.

The IC-2SE is equipped with an advanced 24-hour system clock with timer function. The transceiver automatically turns on when real time matches a pre-programmed time. This is perfect for scheduling QSO's. Auto power-off timers and other settings can be made in clock mode.

Convenient Scan Functions.

The IC-2SE is equipped with VFO and memory scan.

- **VFO Scan.** VFO Scan repeatedly scans all VFO frequencies. In addition, unnecessary frequencies can be skipped.

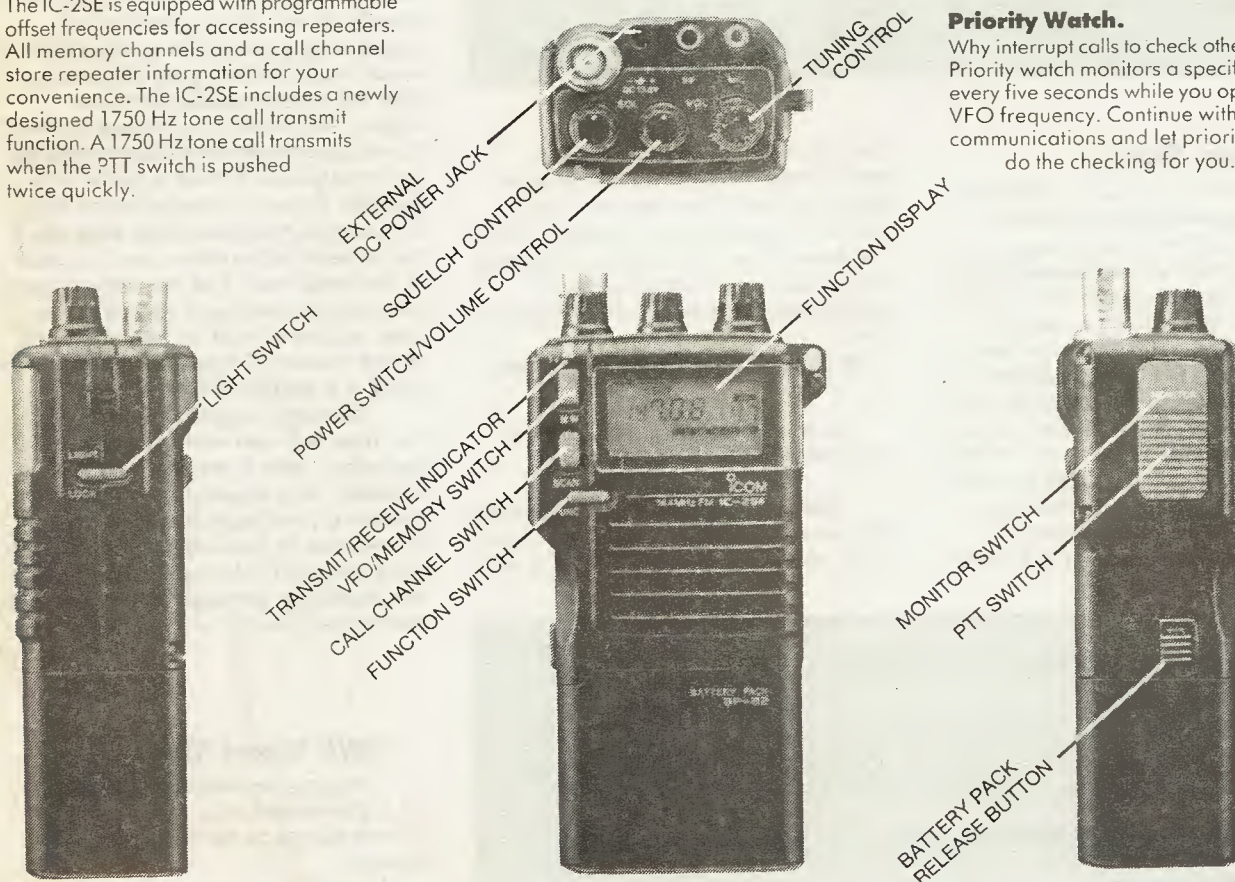
- **Memory Scan.** Memory scan repeatedly scans memory channels.

Auto Power Off Timer Function.

If you ever forget to turn the IC-2SE off, don't worry. It will turn itself off. Power-off time can be selected or deactivated using multi-function mode. Preserve battery pack power for the times when you need it most.

Priority Watch.

Why interrupt calls to check other stations? Priority watch monitors a specified station every five seconds while you operate on a VFO frequency. Continue with your communications and let priority watch do the checking for you.



Helpline: Telephone us free-of-charge on 0800 521145, Mon-Fri 0900-13.00 and 14.00-17.30. This service is strictly for obtaining information about or ordering Icom equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders, thank you.

Datapost: Despatch on same day whenever possible.

Visa & Mastercards: Telephone orders taken by our mail order dept. instant credit & interest-free H.P.



LETTERS

Letter of the Month

I recently made the magnetic loop aerial as described in Tom Hall's article in HRT April 1988. I have found it effective on 40M and intended to make another one for 10M (for indoor use).

Chris Lorek wrote about the loop aerial in HRT April 1989, but no one has addressed the question of radiation danger when these antennas are used indoors, though this topic has come up several times on the air. I do suggest that it would be useful if you got someone to look into this subject and publish the findings before someone gets a bad dose.

Carry on with the good work you are doing at HRT.

— A B Sammons G0HBC

I am not sure that hard information on rf radiation hazard exists. The classic mechanism of damage is heating of body tissues. Some time ago

information was published suggesting that the eyes were particularly vulnerable to microwave radiation, because of the limited blood circulation and consequent poor cooling, and that cataracts could be caused by long term exposure. Incidentally, looking into a fire can cause the same problem.

There is also evidence short of actual proof that lower levels of power than those needed to cause damage by heating can still cause harm. In terms of current understanding this is very surprising, because rf radiation is too low-energy to ionise atoms and fuel chemical reactions (hence the terms ionising and non-ionising radiation). Nevertheless, evidence does exist, and pending the subject being thoroughly understood and pinned down I personally would prefer not to share a room with an antenna radiating more than about ten watts on normal amateur transmitting duty cycles — G3YZW

own location. This transmitter has been tested and is operating within the specification for equipment of this type radio-paging and is not generating any spurious emissions. If you add this frequency to that of the BBC World Service transmissions from Daventry, it becomes clear why you are receiving these bursts of data transmission ($138.175 + 7.325 = 145.5$).

It would seem that the high field strengths that you are receiving from both Daventry and the paging transmitter are mixing within the first RF stages of your receiver and appearing as a signal that does not actually exist . . . I regret that there is very little further assistance that can be given.

Despite the severity of your problem, it should be possible to prevent the signal from getting into your receiver. I would assume from your comments that the interfering signal is very strong, so it will be necessary to filter it out to some extent before it reaches any active device, even a gasfet in a preamp. Either a rejection notch filter or a narrow bandpass filter with good out of band attenuation must be used in the aerial lead. The interfering signal may also be getting in via the mains lead, so that should be filtered, and a toroid should be fitted over the braid to prevent it getting in by that route.

Two other points should be made: any filter will also attenuate the signal you want, even if only by a fraction of a decibel. It is unavoidable. Also, beware of bandpass filters whose attenuation is good close in, but which have no better attenuation farther from the passband, perhaps because of poor mechanical design. — G3YZW

Problem Signal

I am writing to you as a plea for help. Myself and other radio hams in the area are suffering from severe interference that started approximately in mid-1988 and has been with us ever since. It can be received on aircraft bands, two metres and even between 88 to 108 MHz. The attached letter I find very difficult to accept as so many people are suffering and Daventry is at least 35 miles away. We have checked our equipment and even tried a variety of radios: Trio, FDK, Sony, Yaesu etc. They all suffer the same problem. Narrow band preamps and pass band

filters don't improve matters. The interference however does disappear when the BBC World Service drops carrier. I have contacted the BBC direct and found them very helpful; they even carried out tests themselves and agreed that there is a problem signal in Corby.

— M. York, Corby, Northamptonshire.

Here is a brief precis of the letter form the DTI RIS at Wigston:

There is a transmitter on (138.175) MHz located on the Willowbrook water tower in Corby, extremely close to your

£10 FOR THE LETTER OF THE MONTH

You've got a gripe about the bandplans, or your'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.

Whatever you've got to say about amateur radio say it here in the letters column and you could win yourself £10 for writing the letter of the month.

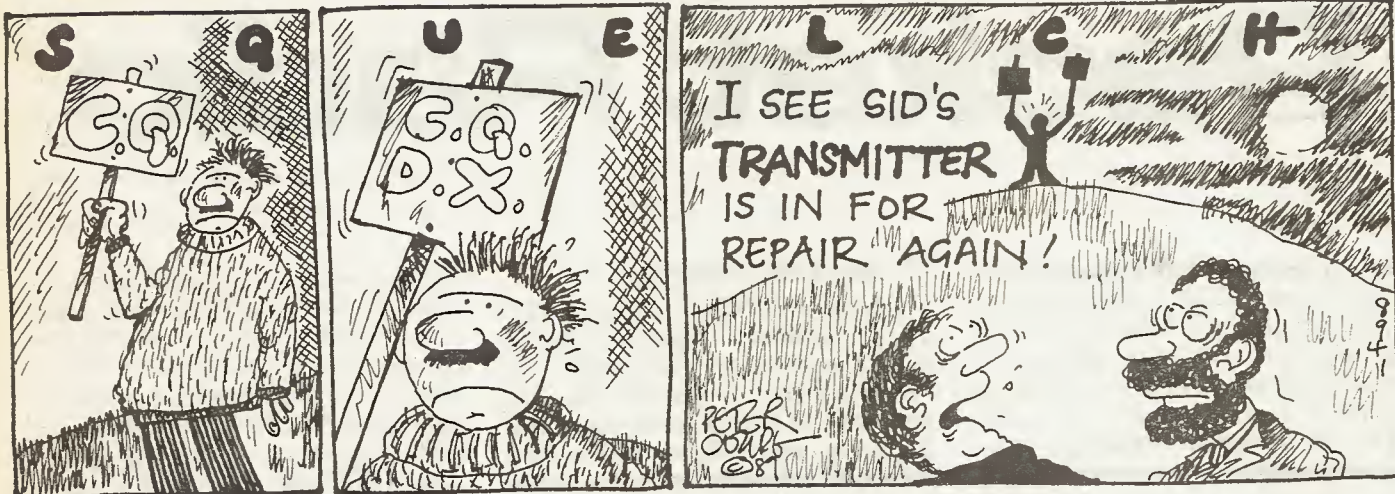
Sent your epistles to: Letters Column, Ham Radio Today, ASP Ltd, Argus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST.

SWR Meter Mods

I am new to radio electronics, but not digital electronics. I am taking an evening course to become a radio amateur.

I have a few mods to suggest for Mike Bedford's SWR Meter Techniques from HRT December 1988.

1. Use op-amps to give $V_f - V_r = V_a$, and $V_f + V_r = V_b$.



2. Feed Va and Vb into the ADCs and the eprom.

3. Take the output from the eprom to a DAC.

All linear so far.

4. Feed the output from the DAV via your ovt in Fig. 4 to a meter. Meters are so much better for viewing trends.

5. If the meter is jerky feed from the DCA can be slugged via a small R/C network, or slug the input to the ADCs.

6. If the meter has more than one scale, a slick of s switch and some extra circuitry could give pep, etc.

I hope this is of interest, and that I have not missed the point of the article — Mike Hurn, Bracknell, Berks.

I agree with your point regarding the viewing of trends on meters, and in a lot of respects I am myself a digital-meter-phobe. However, an SWR meter is normally used to take spot readings rather than view trends. Certainly people often want to get some idea of the bandwidth of a new aerial by looking at SWR against frequency, but in the interests of other band users this is not normally done by transmitting a steady carrier and spinning the tuning knob.

This being so, I decided that a digital display would be quite suitable. It also gives a novel design without adding components, since the eprom can do the 7-segment led encoding in addition to the $(Vf+Vr)(Vf-Vr)$ calculation.

I'm not totally convinced that generating $(Vf+Vr)$ and $(Vf-Vr)$ prior to converting to digital is worth the extra components which would be needed. I don't believe the linearity issue is important, since programming the eprom could (in fact, does in the

program published) sort this out. Perhaps I'm missing something here — I do admit that I've not actually done any calculations to prove it one way or the other.

The circuit printed had been knocking about in my head for two or three years. If anybody's experimentation turns out a working model, perhaps HRT would be interested in publishing it as a full constructional project. — Mike Bedford.

Talk to us — HPA.

Morse Misery

I beg to offer some answer to your questions on morse appended to Letter of the Month since, although it is not now the case that I have spent a lot of time on morse with *absolutely* no result. I am much comforted by Mr Bolton's statistic which adds a figure to a considerable amount of anecdotal evidence.

My own first encounter with code was in the Air Training Corps around 1943/44, in my "straight" set building days; as I recall, I attained 4wpm quite easily but 8wpm was out of reach; whether records followed me or aptitude tests were decisive I do not know, but certainly the RAF declined to consider me for wireless operator training in 1946/47 and imposed a radar fitter's course instead. In the fifties I did a fair amount of radio construction but ultimately, G3 being out of reach in spite of exemption from the RAE, abandoned that interest and revived one in motor sport instead.

The next relevant factor was 11m, followed by the 'B' licence in 1982 (over 80% in both RAE parts) and a further stab at code with outcome as before, leading to an argument with the RSGB and a decline in enthusiasm.

Subsequently I had a QSO with a G8 of some seniority who turned out to be very similarly placed: we agreed that if we restricted our aim strictly to peaking at 12wpm in the test format we might scrape a pass; well, it took a slog of a year and a half to do just that.

Now, my friend and I still have the first 40 minutes of our weekly chat session in code, but that's it: almost all cw on the bands defeats me, between speed, noise, eccentric abbreviations, numerals mixed up with letters and just bad sending. I do not really expect to become an enthusiast! I conclude that cw might well have kept me off (legal) hf for life and has succeeded for what has to be the larger part of it; also I might today be an experimenter and constructor instead of a black box operator, for I would in all probability have kept up with the changes from valves, chassis and wiring looms had G3 been available, and thus be a better amateur in the sight of many who also clamour for continuing imposition of morse. It may be said that I have spent a lot of time on morse practice with absolutely no *useful* result. I am not surprised at Mr Bolton's 20-30% figure: I suspect that in a totally unselected sample it would be higher and I heartily agree with Mr Bolton that we need an alternative way on to the hf bands, as indeed I have argued from time to time. I do wish the morse enthusiasts could grasp that that this does no imply any hostility towards them — only awe.

— Sandy GM01RZ, Dundee.

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.

Packet Radio

Roundup

At the Sandown Rally this year, the Pac-Comm TNC320 was unveiled on the Siskin stand. This model should be generally available before this column appears in print. For your £179, you get a packet TNC with a built in personal message store

Beginner's Guides

Also at Sandown, I picked up a couple of Packet Radio publications, one of which certainly caught my interest after a short browse. This was entitled *Your Gateway to a Basic Understanding of Packet Radio*, pub-

packet radio. The publication is available for £3.50 plus 50p p&p, with proceeds going towards the upkeep and establishment of the SDN2, 7, 1 and 4 Network Nodes in the South West, from Vince Bobin, 13 Homelands Place, Kingsbridge, South Devon TQ7 1QU. Tel: 0548 2543.

Chris Lorek G4HCL goes south in search of packet radio, reading as he goes.

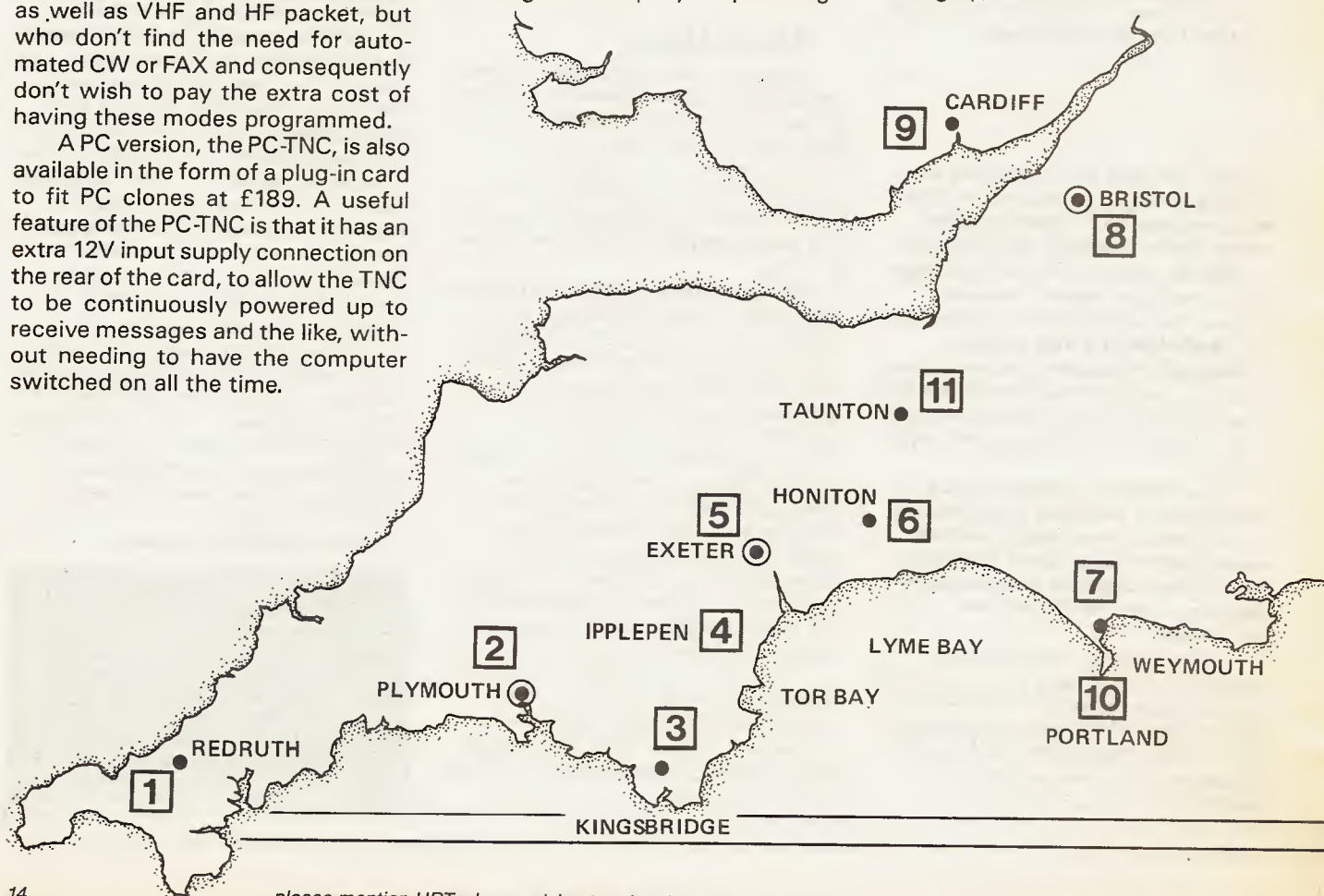
(PMS), together with a terminal unit handling the two popular digital modes of Amtor and RTTY. Compared to packet, many amateurs realise that for one-to-one communication on a reasonably clear channel on HF, Amtor has quite a lot going for it. Packet can tolerate many stations using the same frequency, although the throughput can drop to a very slow rate. With its extra modes, this TNC could be used by amateurs interested in reliable HF communication as well as VHF and HF packet, but who don't find the need for automated CW or FAX and consequently don't wish to pay the extra cost of having these modes programmed.

A PC version, the PC-TNC, is also available in the form of a plug-in card to fit PC clones at £189. A useful feature of the PC-TNC is that it has an extra 12V input supply connection on the rear of the card, to allow the TNC to be continuously powered up to receive messages and the like, without needing to have the computer switched on all the time.

lished as a non-profit enterprise. It is a bound 34-page A4 book, which describes in a very readable way the mysteries of packet, how to get going on the air for the first time, and how to use a BBS and network node, with appendices giving details on how to connect up your computer and TNC, useful addresses, and complete command sets for BBS and TheNet systems. In my opinion it certainly is a very readable publication that leads the beginner step by step through

BARTG Booklet

Recently received at the HRT editorial offices was a copy of the BARTG publication *Beginners Guide to Packet Radio*. This is a 21-page A5 booklet aimed at giving newcomers an understanding of how packet works and what it's all about. It describes the history of packet, then details networks, hardware and protocols with section headings on multiplexing, OSI/RM, frame formats and TNC components. Further chapters detail the selection of equipment, wiring up, and TNC commands.





Unfortunately, in my opinion, this could be a little off-putting for the raw beginner with little digital knowledge, but certainly useful for those who wish to achieve a greater understanding of how things work (appropriate enough for members of BARTG), such as the RS232 connection between the terminal and the TNC. It gives few details on operating, however, having just over a couple of pages devoted to it at the end of the publication. For the technically interested amateur, fine, but unfortunately I would not recommend this as a comprehensive 'Beginners Guide'. Available from the BARTG (British Amateur Radio Teledata Group) who also publish the quarterly journal *Datacom* covering RTTY, Amtor, FAX and Packet Radio interests. Details from Pat Beedie GW6MOJ, 'Ffynnonlas', Salem. Llandelio, Wales SA19 7NP. Tel. 0558 822286.

Network Notes

Again I must thank you for the many messages received via the national packet BBS network. It goes to show how efficient and reliable a communication network system, set up and operated solely by amateurs, can be. One must remember that the numerous nodes and bulletin boards around the country are set up and financed only by their own user groups, in the pure amateur spirit of friendship and goodwill.

One of the messages received here must have been conceived by premonition by Vince G1FBH who is the Chairman of the South Hams Packet Group. On the same day as I

picked up the *Your Gateway* guide written by his group, I received full details of his group's activities, in a message broken up into four parts to ease its way through the system. In fact I returned from Sandown to see the messages kindly auto-forwarded onto my TNC's PBBS by one of my National BBS operator friends, Malcolm G4AEU who operates GB7AEU. How's that for a good service? I have of course already covered the activities of other groups in past columns, so this month we'll focus on the packet scene in the area covered by the South Hams Packet Group (who run the SDN2 node) and the surrounding region of the South West corner of the UK.

South Hams Group

SDN2 is a remote packet network node located in the South Hams area of South Devon, serving the surrounding towns and hamlets in this hilly area. SDN2 has now been running for around five months, with just one short failure in its early days. The RF output power is 25W running into a vertical aerial, the TNC is a BSX Mk2 running The Net, and owing to the remote nature of the site the network node has an 18-hour mains failure backup power supply. The network node supplies a good link between GB3EP and to the local BBS in Plymouth (GB7PLY run by G0BSX). The Group have also applied for GB7KB to run network nodes on 4m, 70cm and 23cm, but are still awaiting formal licences. Membership details from Vince G1FBH @ GB7PLY.

As summer is approaching, amateurs who will be touring in this lovely area may like to keep up with events on their mobile rig, TNC, and laptop computer or P'sion organiser. Using the BBS network certainly makes a change from sending postcards to the amateurs back home, and a lot cheaper too! On a more useful note, you can keep up to date with propagation predictions and so on for your 50MHz portable exploits and the like. The accompanying map shows the location and calls of the various network nodes and BBS stations in this area at the time of writing.

South West BBSs and Nodes

1	G8NXD-2	Node (CORN2)
2	GB3PLY-2	Node (PLY2)
	G0BSX	TCP/IP Node
	GB7PLY-2	BBS
3	G1FBH-2	Node (SND2)
4	G6GLP-2	Node (IPP2)
5	GB3EP	Node (EXE2)
6	GB3DB	Node (AXE2)
7	GB3DP	Node (WEY2)
8	GB7IMB-2	BBS
9	GB7HZ-2	Node (CDF2)
10	GB7ONC-2	BBS
11	GB7KVD-2	BBS

GB7PLY is the one BBS in the area covering both all of Cornwall and South Devon, with around 160 users. GB7PLY is now currently running WORL software on its main call and also MBL on GB7PLY-3. GB7PLY also has a 70cms port. Five users are able to use the BBS's port on any band at the same time, ie ten in all. From time to time when the routing breaks down to the north of GB7IMB an HF link is brought into use to keep the network going.

End of Message

If you'd like a mention given to your group's activities, then please do let me know, or even if you just want to air your latest news in the world of packet, simply drop a message into the network! I can be reached via packet with messages routed to G4HCL @ GB7XJZ, or via Prestel Mailbox 011138096. If you prefer ink and paper, letters addressed to Chris Lorek, c/o Ham Radio Today, Argus Specialist Publications, Argus House, Boundary Way, Hemel Hempstead HP2 7ST will also get to me, but please note that any recent callbook address is *not* correct. Till next month, 73 de G4HCL.

The Smallest Transceiver

Someone a long time ago told me that a hobby was for fun and intended to relax you after the long day at the office. To the amateur, one way of relaxing after that proverbial day is to get on the air and work a bit of DX. The trend lately seems to be the Black Box and as much power as

the bands, propagation and skill at putting these to use makes it all worthwhile.

The little group of circuits here is designed to be used for FUN. You may very well 'cross the pond' with one, but they are primarily intended to provide amusement. They can be built as

that they are each individually built on printed circuit boards approximately one inch square. No, you are not misreading. Each is on a pcb of approximately one square inch (25mm x 25mm). None of the circuits is original, but all have been derived from standards and reduced to fit.

The transmitter can be used with the station transceiver as the receiver. The VFO, as the second VFO for another homebrew rig. The antenna changeover and sidetone can also be used with many other commercial and homebrew units. The receiver can be used to monitor those frequencies that you like while you operate on another band.

Let's look at each in turn and see how

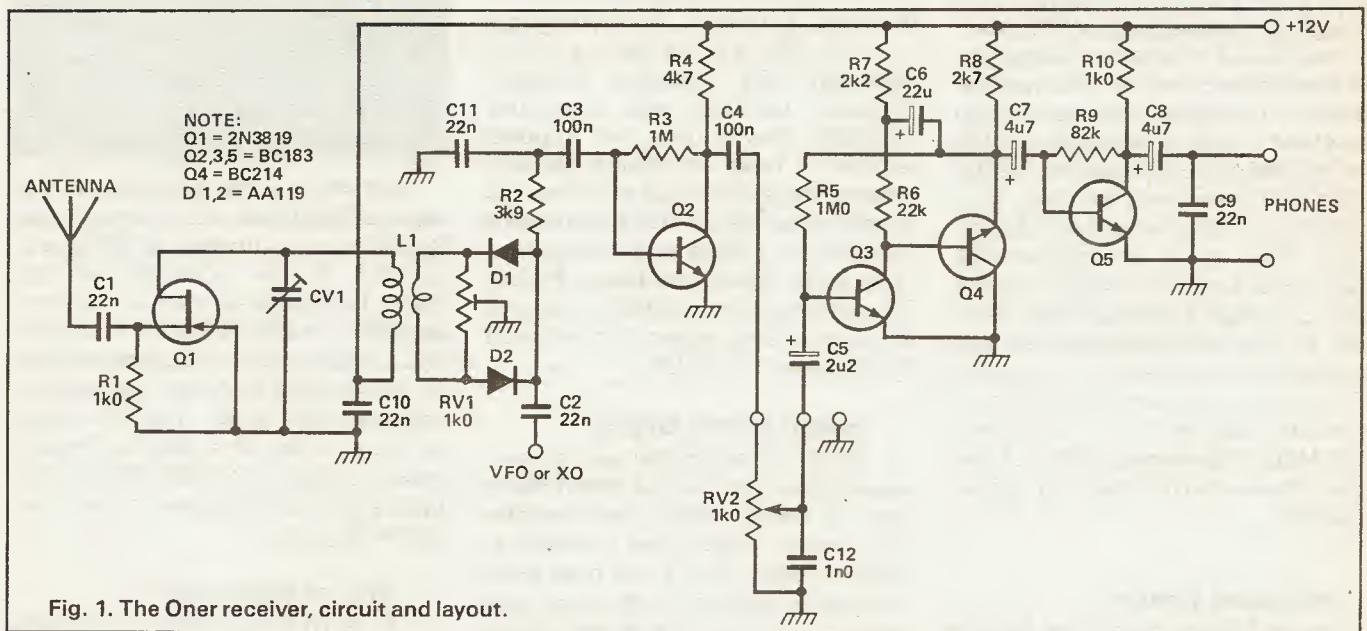
The Kanga Gang cut everything down to size with a transceiver built on one-inch plots!

possible, but there is more to the hobby than switching on the rig and the big amplifier and pressing the PTT. With enough power you can guarantee (almost) to work anyone anywhere.

individual items and used as such, or as a whole.

Oner??

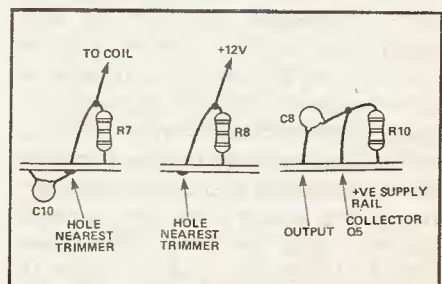
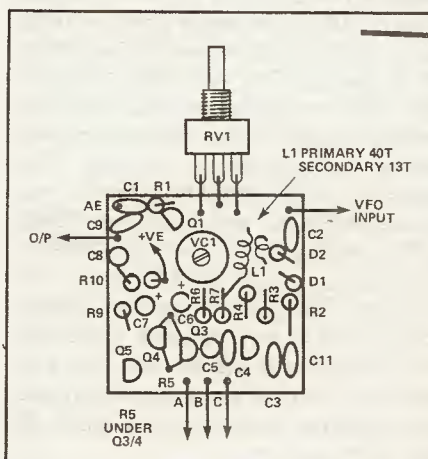
The name 'Oner' comes from the fact



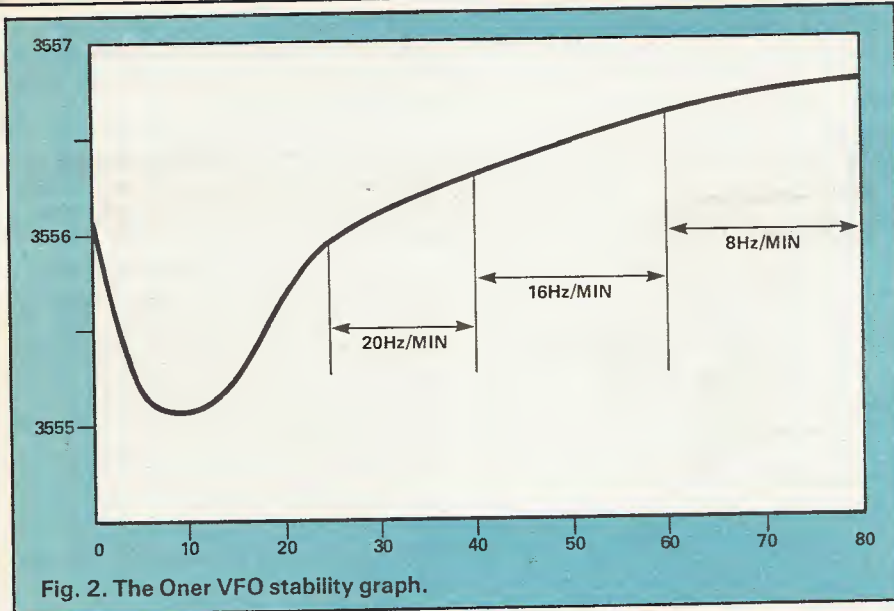
The real challenge is beating these folk at their own game. The more they ignore the regulations and go up in power, the more the QRP pioneers go down.

For those amongst you who have not come across the term QRP, it has come to mean in amateur circles 'low power communications' (QRO = high power). QRPers are a law unto themselves and strive to make and maintain contacts with the lowest power possible. Some successfully cross the pond using milliwatts on a regular basis.

Why do it the difficult way, you may ask? The challenge is in making the contact when all the odds are against you. Every ounce of expertise, knowledge of



they can be used as individual units and how they work as a whole to produce what must be the worlds smallest VFO controlled transceiver (unless you know better). Let's start with the most important part of the system.



sketch and the junction enters the hole connected to the collector of Q5.

The VFO

The second item in the chain is the VFO. It's stability does not compare with that of a full size unit but it will be adequate for 40, 80 or 160 metres, as can be seen from the graph (Fig. 2). Although it was designed to run into the Oner transmitter it is a very useful little VFO in its own right.

The original VFO for the Oner was built when George ('RVJ') was on a visit to the Dover Club and we had built a Oner for fun. Our unit was somewhat lacking in drive, so we laid out the board as shown and now have 5mW across 50 ohms, which could even drive a diode ring for the receiver.

The circuit comprises a 2N3819 FET oscillator loosely coupled to a wide band amplifier. There was insufficient room to include the output capacitor on the board and so one end is soldered to the connection of R7 to the emitter of Q3, and this is used to connect to the base of the Oner's oscillator transistor . . . if nothing else, it saves a piece of wire.

The tuning capacitor is a trimmer, and this has a 3/32 brass adjusting screw. To make this adjustable you have two courses open to you: either use a disc of plastic glued to the adjusting screw and edge tune it, or take a length of 1/4in

The receiver is the most useful of the group and was the third unit in the series to be produced. We in the Kanga Gang had all used the Oner transmitter for some time, and after a while a challenge was made to one of the group's members, Ian G3ROO, to design a receiver to match it on a one inch square pcb. "Impossible!" was the immediate answer. But typically, the thought bugged him and after a few days he shouted "will one and an eighth be OK?" Needless to say, we didn't believe this. Dave G4HYY was on a flying visit to the area and borrowed the rig for a while, muttering about miniaturisation, but after a few hours on the air he had quite a few QSOs under his belt and was delighted with the rig. So for all you out there who are fed up with your Yaekenic YR2000 black/grey box, here it is.

The Oner Receiver

To save valuable board space, and get down to the required size, we have had to omit pads where possible and even use resistor leads as terminations. The effect is very pleasing, however, and should not cause problems. There is one underboard component, C10 (22nf), and this should be soldered between the long wire of R7 (to which the top end of the coil is connected) and the ground plane below the trimmer. There was no room on the board, as the toroid gets in the way.

The aerial tuned circuit coils depend on the band in use. For 80 metres we have used 40 turns on a T50/2 (this is a little tight on the board) and a 270pf capacitor in parallel with the trimmer. For 20 metres we used a T37/2 with 26 turns resonated with the trimmer fully meshed. We would suggest that suitable turns be added to the T37-2 and capacity added for resonance.

The local oscillator is taken from the Oner VFO and must tune the desired

receive frequency. If the set is to be used on 20 metres we would strongly suggest that the on-board trimmer of the VFO be replaced with a good quality panel mounted unit and the coil wound on a good former and solidly fixed.

Setting up is simple. Connect the aerial, phones and VFO/XD and peak the trimmer for maximum signal, then adjust VR1 for the null in any broadcast breakthrough. This problem was only found on our set on 40 metres at night, and could be completely eliminated.

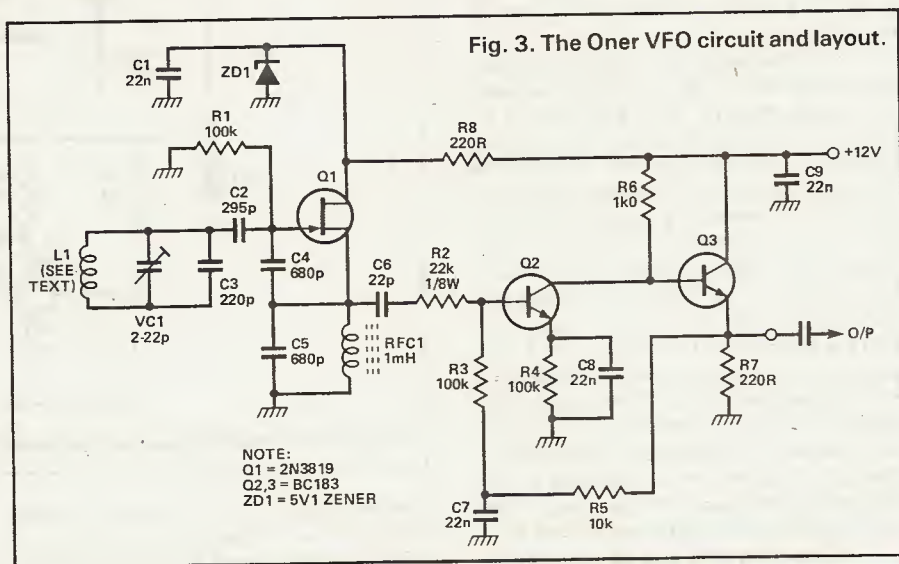
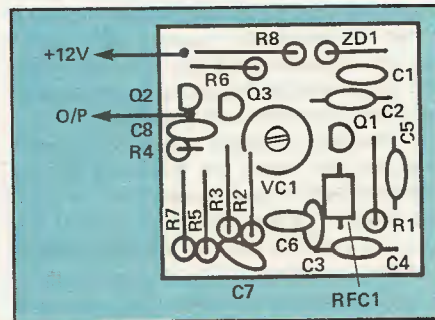


Fig. 3. The Oner VFO circuit and layout.

Receiver Construction

Referring to Fig. 1, R5 (1M) should be placed on the board first as this lies under Q3 and Q4. R7 is used for terminating the cold end of the trimmer and a 22nf (C10) capacitor placed on the underside between the long lead and the groundplane under trimmer capacitor. R8 is used for the +ve supply input and the long wire should also be inserted in the hole nearest to trimmer. C8 and R10 are joined in the



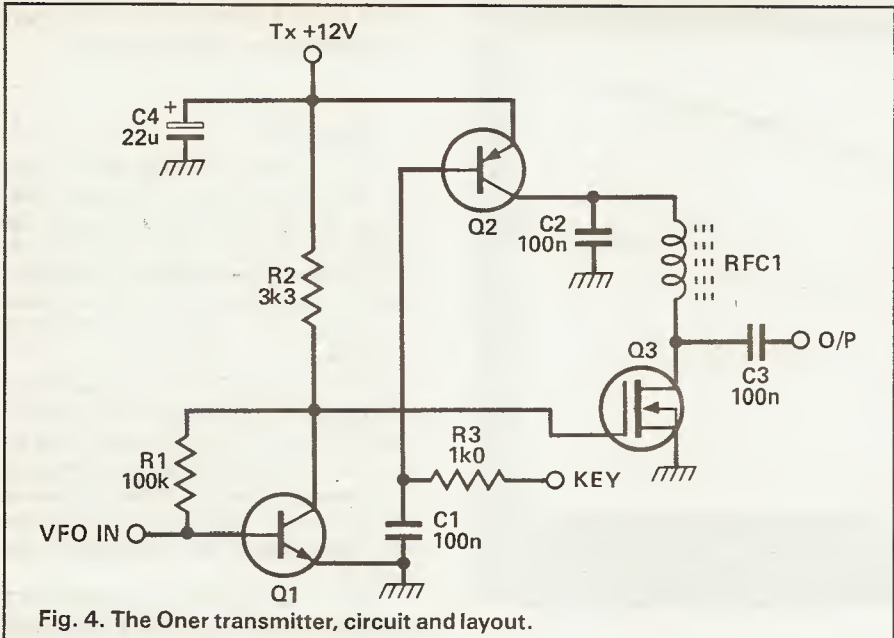
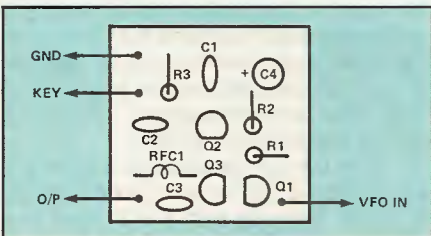


Fig. 4. The Oner transmitter, circuit and layout.



knitting needle and drill a hole in its end and glue this on as an extension spindle to take the knob, reduction drive or what ever you want.

The most important thing is to supply support for the shaft, and we have done this using another 1in square piece of board with a ¼in hole drilled in the correct position. This acts as the front panel soldered upright on a one inch by three inch strip of board as a base plate. (There is, of course, nothing to stop you using a miniature air spaced capacitor instead of the trimmer.) The VFO is mounted one inch behind the front panel, and then there is a screen with two holes in it, one to take the +12 volts and the other the feed capacitor to the Oner pcb. This second piece of board acts as a screen and reduces the chance of feedback. A third piece of one inch pcb acts as the backdrop and takes the low pass filter built ugly-style, and the aerial socket.

To build the VFO (Fig. 3), place all the resistors on the board first then add the other components leaving the polystyrene capacitors till last. Also note that the 220pf and 680pf polystyrene capacitors use the same earthing hole.

There is no room to mount the coil ring, so the wires are soldered to the board across the underside of the trimmer capacitor. The coil should consist of 34 turns of 24SWG wire on a T50-2 dust iron ring, turns should be removed until it is oscillating on almost 3500kHz with the

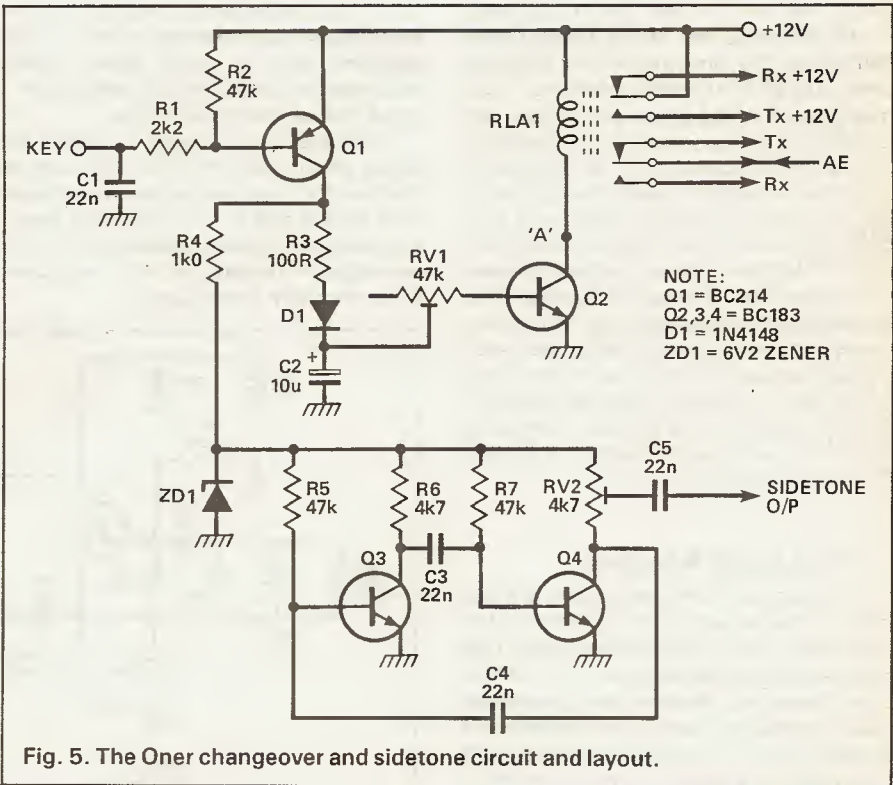


Fig. 5. The Oner changeover and sidetone circuit and layout.

trimmer capacitor fully meshed. Beeswax may then be dripped onto it to fix it in place; we find beeswax very useful for keeping components in place. Final frequency trimming is done by moving the turns on the ring until the lower point is fixed on 3499kHz, the top frequency with the capacitor unmeshed should be about 3590kHz.

The Transmitter

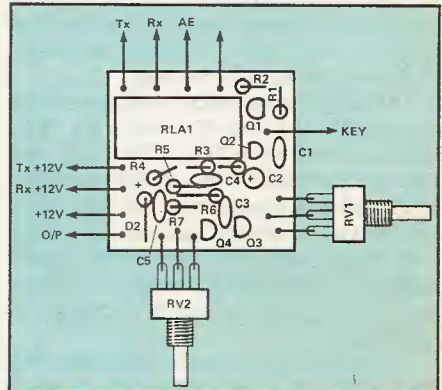
Our thanks to the G-QRP Club for giving us permission to reproduce the Oner Transmitter, as this (almost) completes the Oner range to make a com-

plete transceiver. (The G-QRP Club is a group of enthusiasts interested in low power communications; more info from Dave G4HYQ QTHR.)

This transmitter has been built by many hundreds of amateurs around the world and with luck we will now regularly hear stations equipped with the transceiver.

The components used in our version are not the same as the original article in SPRAT (QRP club magazine) (Fig. 4) because we have altered components to suit the components we have available at home. This has not reduced the specification, and providing the builder is careful we can suggest a couple of component changes that will increase the higher frequency output. However it is important that a small heatsink is soldered to Q3 and that the key is not held down for too long a period.

The changes are simple: the bias resistor R1 should be reduced to 47k and



the collector-load reduced to 1k. In three sets built and tested this had the effect of increasing the output of 14MHz by 4dB and the output on 1.8 by 2dB. This does not sound like a great deal, but does make a difference when running QRP.

Although we are only running a couple of watts with the Oner, the harmonic output can still cause problems to other users. It is best if we follow the transmitter with a simple "pi" filter consisting of a single inductor and two capacitors. This will reduce the second harmonic by at least 10dB and this, coupled with the station ATU, should be adequate.

For crystal controlled use the crystal should be connected across R1; a small shift of frequency can be obtained by inserting a small trimmer in series with the crystal.

Antenna Changeover

This addition to the Oner range carries out the aerial changeover function, supplying positive supply on receive and positive supply on transmit to power the other boards. It must be appreciated that while this works extremely well, it is very compact and therefore very simple. It does not give any of the other facilities of the more versatile Kanga transmit/receive changeover control board (Fig. 5).

As well as the Tx/Rx switching we have included sidetone on the board which can be used to drive your headphones while the receiver is muted.

It is very simple. When the key is depressed, TQ1 turns on and the collector goes positive. This charges C3 via R3 and D1. R3 is present to limit the current through Q1 and is not strictly necessary. D1 is present to stop discharge of C3 via the multivibrator sidetone circuit. The charge in C3 turns on Q2 via RV1 and the relay is energised. At this same time the supply is routed to D2 via R4 and 6.2 volts is supplied to the multivibrator circuit formed by Q3 and Q4. The frequency of oscillation is about 1kHz and the output amplitude is adjustable by RV2 and will drive a high impedance pair of phones to uncomfortable amplitude (too loud!).

The component list refers to the component numbers in *each* unit, so that they correspond closely to the kits available. This may cause a bit of confusion to builders, as there are four R1s, but if care is taken and each one built in turn no problems should arise.

Interconnection

This could be the difficult bit, but in practice it is quite easy. Having built and checked that each unit is working individually, we can look at the interconnections. The VFO is designed to drive both the transmitter and the receiver in turn. We could write many words on these interconnections, but the diagram (Fig. 6) is perhaps the easiest way to describe it.

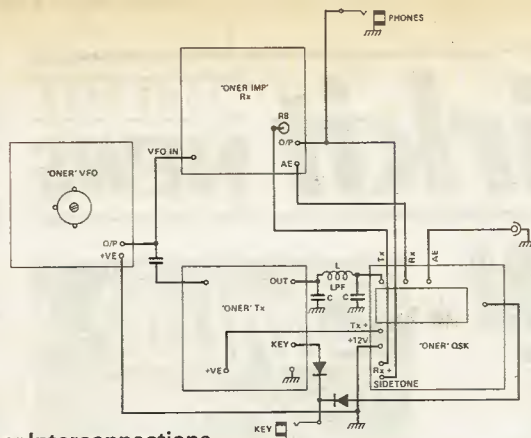


Fig. 6. The Oner Interconnections.

Parts Lists

Oner Receiver

RESISTORS

R1,R10	1k
R2	3k9
R3,R5	1M
R4	4k7
R6	22k
R7	2k2
R8	2k7
R9	82k
RV1	1k Vertical preset
RV2	1k Log volume control

CAPACITORS

C1,2,9,10,11	22n
C3,C4	100n
C5	2 μ 2
C6	22 μ
C7,C8	4 μ 8
C12	1n
VC1	2-22PF Trimmer

SEMICONDUCTORS

D1,2	AA119
Q1	2N3819
Q2,3,5	BC183 or equivalent
Q4	BC214

MISCELLANEOUS

T37/2 cares for winding details see text.

Oner Transmitter

RESISTORS

R1	100k
R2	3k3
R3	1k

CAPACITORS

C1,2,3	100n
C4	22 μ F Electrolytic

SEMICONDUCTORS

Q1	BC183
Q2	BC214
Q3	VN10KM
RFC1	about 12 turns of wire on small ferrite bead.

Oner changeover

RESISTORS

R1	2k2
R2,R5,R7	47k
R3	100R

R4	1k
R6	4k7

CAPACITORS

C1,C2	1nf
C3	10 μ f
C4	10 μ f
C5,C8,C6,C7	0.022 22nf

SEMICONDUCTORS

D1	1N4148
D2	6VZ 400mW zener
Q1	BC214 or similar
Q2,Q3,Q4	BC183

MISCELLANEOUS

RLA1	12V 2P 2W
------	-----------

Oner VFO

RESISTORS

R1,3	100k
R2	22k
R4	100R
R5	10k
R6	1k
R7	220R

CAPACITORS

C1,7,8,9	22n
C2	295p* polystyrene
C3	220p polystyrene
C4,5	680p polystyrene
C6	22p
VC1	22p trimmer

SEMICONDUCTORS

D1	5V1 400mV zener diode
Q1	2N3819 or similar N-channel jfet
Q2,3	BC183 or similar

MISCELLANEOUS

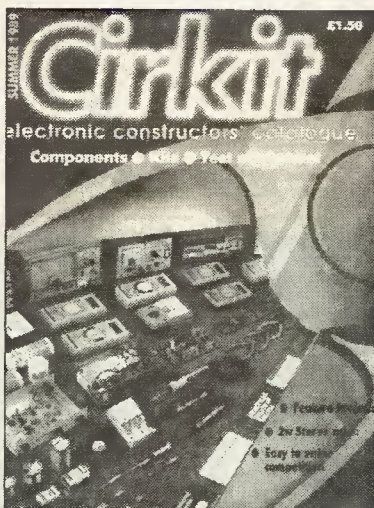
L1	tuning coil, see text
RFC1	1mH RF choke

*Note: If constructors not using the kit cannot find a 295p capacitor, 330p should work.

The Kits

Each of the Oner units is available in kit form from Kanga Products, 3 Limes Road, Folkestone CT19 4AU as follows: Oner/Receiver £9.95; Oner/VFO £6.95; Oner/Changeover £9.95; Oner/Transmitter £4.50; all four for £27.50. The bare boards (with instructions) £2.50 per board. Please add £1.00 for P&P to all orders.

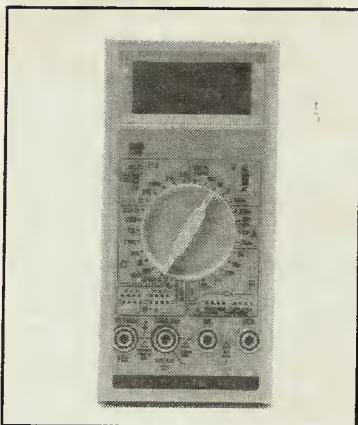
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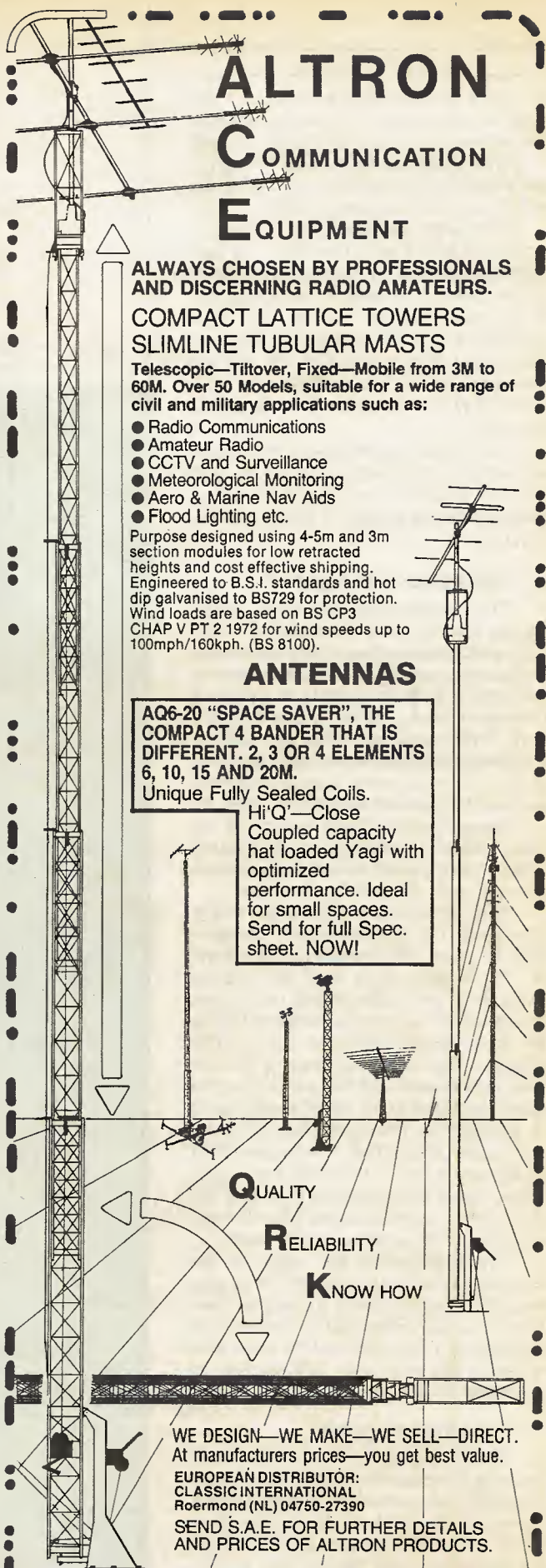
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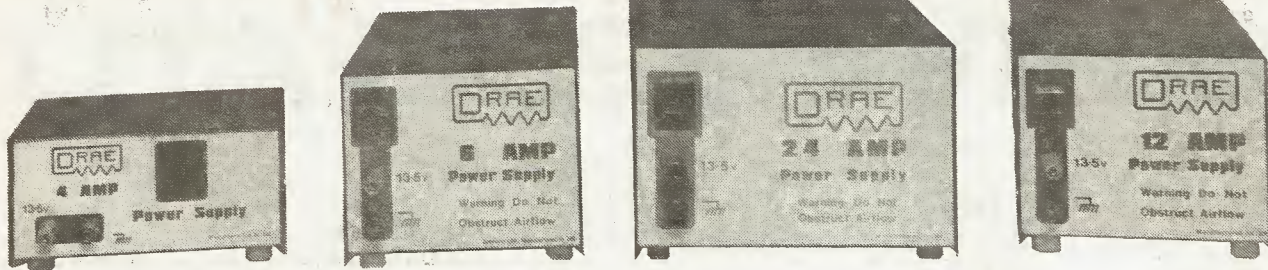
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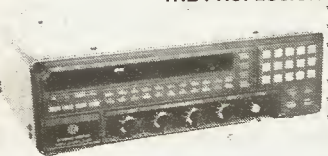
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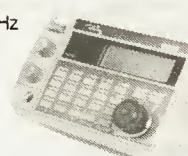
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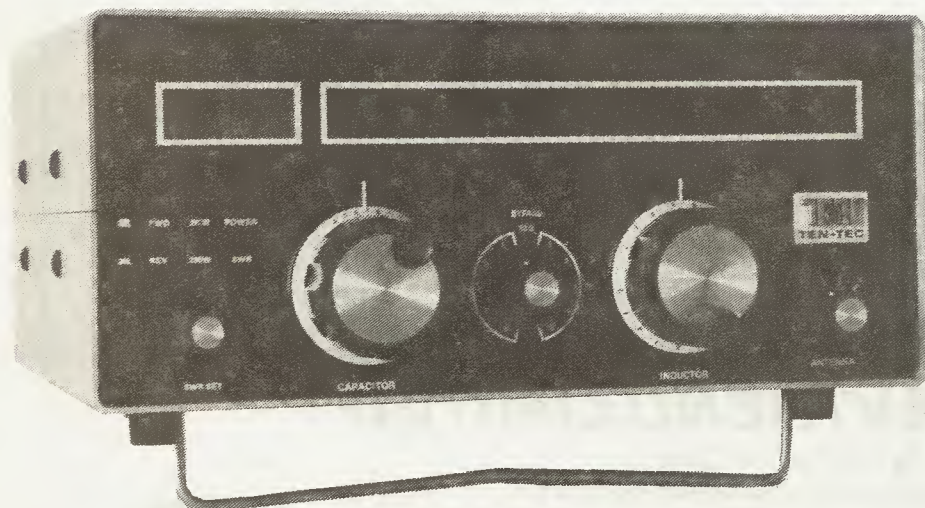
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Ten-Tec 229B ATU

Review



Chris Lorek G4HCL finds that L has all the best tunings.

For many amateurs operating on the HF bands, particularly 80m and 160m, an aerial tuning unit or ATU is an absolute necessity. This matches the impedance of the aerial system to the output impedance of your transmitter, giving maximum power transfer into the aerial system, and possibly more importantly safeguarding your expensive power amplifier devices from blowing up!

The KW ATU

Veteran HF operators will know the KW 'Eee-Zee' match ATU well, on sale many years ago and regarded by many amateurs as the ultimate of the day. The latest KW ATU is featured in the Ten-Tec range as their Model 229B, and is claimed to match virtually any unbalanced load, at all the power the law will allow, from 1.8MHz to 30MHz. We thought it would be a good idea to try it out, even to the extent of loading up the house drainpipes and having worldwide QSOs.

Offerings

The aerial tuning unit comes in a large metal case, 139mm x 330mm x 279mm, its physical size together with the large tuning controls giving you an idea of its quoted power handling capabilities of 2kW. The output matching range is specified as at least 10:1 SWR, at any phase angle, with a maximum input

impedance at full power of 3000 ohms. A modified 'L Match' arrangement is used (more of this later), with a large tuning capacitor of 3.5kV voltage rating and a silver plated multi-turn roller coaster coil of 28 μ H to provide a continuously variable inductance. A sliding cursor along the front panel window together with a calibrated adjustment knob gives an indication of the inductance in circuit, the capacitor knob graduated with a 0-10 scale to show the amount of variable capacitance in circuit.

Four SO-239 aerial input sockets are

provided, a front panel switch being used to select these in use. One of these sockets is internally linked to a screw terminal to allow a long wire aerial to be connected in place of aerial connection No.4 if required. An optional balun may also be internally fitted, to allow a balance input to be matched to a 50ohms unbalanced line to feed your transmitter. A large screw connection is also provided on the rear of the case to allow connection of an RF ground, very important and of course essential when using long wire aerals.

A front panel meter gives a readout of switched forward or reverse power, with full-scale ranges of 200W and 2000W. A further rotary 'SWR SET' potentiometer is provided, to allow direct SWR readings to be given following adjustment to match the forward power level. Applying a DC supply provides internal backlighting of the meter scale and inductance position cursor.

Circuitry

The matching circuit is basically an 'L' network using an inductor-capacitor arrangement in an L-formation. This arrangement does have the advantage that only two adjustable components are used rather than three. Because there are no internal nodes in the network, the maximum circuit voltages and currents that occur in the ATU are never greater than those present at the input or output connections. Also, because there are only two components to adjust, there is only

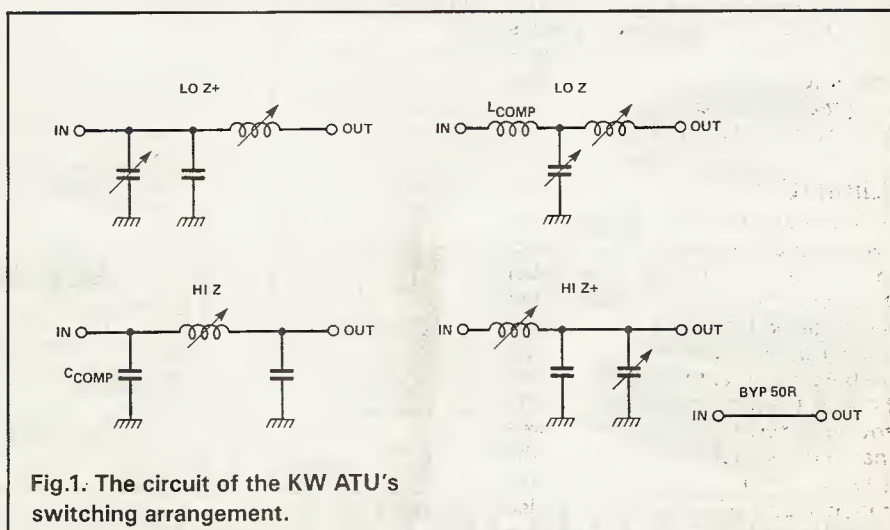
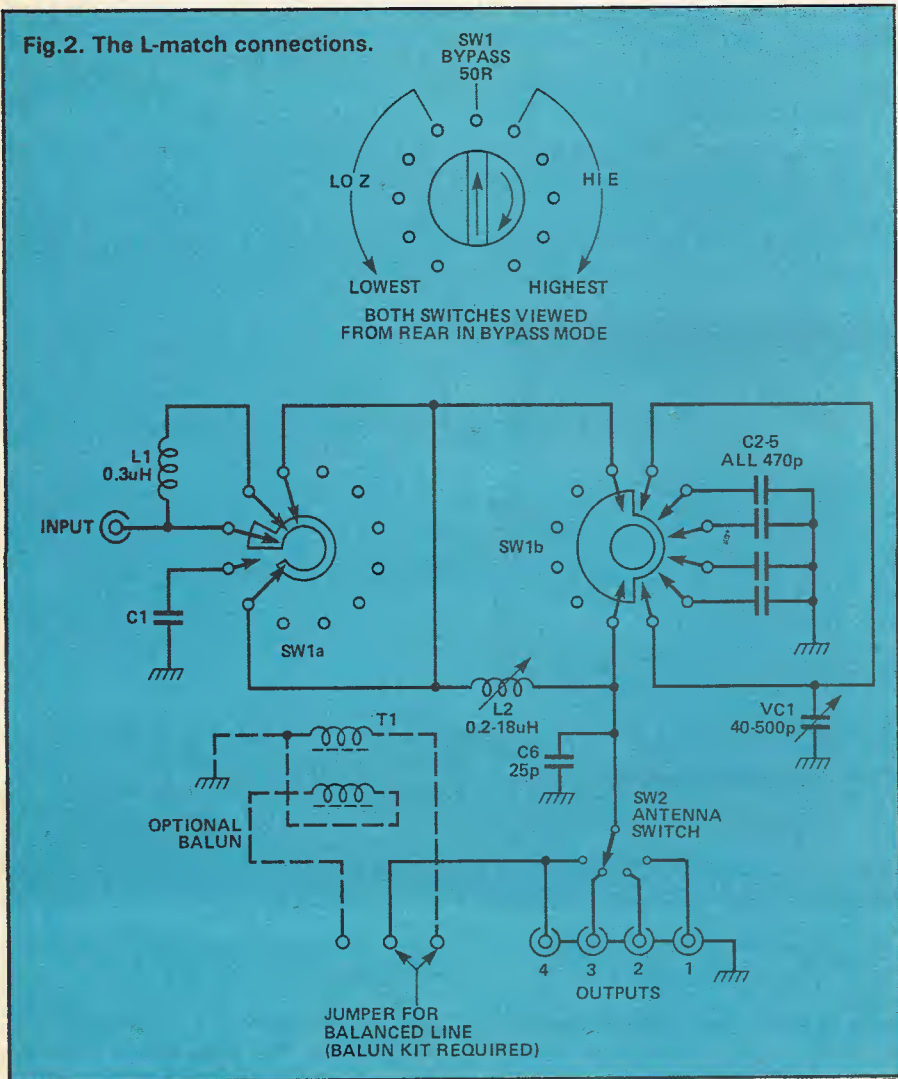


Fig.1: The circuit of the KW ATU's switching arrangement.

Fig.2. The L-match connections.



one setting of each that will provide a perfect match, providing a quicker method of tuning up in practice. The fundamental low-Q network provided gives lower circulating currents hence lower loss for a given power level, and also provides a reasonably broad bandwidth when compared with other networks using essentially higher Q. The inductor in the L configuration is always in series with the transmission line, providing a natural low-pass filter effect hence reducing the levels of any harmonics from the transmitter power amplifier.

Limitations

Life is not all roses, unfortunately, and as with most things the L configuration does have its disadvantages. First of all, it can only match impedances either higher, or lower, than the 50ohm output depending upon whether the capacitor comes before or after the series inductor, as shown in the accompanying diagram. To provide this switching function a large internal ceramic switch (SW1) is used in the ATU, with a corresponding front panel indication of LO or HI. This switch is also used to place additional capacitance in

parallel with the variable wide-spaced tuning capacitor, to provide a greater degree of impedance matching range, four 470pF ceramic capacitors being used. On 160m though, some low impedance may require more than the 2400pF total provided in the ATU with the variable capacitor at full mesh. Under these conditions, a further 1000pF 1kV capaci-

tor, supplied with the tuner, may be soldered into circuit as required to provide extra capacitance if needed.

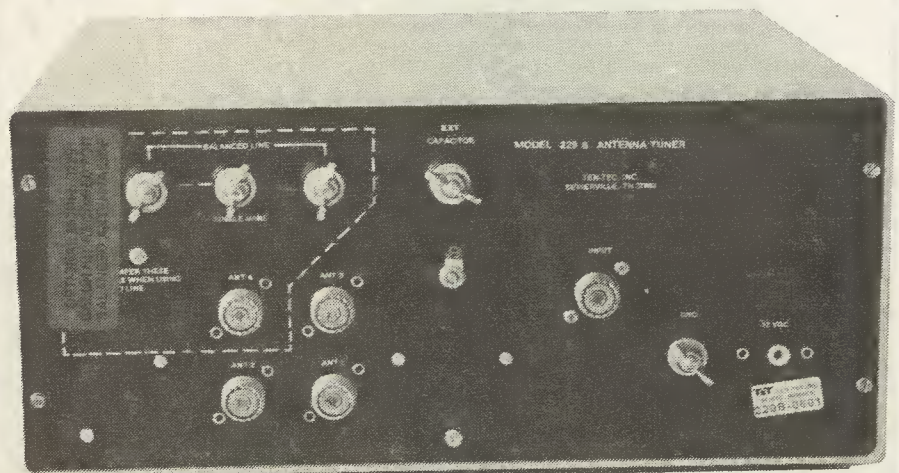
Stray Reactances

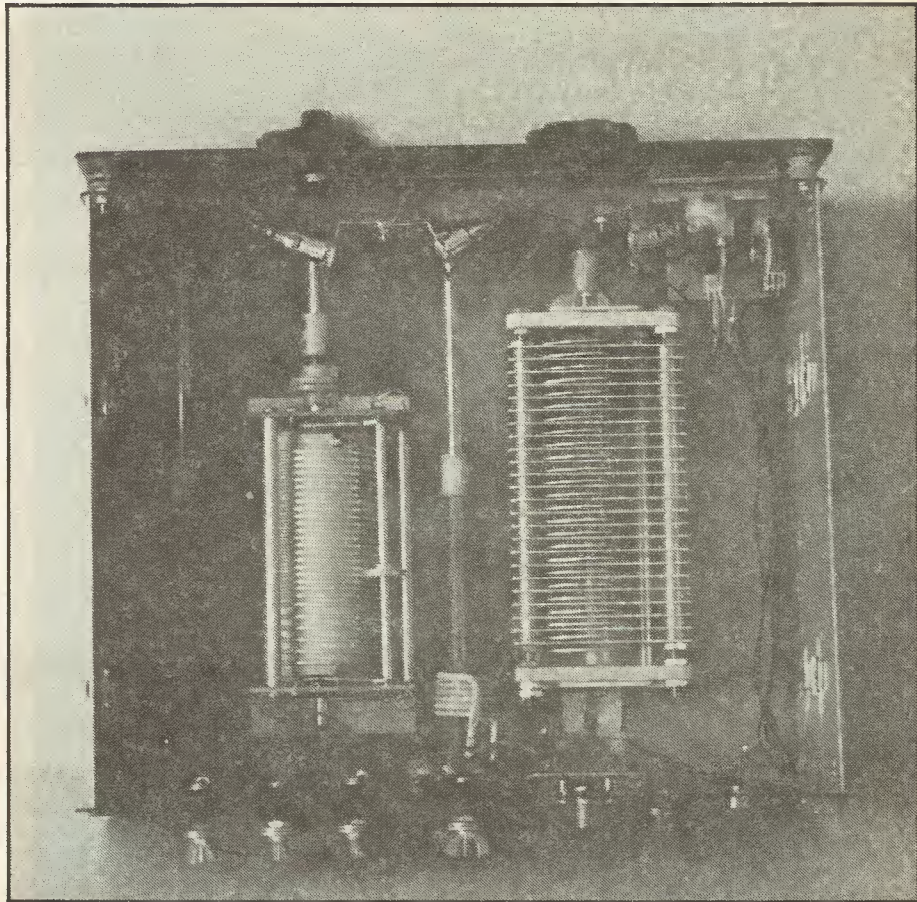
At high frequencies, in the case of only a slight mismatch as the load impedance approaches 50 ohms, the values of inductance and capacitance required for matching become small, and the stray inductance and capacitance present in an ATU circuit may exceed this. Rather than simply switching to Bypass mode on the KW ATU to directly connect input to output, the designers seem to have thought of everything by adding a small compensating capacitor of 25pF and inductor of 0.3uH into the circuit to counteract this problem, shown as C7 and L1 on the accompanying circuit of the tuner section of the ATU. Hence fine-tuning adjustments may be made to low values of mismatch, if needed.

In Use

I have used several types of ATU in the past, my usual one being simply a Japanese type matching my HF transmitter lineup, which tends to get used more as an aerial selector than anything else. With perfectly matched resonant aerials, there is of course little need for an ATU, but many amateurs, myself included, do not have this ideal on all bands. I used the KW ATU in two forms, firstly to fine tune the impedance of my resonant aerials when I shifted in frequency from one end of the band to the other, and secondly as a true complex impedance transformer to tune a non-resonant aerial system.

All aerials have a resonant point, when using high-Q aerials such as trapped verticals the VSWR raises as you approach the band edges. In my case inserting the ATU allowed this to be corrected right down to a VSWR of 1:1 to feed my transceiver, this ideal match giving the benefit of better PA perform-





ance such as linearity and power transfer. It is important to note that the VSWR still remains at the aerial itself and along the coax feed line to the ATU, hence using such a tuner at the transmitter end only improves the match to the transmitter itself.

After some garden work laying new turf, I took advantage of the situation by

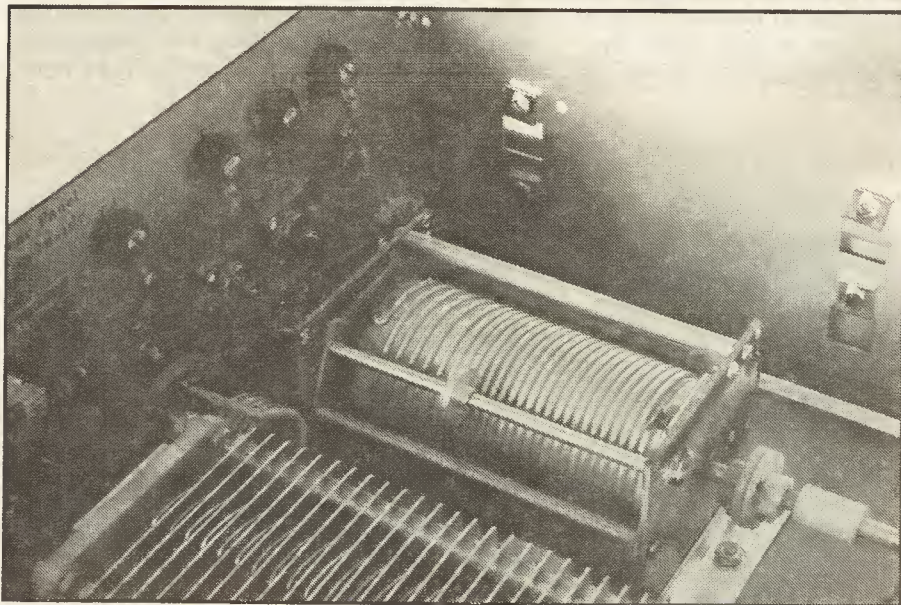
burying over 50 copper earth radials of various lengths stretching towards the extremities of my garden. Living in a residential area with the need to reduce the visible aspect of my aerials as much as possible, I thought I would try the ATU at loading up a top-loaded vertical aerial, this being a wire disguised behind the plastic drain guttering of my two-storey house. This idea is actually described in the *ARRL Antenna Book*, using bonded

metal guttering. In my case, one down-pipe at the base of the radial system was the vertical section, while the horizontal guttering at the roof provided the top loading. The ATU was placed indoors about a metre from the vertical and ground feeds.

In use, the ATU provided a very good performance, matching the wire system right down to a VSWR of 1:1 on all bands. I was very impressed. A coax feed led from the feedpoint to the shack, where my Ten-Tec Hercules HF solid-state linear amplifier was used to power the system up. The aerial performance when fed with this system is of course not relevant to the ATU's matching capabilities, but I was certainly impressed with the results obtained on 20m when compared to my two other resonant 20m aerials in use at the time, this being another story!

Even when using the legal maximum power of 400W pep, I never experienced any 'flashover' in the ATU which I have found under some high-impedance matching conditions with other ATUs even when using lower powers. This improvement is due to the L match arrangement used. The ATU was used for several weeks on the well-used 14MHz port of my packet radio node, to ensure a good test, and gave unfailing performance. What more can I say?

My thanks go to HRS Electronics for the loan of the Ten-Tec Review equipment.





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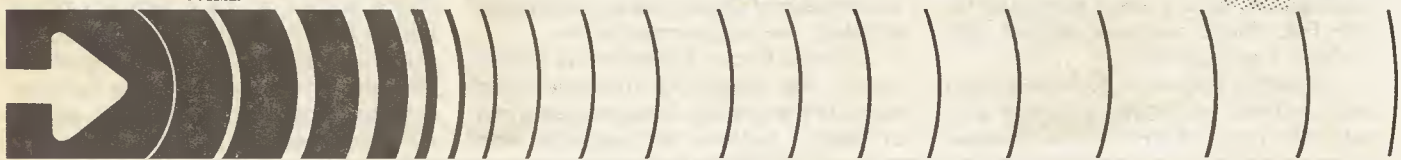
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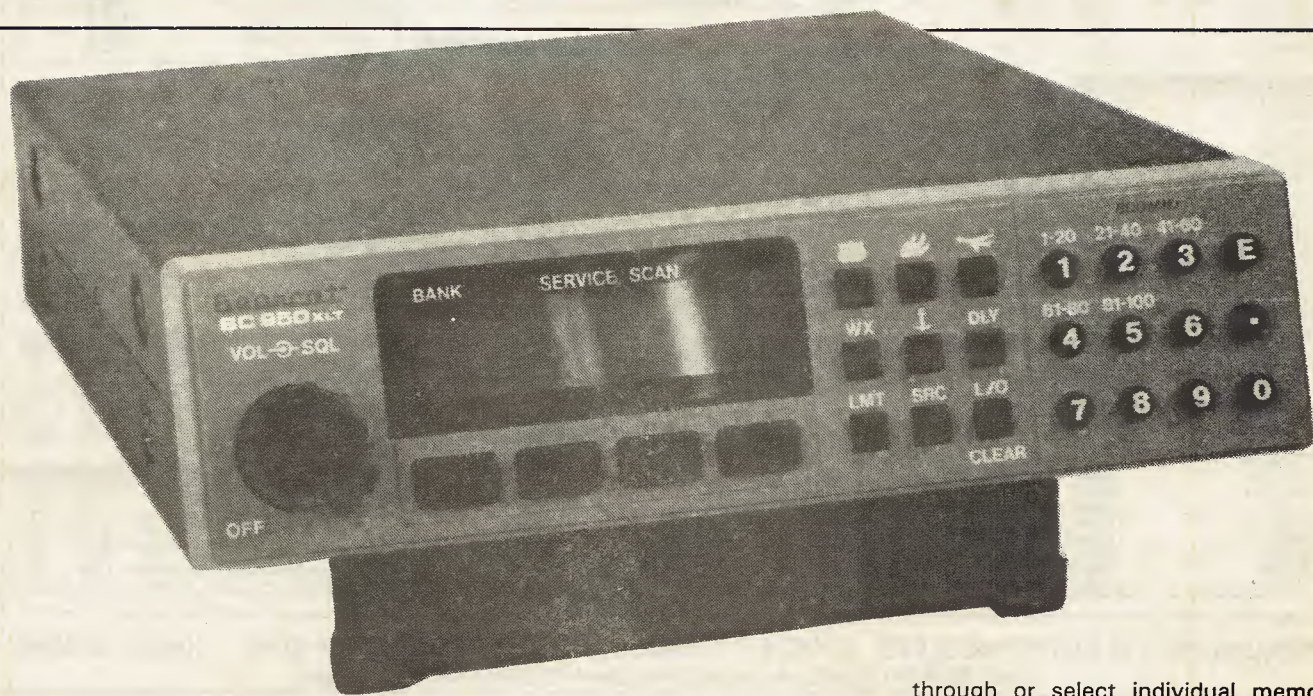
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Bearcat BC950XLT Review



Bearcat are well known in the scanner field. Their range seems to get larger each day, with receivers covering virtually anything worth listening to on VHF and UHF. Their latest offering is the BC950XLT, a small, smart, mobile scanner that would take pride of place under

frequencies, a further button push scanning the entire AM aircraft band. Other scan ranges are also fitted for use in the USA, such as police, weather, and fire. These are not relevant in the UK, due to the different frequency ranges used. The 5kHz steps on VHF are also as a result of the set being designed for the Ameri-

Chris Lorek G4HCL finds the new mobile scanner useful if you allow for the American accent.

any dashboard as well as being at home in the shack.

Coverage

The receiver covers 29-54MHz, 118-136MHz, 136-174MHz, 406-512MHz, 806-824MHz, 849-869MHz and 894-956MHz, so the set covers the 10m, 6m, 2, and 70cm amateur bands as well as 934MHz personal radio, with marine and civil aircraft frequencies and several private mobile, radio and cellular radio bands. FM operation is always selected apart from the airband range of 118-136MHz, where AM is automatically switched in, 5kHz steps being used on VHF FM, 25kHz steps on airband, and 12.5kHz steps on UHF.

A useful feature is a single button push instantly scanning a factory programmed range of VHF marine channel

can market, which is also the reason for the gaps occurring in the 800MHz coverage where American cellular phones operate, to prevent reception of these — but again this is not currently of relevance in the UK.

Controls

The usual volume and squelch controls are fitted on the front panel. The squelch is a small lever concentric to the large volume knob. A keypad arrangement of small rubberised circular buttons is used for direct frequency or memory channel selection, adjacent to which are a further set of square rubberised buttons to select the programmed scans.

A large backlit liquid crystal display shows the operating frequency and status of the receiver. Below this are a row of backlit buttons to manually step

through or select individual memory channels, initiate memory and priority scan, and to hold the current frequency.

A total of 100 memory channels are arranged into five groups of twenty channels. Each channel may store the operational frequency, with any delay or lockout programmed status. The delay facility adds a two second hold time to prevent the set re-commencing the scan sequence as soon as the received signal disappears; this is useful when receiving simplex channels where a slight pause occurs between transmissions. The lockout facility prevents the set halting on a channel with the lockout programmed in, to prevent continuous transmissions such as beacons or busy repeaters locking the scan up, while allowing the channel to be manually selected. Any or all of the selected groups of 20 channels may be scanned as required, which is useful, for instance, for reception of different frequency ranges.

Searching

As well as a memory scan, any part of the frequency coverage may be searched for activity by entering the lower and upper frequencies and pressing the search button, the scan halting when it finds a busy frequency. In all cases, the scan resumes as soon as the signal disappears; otherwise the delay function may be programmed into the search mode to allow a pause before resuming

the scan. When searching a frequency range, it is possible to enter the tuned frequency directly into a pre-selected memory channel by a single press of the 'E' (enter) button.

A priority scan feature automatically samples the first channel programmed in each group of twenty memory channels every few seconds, again locking onto the first busy frequency. This priority mode may be used while the set is monitoring a single channel, scanning memories, or searching a pre-programmed range.

Connections

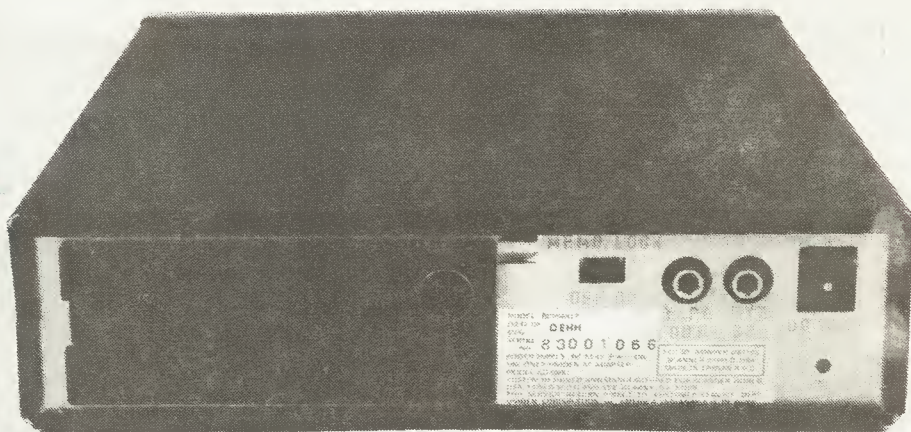
Being primarily designed for mobile use, the set operates from a nominal 13.8V DC supply. This of course may be taken either from the car battery or from a plug-in AC adapter when used at home, into a coaxial DC input connector on the rear panel of the scanner. Adjacent 3.5mm jack sockets on the rear allow connection of an external speaker and a tape recorder. The aerial input uses a standard car radio coaxial socket. A battery housing next to this allows two AA size cells to be fitted for memory channel backup, with a small slider placing these in or out of circuit.

The scanner measures a compact 41mm(H) x 160mm(W) x 189mm(D), and comes supplied with a mobile mounting bracket for car fitting. A folding stand is provided on the bottom panel of the set to allow the scanner to be tilted upwards if required when used on a table top. Available options mentioned in the accompanying scanner details include an internally fitted CTCSS unit to allow sub-tone controlled scanning, and an RF amplifier to increase the receiver sensitivity for use with weak signals.

In Use

On unpacking the unit, I was pleased to see the set really was small in size. The grey sloping fascia matched well with my car's fascia, so that it virtually appeared to be a standard fitment. I initially connected my car aerial to the scanner, but found this gave poor results due to using the rear screen heater in conjunction with a tuned preamp, as commonly found now on cars. A gutter-mounted whip, however, gave excellent results after I had located a suitable car radio type plug to fit onto the coax. Although not tested with this scanner, I feel one of the 25-1300MHz mobile whips, such as the HS-1300M types now available with a built-in preamp internally fitted to the aerial base, should provide an excellent match to scanners like this mobile unit.

The well laid-out fascia controls were very easy to use on the move. Once I had become used to the functions of the large keys below the display I found these could easily be used by touch alone. Bearcat



must be congratulated on their positioning of these commonly used controls, as some scanners need a careful inspection of the control functions followed by several button pushing operations to change scanning modes and the like, although this is often due to the large number of facilities provided.

In my family hatchback at normal driving speeds there was sufficient audio from the internal speaker that I rarely found the need for an external speaker. The internal speaker is unfortunately positioned on the bottom lid of the set, directing the sound downwards rather than towards my ears, so that I often had to have the volume set at a fairly high level. The backlight illumination of the display and controls was very good indeed, giving easy identification in the dark, although I would have preferred the selected range scan buttons illuminated as well.

Channel Steps

I found the 5kHz channel steps on VHF a slight nuisance, Bearcat unfortunately still don't seem to have realised that we Europeans use 12.5kHz channel spacing on high band VHF as well as UHF. This problem I have encountered on many of their sets, although to be fair I believe this must be due to their scanners being primarily intended for the American market rather than the rest of the world. In practice I found the bandwidth of the receiver to be wide enough to receive 12.5kHz spaced signals 2.5kHz away from the nearest 5kHz step without distortion, so that this was mainly a cosmetic problem, although the frequency searching time was increased somewhat over a given VHF range due to this.

Home Use

After a period of mobile operation, I placed the set in my shack powered from an external 13.8V supply, coupled to a variety of aerials ranging from an indoor dipole, loft mounted discone, an outdoor VHF/UHF colinear and a rotatable 50-

1300MHz log-periodic yagi. I had few problems with reception of 'birdies', ie internally generated signals that have the annoying habit of stopping the set in search mode, although many spurious signals were picked up that emanated from neighbouring computers and the like, together with my three shack-installed packet radio TNCs with their internal microprocessors. The receiver bandwidth was reasonably wide to allow 25kHz spaced signals to be received, but this is a compromise as strong adjacent 12.5kHz signals were often received as well, albeit with some distortion.

At my main QTH, living close to both an international airport and a busy shipping port, I found the pre-programmed airband and marine ranges very handy. All simplex and duplex marine channels, with the exception of the Guard channels on either side of channel 16 and the commonly used Marina channel, were scanned, the airband range being searched in 25kHz steps from 118MHz to 136MHz, I did find some airband and other strong signals coming through on the set when scanning through other frequency ranges, due to image frequency reception. This is a common limitation on sets of this type, due to the basic design using a low first IF; even so it was still annoying. On UHF, luckily the set's 'image' of the 934MHz personal radio band was below this band rather than above it, so that the breakthrough of cellular phone frequencies found on many 934MHz transceivers was not a problem. The Bearcat of course has the capability of receiving these frequencies as well.

Insides

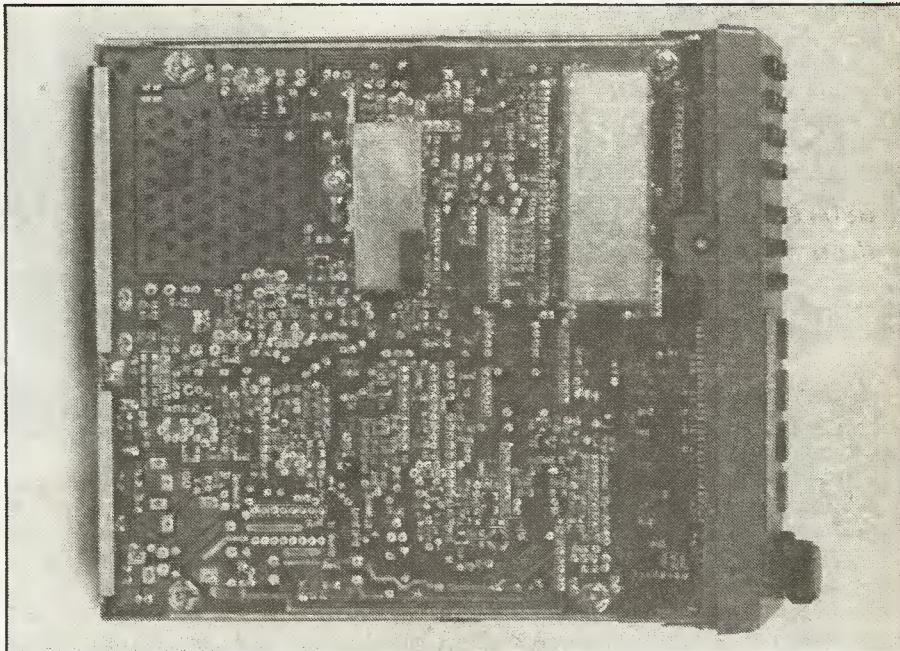
The set has a metal chassis, inside which is a large motherboard housing the main RF and control circuits, a further PCB behind the front panel housing the switching functions.

Four separate varicap-tuned front end stages are used, being mixed to a common IF of 10.85MHz and fed through a monolithic dual crystal filter. AM and FM demodulators follow, with mixing and

further filtering at the second IF using a ceramic multi-pole filter. A single 10.40MHz crystal oscillator acts as the synthesiser reference and second mixer to reduce the number of internally-generated 'birdies', a single-chip synthesiser with its associated dual-modulus prescaler being used for frequency control in conjunction with a large custom program microprocessor.

Laboratory Results

The measured receive sensitivity was reasonable for use with a typical amplified base or mobile wideband aerial, but I would have preferred to have seen a better sensitivity for use with a simple whip aerial or discone. On the other hand, the strong signal blocking and inter-modulation performance figures were excellent for a scanner such as this. Possibly this is the reason for the manufacturer's decision to provide the option of an add-on pre-amp, of which there are currently a few types on the market. The adjacent channel rejection of 25kHz separated signals was likewise very good, that of 12.5kHz signals rather worse. This however is often a compromise with multi-range scanners such as this. The image rejection was, compared to purpose-designed receivers, rather poor at VHF and appalling at UHF. This again is often a compromise and is a basic limitation with receivers of this type designed to meet a given requirement, but here the measured performance is no worse than other similar scanners that I have encountered.



Conclusions

The set is very easy to use, especially in a mobile environment. Its strong-signal handling capabilities, apart from the limitations of image rejection, are very good, making it capable of being used to good effect with the commonly available amplified wideband aerials not available for scanner use. When used with a simple whip or discone, though, it could be found to be less sensitive than a purpose-designed receiver for the band in use, ie the 2m or 70cm amateur bands, and this should be borne in mind.

The ability to search all channels quickly in a given range could be a useful feature, depending on your interests. The 5kHz VHF steps do not conform to UK use on some frequency ranges, although this was not found to be a problem in practice; this may be used to advantage on the airband range in programming frequency offsets as used by some base transmitters.

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

LABORATORY RESULTS

Sensitivity

Input level required to give 12dB SINAD

Freq. (MHz)	Sig. Level
29	0.512µV pd
47	0.315µV pd
49	0.318µV pd
51	0.332µV pd
120	0.705µV pd (AM)
130	0.675µV pd (AM)
140	0.562µV pd
145	0.497µV pd
160	0.510µV pd
170	0.572µV pd
410	0.356µV pd
430	0.412µV pd
450	0.422µV pd
470	0.426µV pd
910	1.287µV pd
930	1.912µV pd
940	2.038µV pd
950	2.655µV pd

Squelch Sensitivity

Threshold 4.5dB SINAD
Maximum 11.5dB SINAD

Adjacent Channel Selectivity: Measured as increase in level of FM interfering signal, modulated with 400Hz deviation, above 12dB SINAD ref. level to cause 6dB degradation in 12db on-channel signal, measured at 145MHz

+ 12.5kHz	11.5dB
- 12.5kHz	12.5dB
+ 25kHz	64.5dB
- 25kHz	63.0dB

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

+ 100kHz	82dB
+ 200kHz	87dB
+ 1MHz	91dB
+ 10MHz	101dB

Intermodulation Rejection: Increase over 12dB SINAD level of two interfering FM signals giving identical 12dB SINAD on-channel, 3rd order inter-modulation product

25/50kHz spacing	67.5dB
50/100kHz spacing	69.5dB

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

3ohm load	1.52W
8 ohm load	1.15W
15ohm	780mW

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

29MHz	41.0dB
51MHz	37.5dB
145MHz	20.5dB
435MHz	5.5dB
935MHz	1.5dB

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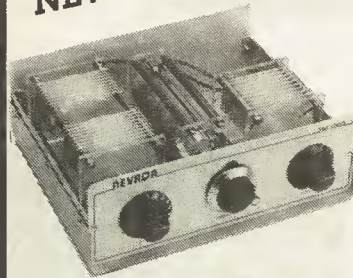
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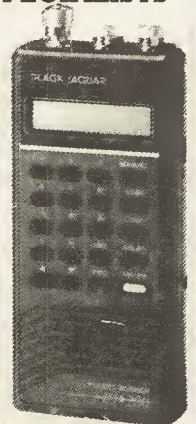
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AOR 2002£487

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TS-440S

As many of you know, Kenwood have a current policy of running three HF lines; the '1' series which started with the TS-120, went on to the TS-130, and now crowned by the TS-140; the top of the range '9' series having the TS-930 and TS-940; and the '4' series which began with the TS-430 and is now completed with the TS-440S.

The TS-440S is designed to be a compact version of the TS-940S, and in RF performance it proves to be so. Chris Lorek, when reviewing the TS-440S said "There was no suggestion of the dreaded reciprocal mixing. . ." and went on to say "Trio engineers have done well considering the standard TS-940S performance — the TS-440 actually outperforms it in this respect." What this means in down to earth listening terms is that the receiver presents you with a quiet background, with signals simply appearing and disappearing when you tune across them, with none of the "sharsh" noises as you approach a strong signal. Kenwood engineering at its best.

Whilst on the subject of the receiver, Geoff Arnold said in his review in Practical Wireless, "The receiver in particular is a joy to use, with clever use of spare microprocessor power to give automatic bandwidth selection according to mode." Again this typifies the Kenwood belief that their equipment is designed to be used by a human being, and they want to make it as easy as possible for you to enjoy your hobby.

The TS-440S is designed to be the all-purpose transceiver for the man on the move. Small enough to carry around, yet with all the performance of its big brother, the TS-940S, the TS-440S is perfect for today's fast moving methods of communication. Unseen advantages such as 100% duty cycle transmit, and fast receive/transmit changeover make the TS-440S the ideal packet radio transceiver, and of course with full BK it's equally at home in demanding CW contests.

There are other excellent but unobtrusive design features to which your attention should be directed. Typical of these is the frequency readout and the way it behaves. Sounds silly? Then consider tuning to 3750 kHz and chatting on lower sideband to Fred. The

readout on the transceiver reads 3750 (of course). Then Fred says "Check me on the upper sideband", and you move the mode switch to USB. If you are using a Kenwood rig, the readout still shows 3750 and you are indeed listening and transmitting on 3750 upper sideband. BUT — many other transceiver leap sideways by 3 kHz and you then have frantic retuning to find Fred. Small point you may say, but it is intensely irritating in use, and Kenwood make sure that it does not happen in their equipment, not HF, not VHF, not UHF.

I absolutely guarantee that you will be impressed by the TS-440S when you sit down and use it; and that is best accomplished by going to one of our branches or your nearest Approved Kenwood Dealer. Don't bother with anyone who clearly doesn't have the background or connections to understand what the equipment is all about, because transceiver like the TS-440S are better explained by someone with genuine product knowledge and a willingness to do more than simply take your money.

For full details of the TS-440S, Kenwood produce an 8 page brochure which is yours for the cost of postage and packing. For full details of all the Kenwood range, simply send £1 and we will fill an envelope with info. and send it right back. If it takes 8 pages to describe the TS-440S there is no way in which I can adequately cram it into this space — send for the brochure.

73. John Wilson G3PCY/5N2AAC

TS-440S £1138

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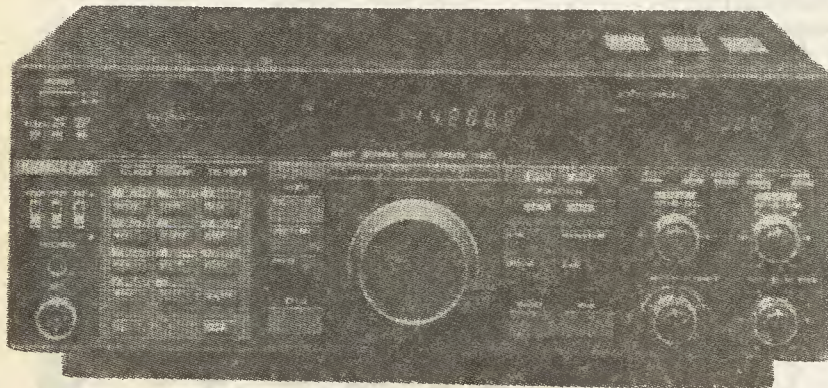
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Each branch carries a full range of everything that we stock and sell, and is run by an experienced radio amateur who is ready with the same good advice and assistance which we try to offer at Matlock. Why not call in and have a word with Sim, GM3SAN in Glasgow; Hank, G3ASM in Darlington; Tony, G4NBS in Cambridge; Ceri, GW0CJB in Barry (our new branch transferred from Cardiff); Dave, G3IKG in Eastcote, London; or Colin, G3XAS in Bournemouth.

You could of course pop in and talk to our front line manager Richard, G4NAD here at Matlock, ably assisted by Bill, G8LXN.

Lurking behind the scenes you might find Alan, G3MME or myself G3PCY, or even Bill, G3UBO on a flying visit. For technical queries you might find yourself talking to Barrie, G8OTY; or Rob, G8MPT; or Keith, G8YQX; or Bob who preceded Keith by getting G8YQL. In a technical world of his own we have John, who doesn't have an amateur licence, but with an M.A. from Cambridge he hardly needs one, does he?

You may get the impression that I'm trying to tell you something — and that is the simple fact that we know what we are doing when it comes to radio communication, and you won't get better advice anywhere in Europe.

73. John Wilson, G3PCY/5N2AAC

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QRZ

In the last *QRZ*, I mentioned the great efforts by the Hungarian group who put Vietnam on the air for the first time in many years. Their expedition, in October and November last year,

ing range, and after the Korean war it was used by the US government to breed Rhesus monkeys for medical research. In 1976 the US General Services Administration turned the

Puerto Rico), it received separate country status.

These days, the island is inhabited by goats, lizards, land crabs, monkeys, aquatic birds, and the occasional visiting DXpeditioner. John, KP2A, was back there recently in February and March operating with a large team as KP2A/KP5, during which the island was raided by the Puerto Rican police, who apparently suspected the poor DX operators of

In the spring, a young op's fancy lightly turns to thoughts of rare prefixes and strange islands.

worked many tens of thousands of QSOs, and yet I received my QSL cards for their operation quite quickly. The card is quite simple, showing just an outline map of Vietnam, with the two callsigns 3W8DX and 3W8CW on the front, and the QSO details on the reverse, but it will be a highly valued possession in the collections of many thousands of DXers who had never worked Vietnam before, and especially those who — like me — were licensed since 1975, when the last Vietnamese operation took place, and who haven't had the opportunity of working Vietnam before.

island over to the Department of the Interior, which is why, with its distinctly separate administration (from

DX Foundations

The 3W8DX QSL cards were sponsored by the International DX Association, one of several DX organizations around the world who give support to DXpeditions to rare DX countries. One with a similar name is the International DX Foundation, which was established in 1987 by John, KP2A. It was John, and also Stu, WA2MOE, who were instrumental in getting Desecheo Island accepted as a separate DXCC country in the early 1980s.

Desecheo (pronounced Dess-uck-ay-oh) is an island of about 360 acres located at 18° 23' north, 67° 29' west, between Puerto Rico and the Dominican Republic. Desecheo is heavily ridged, with a rocky, craggy shore-line. At one time it was inhabited almost entirely by goats, which were left there by Christopher Columbus during his third visit to the New World. During the Second World War the island was used as a bomb-

3W8DX
3W8CW

VIETNAM OPERATION
October 23-November 28, 1988

International DX Association

Operators lucky enough to work the 3W8DX/3W8CW operation in October/November last year should by now have received these QSLs.

Greetings from **DESECHEO** ZONE 8 NORTH AMERICA

INTERNATIONAL **DX** FOUNDATION

KP2A

DX-PEDITION OPERATORS:

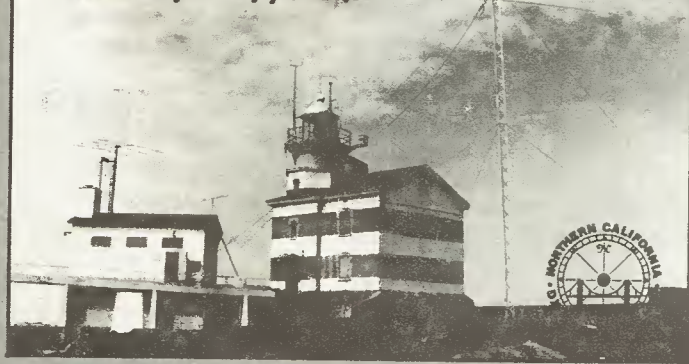
K1MEM—JIM	N2DT—DAN	WA2MOE—STU	W82VFT—STEVE	K8CW—AL	W8DX—BOB
KP2A—JOHN	W4KCL—BARBARA	N2OO—BOB	K04Z—AL	K8HV—CHARLIE	K000—PAT
N2CW—GARY	W8KXA—JIM	K2UQ—GARY	NSADC—RON	W88JW—AL	W8UN—JOHN

TO STATION	CONFIRMING QSO						
	DAY	MONTH	YEAR	GMT	MHZ.	2-WAY	RST
G4JVG/smp	10	JUNE	1981	0644	14	<input checked="" type="checkbox"/> CW <input type="checkbox"/> SSB	5-9

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KP2A was one of the founder members of the International DX Foundation, as well as being on the record-breaking 1981 Desecheo expedition.

**Märkets Fyr
G4JVG/OH0/OJ0**



The NCDXF sponsored the QSLs for my 1983 expedition to Market Reef.

drug smuggling. It took KP2A some explaining to reassure the authorities that the operation was a legitimate amateur radio expedition. I am not sure how many QSOs were made by the KP2A/KP5 operation, but in June 1981, when I first worked Desecheo, the eighteen operators made no fewer than 43000 QSOs, a record for the most contacts during a single DXpedition then.

I have already mentioned the International DX Association and the International DX Foundation, so it would be unfair not to mention the Northern California DX Foundation. This organisation helps to sponsor DXpeditions from many rare spots and their famous round logo is on QSLs from many expedition stations that have benefitted from their support. In the case of really rare locations, such as Peter 1st Island, the NCDXF is willing to contribute several thousand dollars towards an expedition; in the case of places where there may be just one or two resident operators the foundation will supply a rig or antenna to the operator (a case in point is Rodriguez Island, in the Indian Ocean, where Robert, 3B9FR had his rig supplied by NCDXF).

In the case of expeditions to somewhat less rare places, the Foundation will assist towards to DXpeditioners' costs of getting QSL cards printed — for example, I benefitted from NCDXF support when I operated from Market Reef as G4JVG/OH0/OJ0 in 1983. The organisation contributed 3 US cents per QSL card printed, which just about covered the cost of the cards, and meant I could have quite nice photograph QSL

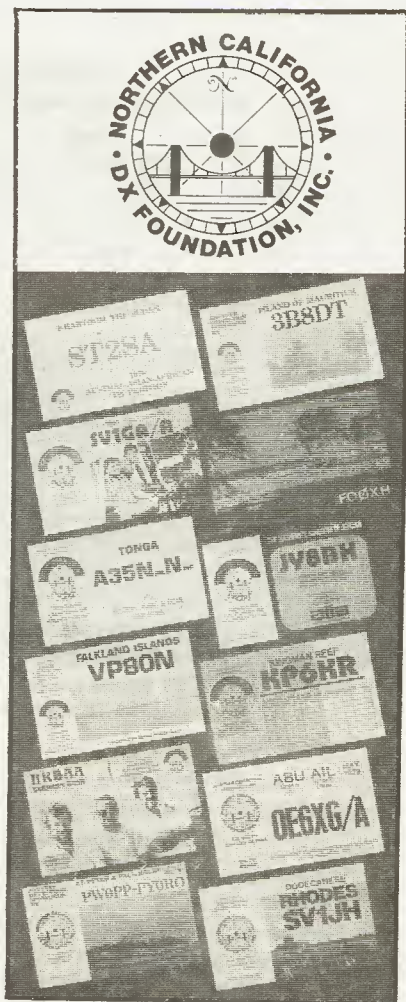
cards printed, instead of boring and functional ones.

Whether or not NCDXF would pay for your QSLs depends on your past record: they are unlikely to offer to sponsor your DXpedition if you have never been on one before, or if you go to GD or GJ and only make a couple of hundred QSOs. If, however, you were to make several thousand QSOs (even if you were only operating from a semi-rare location such as Guernsey or Liechtenstein) you may well be lucky. In any case, if you are interested in HF DXing, it is well worth becoming a member of NCDXF. The suggested annual contribution is \$25 US, although the board of the foundation point out that they do not wish to exclude anyone from the Foundation for financial reasons and "if 25 dollars is not within your budget, then please give what other amount you can" (I would suggest that \$10 would be a minimum acceptable amount). For this, you get a fine full-colour membership certificate, 8½ x 11 inches, which features reproductions of many of the QSLs of expeditions sponsored by the Foundation (including OE6XG/A to Abu Ail in the Red Sea, FO0XH to Clipperton Island and HK0AA to Bajo Nuevo, now a "deleted" country), a newsletter, and the knowledge that you are helping what is arguably the world's foremost DX club. The address to write to is NCDXF, P.O. Box 2368, Stanford, CA 94305, U.S.A.

I was joined up by Eric, SMOAGD, who was on the aforementioned Bajo Nuevo expedition, when I was visiting Sweden. During that trip I also met Rusty, W00AT, who was on the Clipperton Island expedition and who



A copy of the membership certificate of NCDXF. The original is in full colour!

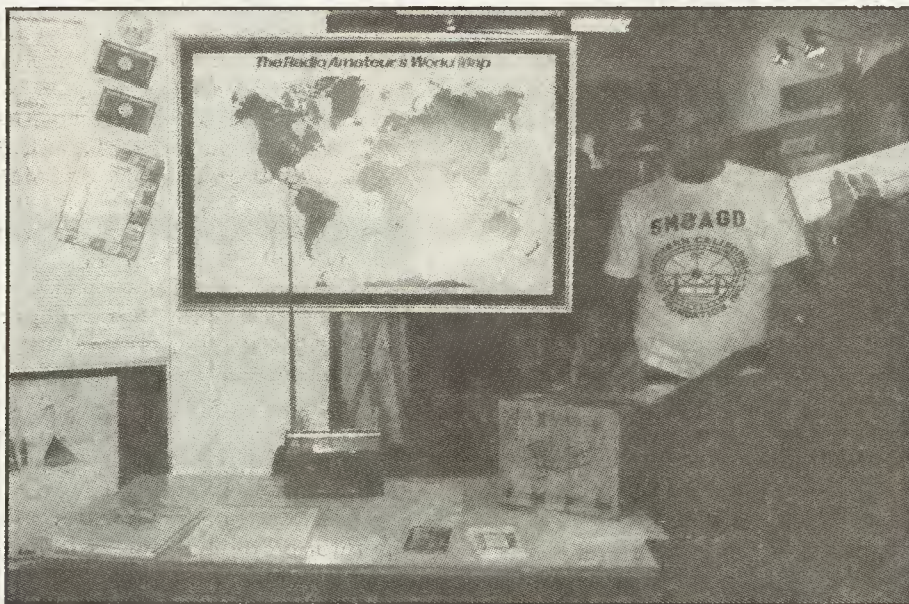


These are some of the QSL cards of expeditions which have been assisted by NCDXF.

is now the President of NCDXF. Most of the top DXers and DXpedition operators in the world are members of this organisation. The most recent



A multi-national collection of DXers: left to right — Lars SM0CCW; Eva G4JVG — XYL; Bill W6-SWL, Rusty W6OAT (President of NCDXF); Nan SM5BBC — XYL; Eva SM0OTG; Eric SM0AGD; Rune SM0COP, Heidi HB9? and Gunnar SM0AVK.



Eric Sjolund SM0AGD, wearing his NCDXF T-shirt. Eric has operated from very many exotic locations, such as Serrana Bank, Tokelau and Mauritius, to name but three.

NCDXF newsletter, which I have just received, has a most interesting article by Tom Gregory, N4NW, who is perhaps more famous as 9Q5NW and TN4NW. Tom is based in Zaire, but makes occasional visits across the Congo-Zaire river to put the even rarer TN on the air. Tom reports that his licence cost about \$700 US, so it is perhaps not surprising that there are not other amateurs currently active from the Congo!

Sweet Georgia, South

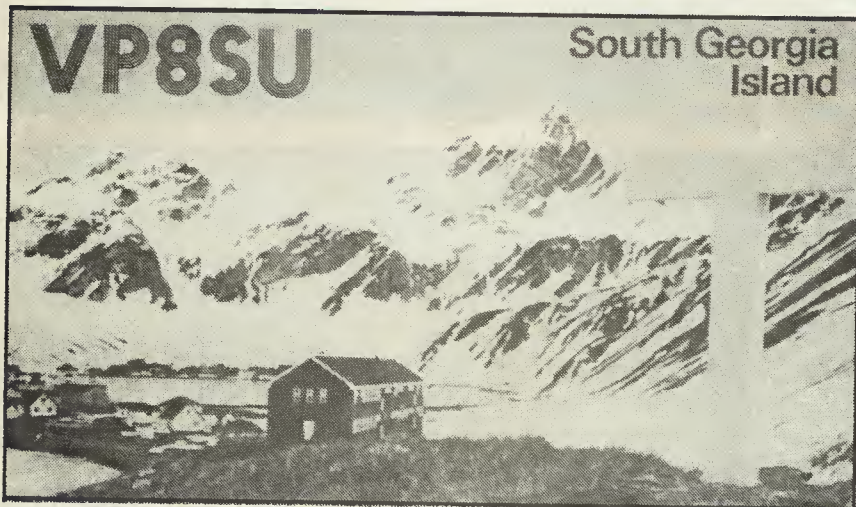
Recent copies of the RSGB's excellent *DX News Sheet* have men-

tioned increased activity from South Georgia. There was a time, as recently as the early 1980s, when VP8 South Georgia was not particularly rare, with VP8SU putting in regular appearances, especially on 20 metres SSB. These days, South Georgia ranks as number 13 in the most wanted countries list overall, and higher than such rarities as Mozambique, Malpelo Island, Peter 1st Island, Mellish Reef and Abu Ail. Bearing this in mind, it is well worth looking out for VP8BUB, who has been heard in the evenings GMT around 28470, 21270, 21205 and

14250. A new operator on South Georgia is VP8BWT, Steve, who should be active until the end of July or beginning of August. Other news from the *DX News Sheet* suggests that the only station in Cambodia, XU1SS, has recently become active again. This station is located at the KPLNF village in Cambodia, close to the Thai border and in an area that has been subjected to frequent attacks by the Vietnamese-backed Cambodian government forces. There are times, therefore, that XU1SS is entirely QRT, but when the station is on the air it is quite easy to work. Although their QSL card states that they use an FL-2100B linear (capable of producing 600 watts or so pep), when I worked them recently they were using only an FT-77 "bare-foot", about 10 watts into a vertical antenna, on battery power. The difficulty is not so much getting through the pile-up as hearing the DX station yourself. *DX News Sheet* reported XU1SS as being on 28018 CW around 1000 GMT and QSL route as via JA4KFA (however, I received a QSL via JA1HQG, who was on the initial operation which established the XU1SS club station).

One of the most active DXpeditioners at the moment, along with Martti OH2BH and Paul F6EXV, both of whom I have mentioned in several previous QRZs, must be Baldur, DJ6SI. In April 1988 Baldur operated as TY9SI from the rare African country of Benin, while in March this year he made a return visit, this time with his XYL Christa, who has been active as TY88YL. Baldur speaks but little English, so he operates 100% CW, and a very fine CW operator he is too. Christa operates almost 100% SSB, so they make a good DXpedition team. They insist on all QSLs going direct: the address is Baldur and Christa Drobnicca, Zedernweg 6, D-5010 Bergheim, West Germany (don't forget to include an SAE and at least one IRC).

It was a pleasure to receive another letter from Nick, G8SYE, of Hartshill, near Nuneaton, who sent in a report of his HF listening activities. Nick, along with many others, has noticed the tremendous upswing in HF propagation and activity and reports hearing CU3AD from the Azores and FM5CW from Martinique, both with good signals on 10 metres SSB, as well as V44KI from St Kitts



The last major operation from South Georgia was by VP8SU in the early '80s. Now it is the 13th rarest DXCC country in the world.



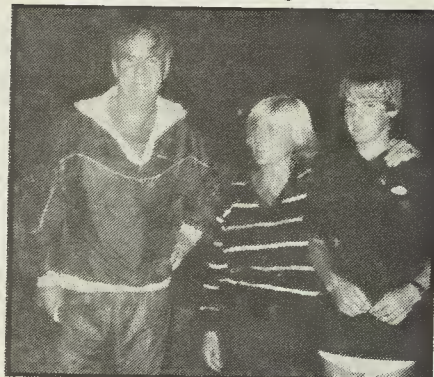
The only station presently active from Cambodia, UX1SS, was QRT for a while, but is believed to be back on the air again now.

and XE1ZW from Mexico on 15 metres SSB. Apart from these, Nick reports a host of American and Japanese stations on 10 metres, including JA30VU at 59+ — not surprising, perhaps, as he uses a 7 element monoband beam 40 metres high.

My "QSL of the month" is from another JA with an impressive antenna set-up: JA7EAI, Yoshitaka Chida of Miyagi, Japan, whose speciality band is 40 metres. Yoshi runs a full-size 2-element yagi on 40 metres, also at 40 metres (about 130 feet) high. He is active every winter and can often be heard and worked on 40 metres SSB, long path, in the mornings, and is one of the strongest signals out of Japan on that band.

Notice of such DX activity, and

especially that of current DXpeditions, is often given on 2 metres, 144.525MHz FM. This frequency started out by being the "net"



Baldur (TY9SI/DJ6SI), Christa (TY88YL) and their son. Baldur and Christa have been very active from Benin, West Africa, recently.

frequency of CDXC in South-East England, but its use has spread to the South-West, South Wales and now most parts of England and Wales. HF operators who spot interesting DX can report the callsign and frequency of the DX station on 144.525, and also use it for exchanging HF DX news and views. If you are interested in HF DX, and have a 2 metre rig, it is well worth leaving it on 144.525 when you are next looking around for HF DX — and, if you hear any interesting DX stations on shortwave, don't forget to report them on the VHF DX frequency.

Getting It Prefixed

The last weekend of March was, as usual, the CQ WPX (prefix) contest, SSB leg. As usual, many unusual and rare prefixes were activated especially for the contest, and there were a number of DXpeditions to fairly exotic spots to give out the rare multipliers for the contest. I worked FG/DK8FZ on Guadeloupe in the Caribbean, UA1OT on Franz Josef Land, arguably the rarest of the USSR DXCC Countries, 9H3AM, one of the more unusual Maltese prefixes (this was G3VLX on a DXpedition-cum-holiday), WP4GQB from Puerto Rico, P33ES (normally 5B4ES) and several others. One or two that got away were C45A (also from Cyprus), AZ4F from Argentina, FKOAW from New Caledonia (very strong on 21263, but generating an enormous pile-up of European callers) and the aforementioned 9Q5NW from Zaire (not Tom Gregory operating, but a guest operator probably from Germany or Switzerland). It was also good to work WOAIH/9, Paul from Wisconsin, in the WPX contest, having met him personally last year in Oxford (see January 1989 QRV — who said that contests were impersonal events?). I had hoped to be participating seriously this year in WPX as one of the team of operators at GB4CDX, but unfortunately, due to work load and the fact that the contest weekend coincided with the Easter weekend we were not able to get a team together. Perhaps next year instead.

Meanwhile, if you have any news or photographs for inclusion in QRV, I would be very pleased to hear from you. As usual, the address is Steve Telenius-Lowe, G4JVG, "Penworth", Tokers Green Lane, Tokers Green, Reading RG4 9EB.

MORSE FORUM

There has been plenty happening in the CW world over the last couple of months. What with a number of CW contests, straight key days and the like, life has been quite busy. In

with semi automatic or bug keys in particular. They boast that they are the oldest name in amateur radio, having been established in 1890.

They manufacture a range of bug

watts of RF output. This was less than many of the QRP clubs around the world. The G-QRP Club have now announced that their limits are to be raised to 5 watts of RF. This means that from 1st January, 1989 any contracts with this power will count towards their awards and will be valid for their activities.

Ian Poole G3YWX with news (and olds) on the morse scene

addition to this, ten metres, one of my favourite hunting grounds, has continued to improve giving a good crop of DX contacts as well as some interesting chats.

How They Learned CW

It is interesting to see the different ways in which Morse was learnt many years ago. In a book called *Wireless Telegraphy for Amateurs*, dating back to the first ten years after the turn of the century, there are some interesting suggestions.

It says, "Until operators are thoroughly familiar with the different signals, it is well for all messages to be written on a piece of paper in the Morse Code and transmitted while the sender reads the paper."

As far as receiving is concerned it offers the equivalent advice, "Similarly, the receiving operator should write down in properly spaced dots and dashes all that he receives, interpreting at leisure when the signals have ceased."

The reason for doing this is given "that any hesitation while the signals for letters are hunted for in a book will lead to hopeless confusion." I am sure that we would agree that it would be confusing!

Since then methods of learning the code have changed a lot. It is not surprising, because about eighty years have passed since the book was published. Technology has come on in leaps and bounds. The spark gap transmitters and coherers for Hertzian Waves described in the book have given way to the semiconductor microelectronics orientated radio of today.

Shop Window

Vibroplex is a name which has

been long associated with CW, and keys and paddles. Their best known model is the "Original" which was invented in 1890 by Horace G. Martin and is the key everyone thinks of when the name Vibroplex is mentioned.

The design of the Original has hardly changed, using the same tools and dies as the early models. The look and feel of these bugs are quite distinctive and they are a real joy to operate. Not only do they feel distinctive, but it is often possible to hear the signature of a bug.

With all the electronic keyers available today these mechanical semi-automatic bugs are still very popular. This must be a tribute to the quality of the original design and today's workmanship. In addition, they are competitive in terms of cost. The standard model with a textured finish on the base and bright chrome top parts is £70.54. The deluxe version boasts a highly polished chrome base and jewelled movements and costs £82.74. Then for £129.62 it is possible to have the presentation version which possesses a 24 carat gold plated brass plate.

In addition to the original key, Vibroplex also make a number of paddles for keyers. They are made to the same standards as the Original, but for use with today's electronic keyers.

The full range of Vibroplex keys is available from: Dewsbury Electronics, 176 Lower High Street, Stourbridge, West Midlands DY8 1TG, Tel: 0384 390063 or 371228.

Power Level Raised

Up until the beginning of this year the power limit for all the G-QRP Club activities was 5 watts DC input or 3

CW Novice Award

While on the subject of the G-QRP Club it is worth mentioning the CW Novice Award which is administered by them on behalf of the European CW Association (EUCW).

Essentially the idea of this award is to encourage newly licenced stations to use CW. In order to qualify for it it is necessary to contact fifty different stations on CW within the first year of holding a licence. There are two classes: Class A using QRP and Class B using any power up to the legal limit. In this case the definition of QRP is 3 watts or less for contacts up to 31st December, 1988 and 5 watts or less for contacts after 1st January, 1989. We wonder if they will be printing a "hers" version of their certificate for YL CWers?

The application should consist of a log extract giving details of contacts, and this has to be certified as true by one other licenced radio amateur. The fee is only three first class postage stamps for those inside the United Kingdom and for anyone outside it is three IRCs.

The address for applications is Mr A. Taylor G8PG, 37 Pickerill Road, Greasby, Merseyside L49 3ND.

Correspondence

The first letter this month was from Demeyere Norbert ON4ANE who is a regular reader of Morse Forum and HRT — it's nice to hear that the magazine is regularly read in Belgium. He said he enjoys using CW but he has trouble deciphering or understanding some of the abbreviations which crop up. While there are lists of standard abbreviations which are readily

available, people often make up their own as they go along and they are not always obvious. This is a problem which all of us encounter from time to time. The only way round it is to carry on and try to understand the meaning from the rest of the sentence.

Stephen Pearson wrote in saying how much he enjoyed the various straight key days which are being organised these days. He said that it is very nice to listen to "real" morse as sent by the operator himself. He went on to add that it reveals quite a lot about the person sending it, as it is rather like handwriting. In fact there is a lot of value in being able to send CW on a straight key. While keyers and morse generators have their place, it is worth dusting down the old straight key and pounding the brass for a while. These straight key days are an ideal opportunity to do this.

Band Reports

Unfortunately there was only one log extract sent in this month. To anyone else wanting to send in their contribution, they are most welcome!

Richard Everitt G4ZFE was our contributor, and he was active mainly on 20 and 40. Although 10 and 15 metres were good, he was not able to use them to the full because of aerial problems. On forty metres he managed contacts with J79JC, S79M, TA2/G3UIN, VO9QM, VU7NRO/JOS, Z08JP, ZS4TX and 8P9EM. Twenty produced FK/JHOMGW, FR/DL4BBO, VQ9QM, 6Y5HN and 9J2BO. Then on fifteen and ten contact was made with FR/DL4BBO.

News and Events

The Norwegian Radio Historical Association is organising another

Antique Field Day this year on the 3rd of June. The idea of the day is to fire up old or antique radio equipment and re-live some of the excitement of the old days. The Norwegian Society will be setting the pace by using a Radio Set MkII which was produced in the UK during the Second World War, and dropped to the resistance forces. They plan to operate on 3.513 MHz between 0700 and 0900 GMT, moving to 14.055 MHz between 1000 and 1200 GMT. They do stress that these frequencies will not be exact as they will only be relying on the equipment crystals for their frequency accuracy. During the day they will be looking for any contacts, but they would be particularly pleased to have any with the UK. It's a pity we didn't know about this one sooner, as HRT just misses the first week of June this month.

A little later on in the diary is the EUCW Straight Key Day which is to be held on the 24th of June. Stations all across Europe will be taking part and all amateurs, whether members of EUCW clubs or not, are invited to join in. The idea is to give the electronic keyers a rest and get back to the enjoyment of using a straight key for a day.

Frequencies between 3.540 and 3.570 MHz, 7.020 and 7.040 MHz, 14.050 and 14.070 MHz or anywhere in the 10 MHz band can be used. No hard and fast times are set down, because it is not a contest, so even an hour or two is fine. If you make at least five contacts you can vote for the best "fist", one vote for each of the three you consider best. Then a "Straight Key Award" will be sent free of charge to every operator who receives at least two votes. Logs and votes should be sent to Daniel Klintman SM7RXD, Adjunktsgatan 30, S-214 56 Malmoe, Sweden by July 18th.

Sign Off

Thanks to everyone who did write in, it was nice to hear from you. I would also like to hear from anyone else who has any news or views. Band reports are particularly welcome so that it is possible to see what there is to be worked on CW. As usual, my address is 144 Worple Road, Staines, Middlesex TW18 1EQ and I am correct in the callbook.

So until next time 73s es BCNU de Ian G3YWX VA.



50MHz Beacon List

Frequency	Callsign	Location	LOCATOR	ERPW	Antenna	Dir	Mode	Notes
50.005	H44HIR	Solomon Island	R100					(c)
50.005	ZS2SIX		KG25	25	Dipole	N/S	A1A	(c)
50.010	ZS6PW		KG44				A1A	(i)
50.011	JA2IGY	Japan	PM84JK	10	GP		A1A	(c)
50.020	GB3SIX	Anglesey	IO73TJ	100	3 Ele	NW	F1A	(c)
50.020	JA6ZIH		PM51RV	10	2xSqualo		A1A	(c)
50.023	HH2PR	Haiti						
50.030	CTOWW	Portugal	IN61GE	40	Dipole		F1A	(c)
50.032.5	ZD8VHF	Ascension	I122TB	50	JVL Vert		F1A	(c)2
50.035	ZB2VHF	Gibraltar	IM76HE	100	5Ele		F1A	(c)3
50.039	FY7THF	F. Guyana	GJ35	100	Dipole		F1A	(C)
50.040	SV1SIX	Athens	KM17					4
50.044	DL3ZM/YV5	Caracas					A1A	(i)
50.045	OX3VHF	Greenland	GP60QQ	20	G.P.		A1A	(c)
50.050	ZS6DN	Irene	KG44					(c)
50.050	GB3NHQ	Potters Bar	IO91VQ	15	Xd Dipoles		F1A	(c)
50.057.5	TF3SIX	Iceland	HP94CC	50	5/8 Vert			(c)
50.060	GB3RMK	Nr. Inverness	IO77UO	40	Folded Dip	N/S	F1A	(c)
50.060	PY2AA	Sao Paulo	GC66	25	G.P.		F1A	(c)11
50.060	K4TQR	Alabama	EM63	1	Dipole			(c)
50.060	WA8ONQ	Ohio	EM79	2	Turnstile		A1A	(c)
50.061	K1NFE	Conn	FN31	15	Turnstile			(c)
50.062	W3VD	Maryland	FM19	10	V Dipole			(c)
50.062.5	GB3NGI	Nr. Londonderry	IO65PA					(c)
50.063	N4PZ	Fla	EL87	400mw	Whip			(c)
50.064	N7DB	Oregon	CN85	30	Vertical			(c)
50.064	W5VAS	Louisiana	EL59	1	Halo			(c)
50.065	KL7WE	Alaska	BT51	1.5	3 ele		F1A	(c)1
50.065	KA0CDN	Colorado	DM79	20	Halo			(c)5
50.065	WO1JR	Colorado	DM79	20	Halo			(c)5
50.065.5	GJ4HXJ	Jersey	IN89WE	10	Halo			(c)12
50.066	VK6RPR	Perth	OF78	10	Ommi			(c)11
50.067	WB8IGY	Ohio	EM79	2	Vertical		A1A	(c)
50.067	W0BJ	Nevada	DN91	5	Turnstile			(c)
50.067	W4RFR	Tennessee	EM66	2				(c)
50.069	W4HHK	Tennessee	EM55	1	S. Dipole			(c)
50.070	KA4VEY	Alabama	EM64	10	Vertical			(c)
50.070	KB4UPI	Alabama	EM63	1	Dipole			(c)
50.070	K0HTF	Iowa	EN31	3	Inv Vee			(c)
50.070	N4LTA	S.C.	EM94	10	Halo			(c)
50.070	WA7ECY	Oregon	CN85	10	Vertical			(c)
50.070	WB0CGH	Texas	EM13	1	Ringo			(c)
50.070	WB4GIG	Virginia	FM06					(i)
50.070	W2CAP/1	Mass	FN41	15	V. Dipole			(c)
50.072	WA2YTM	New York	FN12	15	Turnstile			(c)
50.075	FY2AMI	Sao Paulo	GG67	5	G.P.			(c)
50.075	VS6HK	Hong Kong	OL72	30	G.P.			(c)
50.077	N0LL	Kansas	EM09	22	Halo		A1A	(c)
50.077.5	TI2NA	San Jose	EJ79					(c)11
50.080	HC8SIX	Galapagos Is	EI59	4	Vertical			(c)
50.080	WB4OOJ	Florida	EL87	10	Vertical			(c)
50.080	W1AW	Conn	FN31	50	6 Element	W		(i)
50.083	LU1DMA	Antonio/B.A.		25	Beam	NW		10
50.085	9H1SIX	Malta	JM65FV	80	5 Element			(c)
50.086	VE2STL	Quebec	FN46	1.5	Vert Pole			(c)
50.086	VP2MD	Montserrat	FK86	10	6 Ele	NW		(c)
50.088	VB1SIX	New Brunswick	FN65	50	5 Element	E		(c)
50.092	W5GTP	Louisiana	EM40	30	3 Element			(i)
50.095	K7IHZ	Arizona	DM43	20	Jqualo			(c)
50.099	KH6EQI	Pearl Harbour		100	Yagi			(c)
50.099	KP4EKG	Puerto Rico		10	6 Element			(c)6
50.099	HC2FG	Guayaquil	FI07	8	J-pole			(c)
50.100	VP5D	Turks/Caicos	FL41	10	G.P.		A1A	(c)
50.100	KG6DX	Guam	OK23	40	3 Ele			(c)78
50.110	KG6DX	Guam	OK23					(c)78
50.321	ZS5SIX		KG50	6	Halo			(c)11
50.490	JG1ZGW		PM5VP	10	Dipole		A1A	(c)
50.499	5B4CY	Cyprus	KM54	15	G.P.		F1A	(c)
50.904	ZS1STB	Stillbay	KF05	20	G.P.			(c)
50.020	ZI1UHF	West Auckland	RF73	25	V. Dipole			(c)
50.200	VK8VF	Darwin	PH57					
50.320	VK6RTT	Wickham	OG89	25	J-Pole			(c)
50.325	VK2RHV	Newcastle	QF57					(c)
50.345	VK4ABP	Longreach	QG26	10	Vert			(c)
50.350	VK6RTU	Kalgoorlie	PF09					(c)
50.370	VK7RST	Hobart	QE37					(c)
50.410	VK0MA	Mawson	MC12					(c)
50.420	VK2RSY	Sydney	QF56	25	Turnstile			(c)
50.425	VK2RGB	Gunnedah	QF59					(c)
50.435	VK4RTL	Townsville	QH30					(c)
50.450	VK5VF	Mount Lofty	PF94	20	Turnstile			(c)
50.460	VK6RPH	Perth	OF78					(c)
50.465	VK6RTW	Albany	OF84					(c)
50.470	VK7RNT	Launceston	QE38					(c)
50.485	VK8RAS	Alice Springs	PG66					(c)

Notes: (c) — Continuous 24hr operation. (i) Operational when openings possible.

1. Yagi turns with sun during daylight. 2. Beacon on the peak of Green Mountain. 3. Not operational at time of list. 4. Proposed beacons not yet operational. 5. Husband/YXL calls. 6. Operational 12-1300z, 2200-2300z and when op in shack. 7. 50.100 when unattended 50110 when op in shack. 8. 2100-0100z NE, 0100-0430z S, 0430-2100z SW. 9. Callsign to change to JA6YBR. 10. Computer controlled, op, 1800-0300. 11. note new Frequency. 12. Awaiting permit for callsign GB31OJ. Amstrad Data Base/Compiled by G4UPS.

VHF at Sandown



The Convention site at Sandown Racecourse.

G4HCL squeezes in — and out — of another successful VHF convention.

On April 16th, amateurs from near and far converged again on Sandown Racecourse for the annual VHF get-together. This event is always popular due to the excellent all-round facilities, with several lecture streams to suit most people's tastes, the large trade show, and the many special interest society stands.

This year was no exception, with the ground floor area being filled with an abundance of traders selling every thing from surplus valves to top-of-the-range commercial transceivers, the first floor being devoted to society stands catering for the interests of groups such as Worked-All-Britain (WAB) and Raynet, with many others. Another floor up, and three lecture rooms were in simultaneous use throughout the afternoon.

The convention itself opened at 10.30am, the car park rapidly filling up as BG2VHF operated efficiently on 145.550 and 433.550 to make sure no-one got lost on the roads. On arrival, home constructors must have had a shopping field day on the large number of surplus equipment stands, several of these offering bargain ex-PMR gear as featured in the pages of HRT. Digital modes of communications were very evident, with stands such as Siskin and Amdat offering packet radio equipment, and others providing everything needed such as monitors, keyboards, mainframes

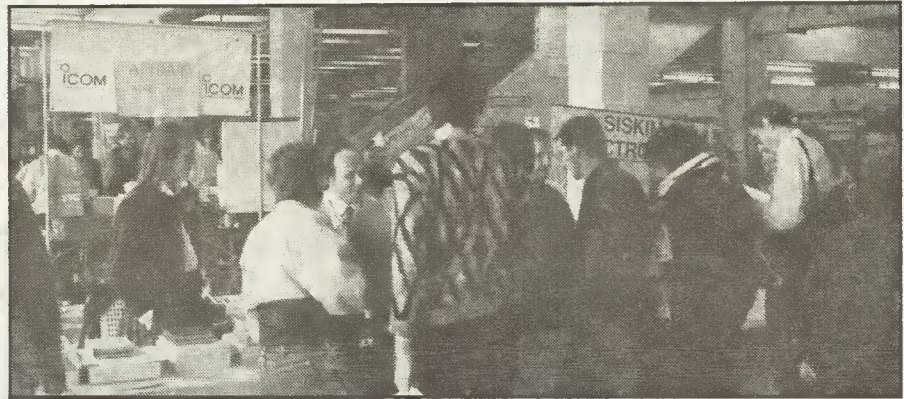
and disc drives to build up your own computer systems piece by piece. Looking upwards, VHF and UHF beams adorned the view throughout the hall, with virtually every conceivable type of array on display from

helices to log-periodics.

At mid-day, some parts of the hall were packed solid with amateurs, and it is true to say that people in some areas, myself included, just could not move backwards or forwards due to the crush. Those carrying goods back to their cars were even greeted with a queue to get out as the pass-out cards completely ran out due to the number of people! This, of course, is one of the prices to pay for attending a popular convention, apart from the £1.50 fee levied on entrance.

President's Address

At 1.30pm, some of us rested our feet and gained some elbow room in the Lecture Hall as the RSGB president Dr. Julian Gannaway G3XGF gave his convention address. He addressed the need for European harmonisation as we approach 1992, and suggested that a European Community Radio Society to complement



Good business at the trader stands.



The RSGB in one of its busy moments.



Dr. Gannaway presents the Harold Rose Trophy.



The pass-out queue for successful purchasers.

the IARU could help towards this. He discussed European EMC (electromagnetic compatibility) standards for example in commercial equipment designed for use on the amateur bands. He felt the rumour that only type-approved equipment would be allowed to amateurs would be a retrograde step, especially where home-constructed equipment is used, and that steps should be taken by the various national societies to stop this being enforced by governments as a condition for beginners' licences. He also hinted that legislation may be passed so that visiting amateurs from abroad may be able to operate the station of any UK amateur without prior formality.

Trophy Presentation

Next on the agenda was the annual presentation of trophies con-

cerned with VHF/UHF contests. Before this, Dr. Gannaway gave a special presentation of the Harold Rose Trophy, awarded to Alan Mills GW3NNF for services rendered to six metres in his capacity as the long-standing beacon keeper of GB3SIX. The award was accepted on his behalf by Brian G3COJ.

The name predominant in the contest awards was undoubtedly that of the 'Hillbillies' contest group, who came away with a total of six trophies in all, namely the Telford Trophy (50MHz), the VHF Manager's Trophy (70MHz), The Mitchell Milling Trophy (144MHz), the VHF Contest Committee Cup (1.3GHz), the G6ZR Trophy (2.3GHz), and the Surrey Trophy (VHF NFD Open). That's devotion for you!

Andrew Cook G4PIQ was presented with the Thorogood Trophy as

winner of the Single Operator section of the 144MHz Trophy contest, and the Sheppey Western Contest Group won the 1951 Council Cup as the overall winners of the 432MHz Trophy Contest. The Arthur Watts Trophy was awarded to the Warrington Radio Club Contest Group as winners of the VHF NFD restricted section, and the Tartan Trophy went to the MacAdders and Sheppey Western Contest Group as the leading GM station in VHF NFD. Finally, the Scottish Trophy awarded to the Edinburgh and District Radio Club as the leading GM in the Restricted Section of VHF NFD, and the Hanson Trophy awarded to the Bob Treacher BRS32525 as overall winner of the VHF Listener Championship were accepted by a member of the RSGB on their behalfs.

Lecture Streams

Immediately following the presentations, three lecture streams commenced, A, B and C. A commenced with 'EMC — What Does the Future Hold?' by G3UFB, followed by 'An Update on Sporadic E' where G3NAQ showed us how triple-hop sporadic E was a viable propagation path to the USA on VHF, and concluded with the VHF Committee forum where amateurs had a chance to air views and discuss current VHF matters such as bandplanning and licensing.

Stream B commenced with the Beginner's Guide to VHF Operating Techniques' when G4ASR showed what to do and more importantly what not to do when trying to fill your logbook with exotic call signs. This



The fruits of success in the contest group.



"Now how am I going to get this lot home?"

was followed by 'Microwave TV' with G8LES describing the happenings on TV on 23cm and above, few amateurs realising the number of re-

peaters operational on this band. Finally, G3YAC gave an interesting talk on 'Eastnet-Microwave Aspects of package Links' where the mys-

teries of inter-node packet radio linking on 23cm using 9600 baud data were explained.

Stream C began with G8AGN and the 'Potential of the Milli-Metric Bands' showing that the future could look very rosy for experimentally minded amateurs, followed by the Remote Imaging Group Annual meeting to discuss weather satellite reception and the like. Finally, the Morse Test Forum with G4GTO rounded the day off at 5.15pm.

Final Bargains

At this time, most of the traders were preparing to pack away, amateurs with an eye for a bargain suggesting their heavy junk items would be better sold to them for a bargain price rather than get taken back and placed into storage until the next rally. More than one amateur was seen to stagger away under the weight of a heavy HT transformer for the next linear project.

Yet another successful convention; yours truly is certainly looking forward to next year's.

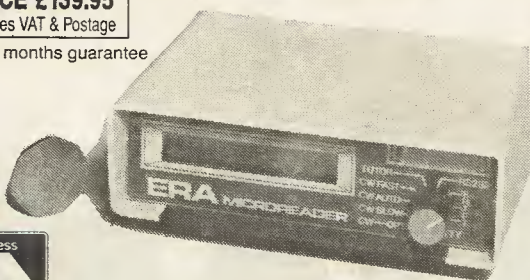
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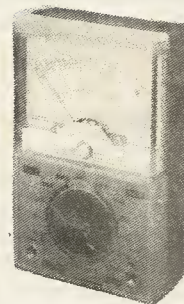
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Planning Permission The Painless Way!

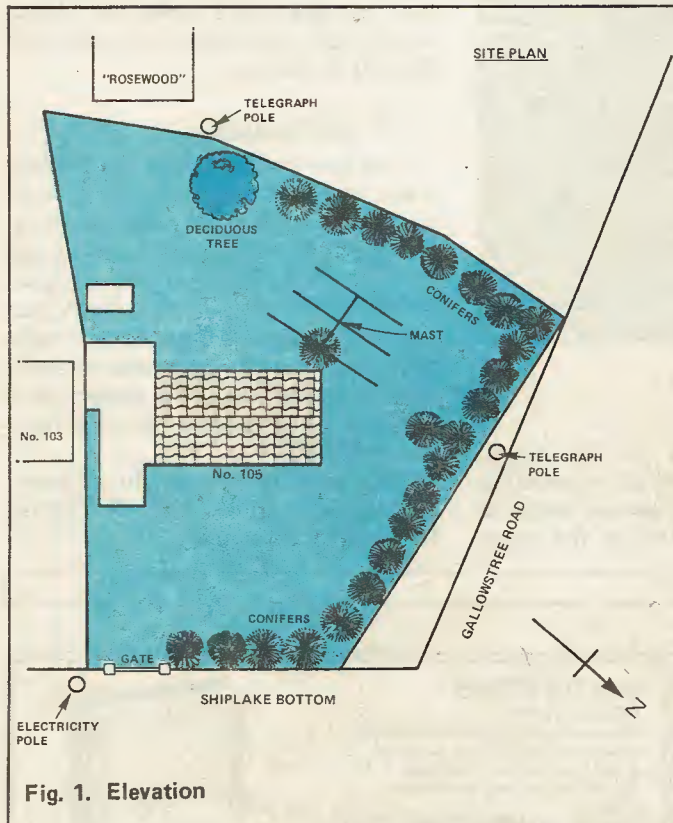


Fig. 1. Elevation

Most amateurs are only too well aware that their success depends on having the most effective antenna system, but there is often an unwillingness to go through the bureaucracy needed to get planning permission for such a system. This is perfectly understandable, especially now that it costs £33 just to have a planning application considered with, of

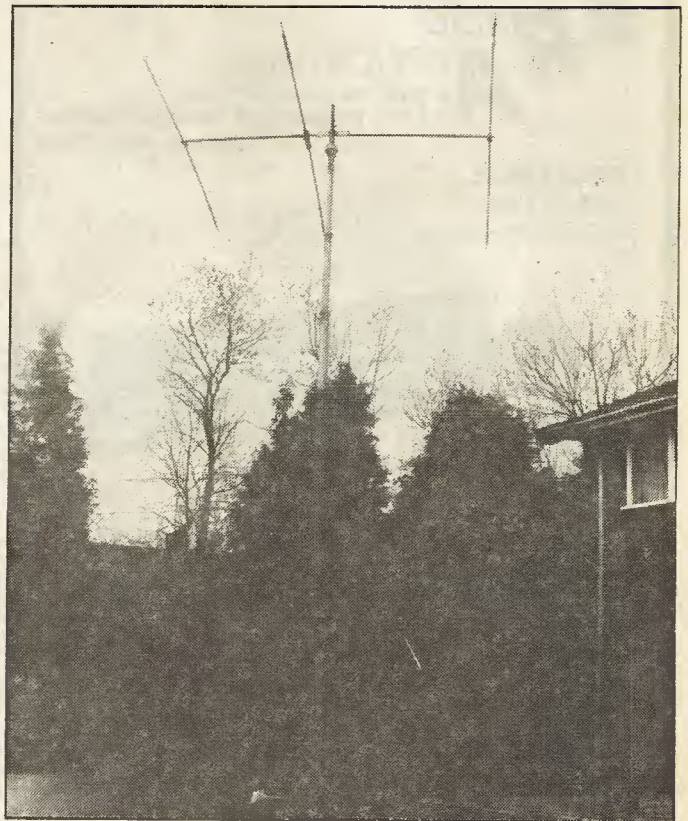
Obtaining planning permission can be a nightmare at the best of times but with a little timely advice from Don Field, G3XTT, the path should be somewhat less tortuous.

course, no guarantee of success. You may get away without planning permission for some antennas attached directly to the house, but the basic rule is always to apply for permission for anything above and beyond a TV aerial. Once you have that piece of paper you are in an excellent position should anyone moving into the area later take objection to your aerial system. Without it you may find that, even having had your antennas up for some time without problems, you are

asked to take them down or make a formal planning application.

Don't be frightened of applying for planning permission, even in an area where outside antennas are prohibited. This will be a general rule to prevent a mass of TV aerials, but amateurs have successfully made the case in such instances that the restriction should not apply to their amateur radio activities. In practice, if you have done your homework properly there is no reason in most cases why a planning application should fail. The various bodies involved in processing an application (parish, district and town councils, planning officers, etc) are there to see fair play, not to reject applications out of hand. However, given that such applications only come their way infrequently, it is up to you, the applicant, to give them as much reassurance as possible. This article, based on my own experience and that of others, gives some practical advice on how to proceed. My hope is that, having read it, you will feel encouraged to press on.

Most of us are not, of course, in the fortunate position of selecting our home purely with amateur radio in mind. Other considerations prevail. If we were so fortunate, we would probably go for a hilltop



location, well away from other people, with several acres of land and surrounded by enough trees to ensure some concealment for our antennas. In practice we are more likely to be living in a suburban location with neighbours close by.

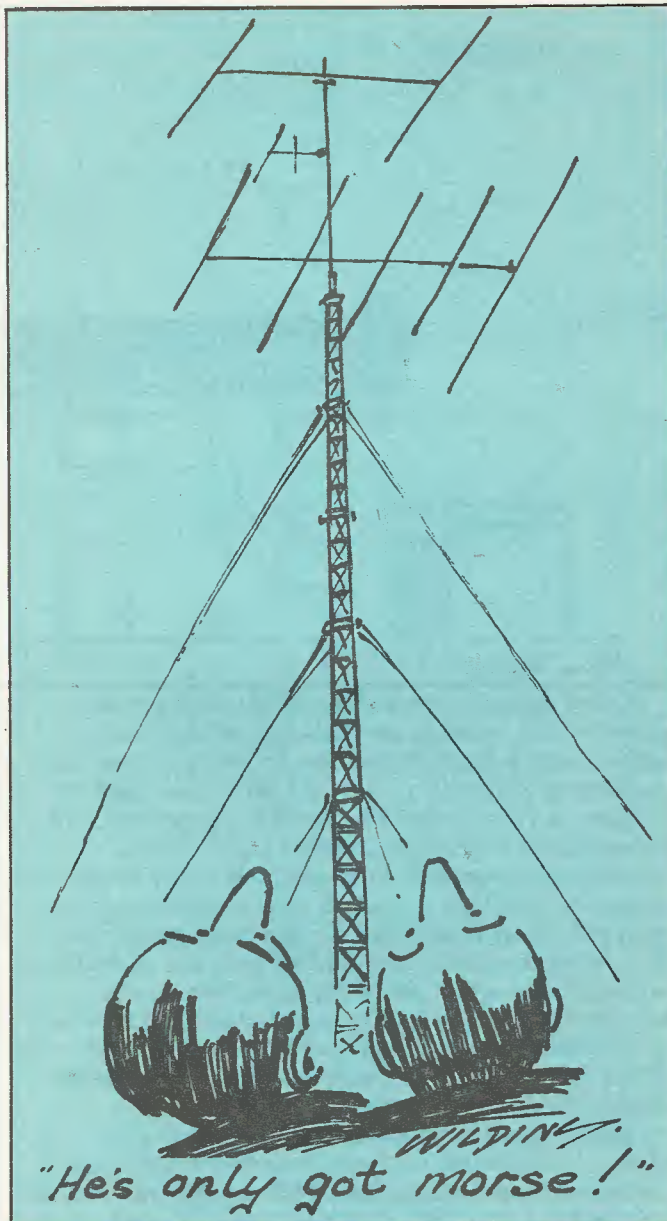
Timing

Common sense dictates that, having moved to a new QTH, you allow at least a few months for settling in and getting to know the local situation before putting in your application and for that 100ft tower and TH7. Make friends with your neighbours and gradually introduce them to the idea that you are a radio amateur. If they can see that, as well as being a radio amateur, you are also a perfectly normal human being, then you are half way to getting their support! This support is, of course, essential. If any of them object to your plans then your task will be very much more difficult. If, on the other hand, a more distant neighbour objects, while all those nearby have expressed their delight at what you have in mind, then that can only help your case.

At this stage investigate what else you may be up against. Is the parish council (where you live in a rural community) likely to be favourable? Attend some of their meetings as an observer and get to know them as individuals. Psychologically, it will be much harder for them to reject an application from someone they know (and who will, of course, be sitting in at the meeting when the application is finally discussed), than from someone who is just a name on a piece of paper.

Look, also, at your own plans, trying to put yourself in the position of a third party. Are you being totally unreasonable in what you are asking for? Some amateurs would advocate putting in for a monster tower and antennas on the basis that a suitable compromise might eventually be reached. Say that a 40 footer with stacked VHF beams that was all you ever really wanted in the first place. My own advice would be that you should actually start out applying for exactly what you think is reasonable, and then pursue that with vigour and thoroughness. What would suit your purpose best? Would you prefer to get permission for a 40ft mast which will stand permanently at that height, or would you rather go for a 60 footer and be prepared to retract it when not in use? Believe it or not, the authorities can be very flexible when you approach them in a sensible, level headed and well-argued manner. Some applications simply don't deserve to succeed and some Amateurs ask for far too much. I remember seeing a four element HF beam on a mast about 20ft high, and hanging over the gardens of the neighbours on either side. It looked totally out of place and made me embarrassed to be a radio amateur. I don't know if the aerial concerned had planning permission. I doubt it. On the other hand, many amateurs are shy of applying even for a modest installation, and there really is no excuse for this either.

There are other things to do at this stage. If you are a member of the RSGB, contact them for a copy of their booklet "Planning Permission, Advice to Members". Telephone your District Planning Officer, both to get a set of application forms, but also to see



what stance the District Planning Committee (the final arbiters) are likely to take.

Planning Officer

In my own case the Planning Officer told me that, while he was broadly sympathetic with what I wanted to do (which was to put up a telescopic 56ft mast with tribander), he didn't rate my chances given that the Committee had rejected every application of this kind to have come before them in the last few years. Not a good omen, but at least I had some idea of what I was up against. Completing the forms isn't a particularly onerous job, but there are a number of important points to bear in mind. Firstly, presentation is all important. To an extent your credibility will be judged on how well the application is put together. If it is presented well, preferably typed and with neat diagrams, this will carry a certain amount of weight because it suggests that you know what you are doing.

ELEVATION

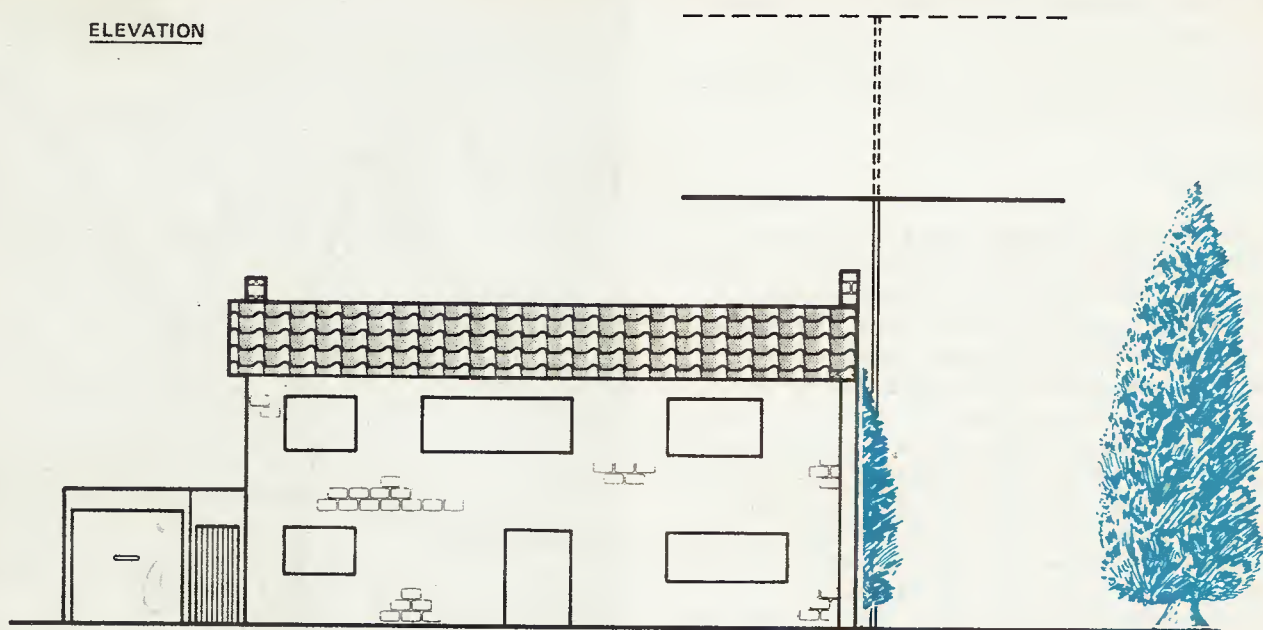


Fig. 2. Site plan

Don't describe what you intend to put up as a tower, which conjures up visions of an electricity pylon. Call it a mast. Remember to make it clear that the application is for a mast "which will be used for supporting various aerial systems in connection with the applicant's hobby of amateur radio". Some amateurs have omitted this, and have found at the end of the day that they ended up with permission for a mast but no antennas! But, on the other hand, don't limit yourself to a specific type of antenna, or you may be caught out when you want to replace it with something different. Ideally you should include details of the mast to be used, and perhaps a photograph of a similar installation. The suppliers of masts will often provide this kind of material on request.

Remember to include in the application any relevant information such as the proximity of trees which will hide the proposed mast, or the fact that the mast will be retracted when not in use. You will, in any case, be required to provide a map showing where your house is in relation to others, plus detailed drawings showing where the mast will be positioned. The first of these is easy enough. A 1/250 scale OS map of your location can be obtained from various sources such as the Land Registry or from certain OS distributors who hold a complete set of microfilm maps and can provide hard copy for a modest charge. The plan and elevation should be more or less to scale, and should show the position of the mast in relation to neighbouring houses, boundary lines, trees, etc. My own (Figs 1 and 2) took just one evening to draw after making some detailed measurements around the garden.

When you have put the application together, don't simply send it off to the Planning Officer with your cheque. Write a covering letter explaining the background to the application with any useful information that didn't fit neatly into the application form. For example, you may want to explain a little bit about amateur radio, its benefits to the community and the differences between it and CB. After all, the

majority of those who see your application probably won't have any idea what amateur radio is all about. Explain in layman's terms why a simple piece of wire won't be satisfactory for what you have in mind. And tell them that you have contacted your close neighbours and already have their support (better still, enclose letters of support from your neighbours).

The Planning Authority will circulate your neighbours with details of the application. In my case the Parish Council did this as well. If this is the first they have heard of it they are likely to panic. If you have already warned them their panic will be less. If you have got their prior written approval this is best of all, because it is then extremely hard for them to object when the Council letter arrives. Details of your application will be published elsewhere, such as in the local newspaper, giving all and sundry the opportunity to object.

When you write the covering letter with your application, give evidence of your own credentials. For example, tell them that you are a long-time member of the local radio club, and have every reason not to blacken the name of amateur radio. Even better, make sure you are a member of RAYNET, or offer your services to the parish council as an advisor on emergency communications (all Parish Councils are expected to have plans for both civil and military emergencies, but often can't find suitable experts in their midst). And finally, offer to answer any queries they may have about your application. Indeed, ask them to let you know when your application will be discussed, so that you can attend the relevant meetings of Parish Council, District Planning Committee, etc. The reason you give for this magnanimous offer will be to explain to them anything which they don't understand. In reality, the main reason for going is that it is always harder for them to reject your application out of hand if you are on-hand listening to every word they say.

Once your application has been sent in, and the Council have circulated your neighbours and put



" I'M DELIGHTED TO HEAR THAT YOU, TOO, ARE EX-CAMOUFLAGE CORPS "

details in the local press, the public will have a period of 21 days in which to register any objections. If you have done your groundwork properly there shouldn't be any or, if any do arise, they should be easily refuted. When my own application went in, a distant neighbour (too far away for me even to have considered approaching beforehand) objected on the basis of what he imagined my aerial would look like on the skyline (which bore no relation to the plan I had submitted). Even though this objection arrived after the closing date the District Planning Committee, in true British fashion, took notice of it and decided to visit my QTH en masse to look over the ground for themselves. Once they had seen how ludicrous the objections were, my application went through smoothly. I have recently heard about an amateur in the West Country whose application was rejected out of hand simply because of one late and ill-informed objection, so it really is important to try and anticipate any problems beforehand. Of course, if your application is rejected there is always a right of appeal, and you could go to a higher authority such as the local MP if you believe you have been treated unfairly. However, the ideal is always to see the application through smoothly first time around.

Incidentally, it is always worth checking for precedent. Have other amateurs in your area successfully obtained planning permission? Can they give you any hints and tips? In my case, as I said earlier, this wasn't so. However, once I had opened the door, so to speak, another amateur living within the same local authority area was able to re-apply, having previously had his application rejected, quoting my

own case. He also took a few lessons from the way in which I had successfully seen my application through, and this time his application was passed.

One question which will inevitably arise when applying for planning permission for an amateur radio antenna is whether it will cause TVI. Although TVI issues should have no bearing on a planning application, which is all to do with aesthetics and structural issues, the question cannot be avoided. Deal with it sensibly. Point out that without a properly installed antenna you may have to resort to wire antennas at a lower height, and this would be *more likely* to lead to TVI. Also point out that it is in your interest as well as theirs to avoid TVI by proper attention to your station and that, if problems do occur, you will do your utmost to deal with them (remember to keep this promise when the time comes, which inevitably it will). However, don't even think about applying for planning permission if you currently have TVI problems. Sort out the problems first and then think about the planning application later. An amateur who can't deal with TVI problems doesn't, in any case, deserve a big tower and beams.

If you have read the above and said to yourself, "this is nothing but common sense", then fine, that's exactly what it is! However, most applications which fail, do so because amateurs have rushed into them and have forgotten some of the basic steps. If you want something enough, surely it is worth going about it in a methodical and thorough way. Some careful preparation will reap dividends. I look forward to seeing many more towers and beams springing up around the countryside.

Technology Roundup

Ian Poole G3YWX looks deep into the crystal filters

Dramatic developments in crystal filter technology made them cheaper and smaller while improving their performance. It is not many years since crystal filters were comparatively large, expensive and made from a series of high tolerance discrete crystals (Fig. 1). This has changed with the discovery of the monolithic crystal filter.

trodes of aluminium, silver or gold. These are carefully deposited onto the crystal under highly controlled conditions to give an exact area of thickness.

How do they Work?

The basic physical construction of the filter is shown in Fig. 2. The crystal exhibits the piezo-electric

effect, and when a signal is placed across one pair of plates it is converted into a mechanical vibration. This vibration passes across the crystal and generates a potential across the second pair of plates. In order for the mechanical vibration to be set up its frequency must be that of the resonance of the crystal.

An equivalent circuit is shown in Fig. 3. L_1 and C_1 determine the resonant frequency. There are two resonant circuits involving L_1 and C_1 , which are represented by different dimensions on the crystal. Because of this the crystal dimensions must be accurately maintained to ensure both tuned circuits have the same, or nearly the same, resonant frequency. L_2 is the internal resonance coupling and C_0 and C_p are parasitic capacitances. C_0 represents the capacitance between the top and bottom plates while C_p is the capacitance between input and output. This must be kept to a minimum, or the stopband performance is impaired. Often two or more filters are placed in series to improve this.

It is best to operate the filter in its fundamental mode but this limits the frequency to 30MHz. If higher frequencies are required then the filter can be used in an overtone mode.

This considerably raises the upper frequency limits and makes this filter technology even more versatile.

The Future

The development of monolithic crystal filters has been reflected in amateur radio. Almost all crystal filters now are monolithic and this has enabled them to be miniaturised in keeping with other components. In addition, their performance has been enhanced. Future developments should see further price reductions, and improvements in filter characteristics and the highest frequencies at which these filters can operate.

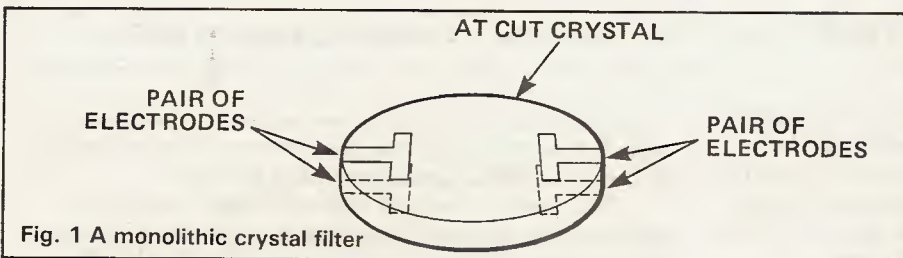


Fig. 1 A monolithic crystal filter

What are They?

The basic monolithic filter structure consists of two pairs of electrodes on a single AT cut crystal resonator. They are coupled to each other via the crystal resonator in such a way that they use its properties to give a highly selective filter.

It has been known for years that dividing the electrodes on certain crystal resonators formed a two pole bandpass filter. The mechanism behind this was not understood until a breakthrough occurred at Bell Laboratories in the USA in 1965. One of the research scientists, named Sykes, recognised that the divided electrode filter consisted of two acoustically coupled resonators. Having discovered the way in which these filters worked, it became possible to develop the idea further. The performance of the filters was improved and they became easier to manufacture.

Today's monolithic crystal filters consist of an AT cut crystal with elec-

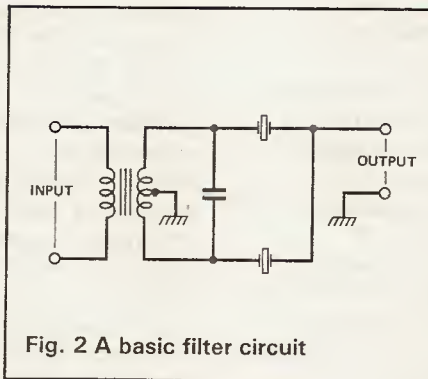


Fig. 2 A basic filter circuit

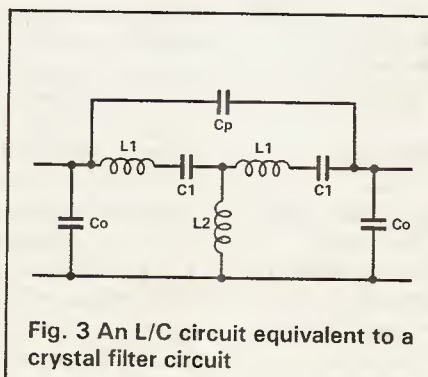


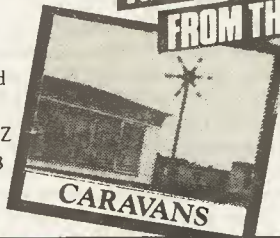
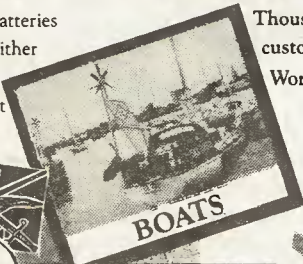
Fig. 3 An L/C circuit equivalent to a crystal filter circuit

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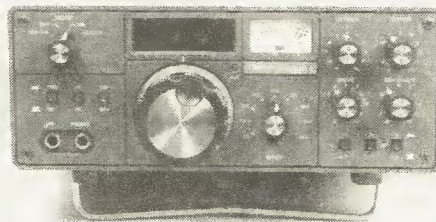
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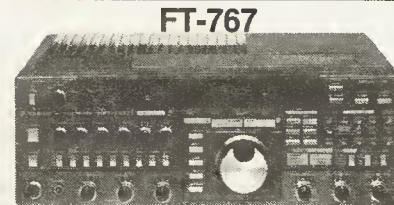
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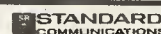


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RADIO Tomorrow

On these club contacts and forward diary pages, dates are shown approximately from the week of publication to the end of the cover month, and further into the year where dates have been supplied. If we get a yearly schedule, we will incorporate half-yearly slabs, to save space and admin and allow for alterations. We need dates at least three calendar months in advance to get them into the nearest issue. For example: the last possible issue for dates from mid-August to mid-September is the September issue. The September issue normally appears on the first Friday in August, and we need club dates by the second Friday in June. Club dates received well in advance will normally be run in more than one issue. Also, please write and let us know if your club has ceased, or changed its name or contact.

SCOTLAND

Aberdeen ARS. Contact: Don Tel. 04676 251.
Ayr ARG. Contact: Robert Paterson GM4CUB Tel. 0292 262496.
Dunfermline RS. Contact: GMDYD Tel. 0383 413440.
Galashiels DARS. Contact: GM3DAR Tel. 0896 56027.
Glenrothes DARC. Contact: Sep 16 Scottish National AR Convention at Fife Institute of Physical Recreation, Glenrothes. Contact: John Hardwick GM4ALA Tel. 0592 742763 6hm7 (0506 410677 (wk)).
Inverness ARC. Contact: Brian Tel. 0463 242463.
Lothians RS. Contact: P J Dick GM4DTH 21, West Maitland St., Edinburgh EH12 5EA. Prestel Mailbox (NOT phone) 314471210. Meetings: 2 and 4 Thursdays 7.30pm Orwell Lodge Hotel, Polworth Terrace, Edinburgh. Jun 14 AGM Jun 28 Barbecue.
Louth DARC. Contact: G11ZB, Tel. 047286 595.
Mid Lanark ARS. Contact: David Williams GM1SSA, Tel. Holytown 732403. Open Day 1989 Sunday June 11, Community Education Centre, Newarthill, by Motherwell A723, 1½ miles south of Newhouse interchange M8/A73.. Traders, bring and buy, packet radio demos, RTTY, QRP, lectures, EH1 annual trophy award. Talk in on S22.
Westside SWC. Contact: Bernie Lyford Tel. 0703 893937.
Westmoreland ARS. Contact: G. Chapman Tel. 0539 28491.

NORTH EAST ENGLAND

Barnsley ARC. Contact: Ernie G4LUE, 8 Hild Av, Cudsworth.
Bourne DARS. Contact: Vince Cawthron G4ODG Tel. 0778 422795.
Derby Dale DARC. Contact: G3SDY Tel. 0484 602905.
Derby DARC. Contact: Kevin Jones G4FPY Tel: 0332 669157.
Meetings: 119 Green Lane, Derby. 7.30pm. Most Wednesdays. Jun 14 2m direction-finding in Allestree Park Jun 21 Barbecue, Drum hall, Little Eaton Jul 5 Junk sale Aug 13 Berby Radio Rally, Lower Bemrose School, St. Albans Rd., Derby. All the usual, and monster junk sale. Contact: Martin Shardlow 0332 556875.
Doncaster ARC. Contact: K. McMahon Tel. Doncaster 852938.
Elvaston Castle Rally Jun 11 Over 100 trade stands, refreshments, childrens' entertainments, craft tent, country park. Cap parking 50p. 5 miles south of Derby on B5010. Contact: John Robson 0332 767994.
Halifax DARS. Contact: D. Moss Tel. 0422 202306.
Hornsea RC. Contact: Richard Tel. 0401 62498. Meetings: The Mill, Atwick Rd., Hornsea. 8pm.
Holyland ARC. Contact: M. Wardle, 11 Sokwell Ave, Barnsley
Keighly ARS. Contact: K A Conlon G1IGH. Tel. Bradford 496222.
Meetings: Wednesdays, 8pm, The Clubroom, rear of Victoria Hall, Keighly, Yorkshire. Jun 27 Wildlife on the Falklands, slides by G0FRQ Jul 11 Night on the air Jul 25 Visit Leeds/Brandford airport (not ATC).
Leeds DARS. Contact: G1EBS Tel. 0274 665355.
Loughborough ARC. Contact: Philip Tel. 0509 412043.

Mansfield ARS. Contact: J M Coates G4GYU Tel. 0623 27257. Meetings: Fridays.
Morecambe Bay ARS. Contact: G4ZJL Tel. 0524 52042.
Pontefract DARS. Contact: Colin Mills G0AAO Tel. 0977 43101. Pontefract Racecourse Rally July 16 11am, 50p. Contact: C. Mills 0977 43101. Jul 27 Fox hunt.
Rotherham ARC. Contact: F. Moody Tel. Rotherham 552925.
Rugby ATS. July 30 AR Car Boot Sale Lodge Farm, Walcote, Nr. Lutterworth, Leics (near M1) £5 pitch 10am Contact: Kevin G8TWH Tel. 0203 441590 David G4DDW Tel. 0455 52599.
Scarborough ARS G4BP. Contact: I G Hunter G4UQP, Station Rd., Scalby, Scarborough, N. Yorks YO13 0QA. Tel. 0723 376847. Scarborough ARS Rally 1989 30 July at the Spa, Scarborough, on the south shore seafront. Open 11am. Talk-in on S22. Trade stands, bring and buy, refreshments and bar.
Sheffield ARC. Contact: Alan Pemberton. Tel. Sheffield 670866.
Sheffield Packet Group. Contact: P. Green, 6 Yews Close, Worrall.
Spalding ARS. Contact: Terry G4TWR Tel. 0775 2940.
Stockton DARS. Contact: G. Noble c/o Causeway Community Centre, Billingham, Stockton on Tees Meetings: Weds Causeway Community Centre 7.30. RAE and morse tuition regularly.
Tyneside ARS. Contact: G. Lindsay G4KOT, 12 Augusta Court, Harrian Park, Wallsend, Tyne & Wear NE28 9QZ.
Wakefield: North Wakefield RC. Contact: J M Hotchin, White Horse Inn, Fall Lane, East Ardsley, Wakefield.
Wigston ARC. Contact: G6HAJ Tel. Leicester 403105.
Worksop ARS. John Huggins G0DZX Sheffield S31 7BX. Tel. 0909 565856. Meetings: The Clubhouse, West St., Worksop.

NORTH WEST ENGLAND

Aire Valley RS. Contact: G6NPT Tel. 0532 44597.
Chester DRS. Contact: Dave Tel. 0244 336639.
E. Lancs ARC. Contact Frank G4CSA Tel. St Annes 720867. Meetings: South Shore Lawn Tennis Club, Midgeland Road, Blackpool. 2 and 4 Thursdays. NB new venue. Jun 22 Visit British Nuclear Fuels, Salwick. Names to sec. in advance. Jul 27 informal.
Isle of Man ARS. Contact: J. Wrigley, 20 Fairy Hill Close, Ballafession, Port Erin, Isle of Man. Tel. 0624 834257.
Kirkby ARC. Contact: meetings. Meetings: Weds Kirkby Sports Centre, 17 Valley Rd., Westvale, Liverpool 7.30.
Liverpool DARC. Contact: W H G Metcalfe G6VS, 38 Kempton Rd., Wavertree, Liverpool. Meetings: Tuesdays, Conservative Club, Church Rd., Jun 13 Construction/on-air Jun 20 VHF NFD preparation Jun 27 Surplus sale Jul 4 Quiz by Ian G4WWX Jul 11 Construction, on-air Jul 18 Inter-club quiz Jul 25 Surplus sale.
Morecambe Bay ARS. Contact: D H Wood G4ZJL Tel. 0524 52042. Tuesdays 7.30 Trimpell Sports and Social Club, Out Moss Lane, Morecambe, Lancs.
Preston ARS. Contact: George Tel. 0772 718175.
Staffs ARS. Contact: Bill G4WTP Tel. 0782 514741.
Stockport RS. Contact: John Verity G4ECI Tel. 061 439 3831. Meetings: Dialstone Community Centre, Lisburne Lane off

Dialstone Lane, Offerton, Stockport. 8pm. 2 and 4 Weds.
Todmorden DARC. Contact: Esde Tyler GOAEC Tel. Halifax 882038. Meetings: 1,3 Thursdays.
Warrington ARC. Contact: Paul G0CBN Tel. 0925 814005.
Wirral ARS. Contact: A Seed G3FOO Tel. 051 644 6094.
 Meetings: 1,3 Wednesdays 7.45 Ivy Farm, Arrows Park Rd., Birkenhead. Jun 21 A capacitor by Len Roberts G3EGX Jul 5 DF contest Jul 19 Equipment sale for funds.

WALES

Abergavenny and NH ARC. Contact: GW4XQH Tel 0873 4655.
Aberporth ARC. Contact: GW0DPR Tel. 023987 274.
Bridgend DARC Contact: D E George GW10UP Tel. 0656 723508.
Conwy Valley ARS. Contact: R A Hinton Tel. 01 301 1864.
Delyn RC. Contact: Stephen Studdart GW7 AAV Tel. 0244 819618. Meetings: Daniel Owen Centre, Mold, Clwyd. Every other Tuesday. Jun 20 Radio Investigation Service visit, equipment checks available. Jul 4 American quiz Jul 18 Weather Forecasting.
Newport ARS. Contact: GW7BSC Tel. 0633 62488. July 2nd Grand Surplus Equipment/Junk Sale, Brynglas House, Newport. 11 (10.30 disabled) to 4. Auction 12 to 3. Refreshments, talk-in. Proceeds to support Project YEAR. Details: NARS, PO Box 33, Newport, Gwent.
North Wales: Dragon Amateur Radio Club/Clwb Radio Amtatur Y DDraig GW4TTA. Contact: Tony Rees Tel. 0248 600963. Meetings: At the Four Crosses, Pentraeth Rd., Menai Bridge. 7.30pm. 1 and 3 Jun 19 Security in the home and shack by John Parry GW3VVC.

THE MIDLANDS

Birmingham: Midland ARS Contact: Paul O'Connor G1ZCY Tel. 021 443 5157. Meetings: Thursdays 7.30 at Unit 16, 60 Regent Place, Jewellery Quarter, Birmingham. 19 Nov Mars Mini Rally at Stockland Green, Birmingham. Details to come. Regular morse tuition.
Coventry ARS. Contact: Johnathan Ward G4HHT Tel. 0203 610408. Meetings: Baden Powell House, 121 St. Nicholas St., Radford, Coventry. 8pm. Fridays. Jun 16 Canal trip Jun 30 2m direction finding contest. Regular on-air/morse tuition Jul 7 Visit to Rolls Royce Heritage Trust (provis) 14, 21, 28 On-air and morse tuition.
Mid Warwickshire ARS. G4TIL Tel. Southam 4765. Stourbridge, West Midlands DY9 0YH.
Rugby ATS. Contact: Kevin Marriott G8TWH, 77 Lloyd Crescent, Stoke Hill, Coventry CV2 5NY. Meetings: Cricket Pavilion, BT1 Radio Station, B entrance, A5 Trunk Rd., Hillmorton, Rugby. Tuesdays 7.30. Jun 13 Prep for VHF NFD Jun 20 DF Hunt Jun 27 Top band DFing by Geoff Foster.
Stratford on Avon DRC. Contact: David G0HWZ. Tel. 0789 750584. Meetings: 2 and 4 Mons, 7.30pm, Baptist Church, Payton St., Stratford on Avon. Jun 12 Foxhunt on 2m Jun 26 Worked all Britain by Dr. Robert Nash G4NEE Jul 10 Amateur satellites Jul 24 Constructors comp.
Stourbridge DARS. Contact: C. Brunn G1WAI Tel. 0562 885602. Meetings: Robin Woods Centre, Beauty Bank, Stourbridge, Worcs. 1 and 3 Mondays.
Telford DARS. Contact: Tom Crosbie Tel. 0952 597506.
West Bromwich Central RC. Contact: Bill Oakes G1YQY, Tel. 021 556 3183.
Wolverhampton ARS. Contact: Keith Tel. 0902 64173.
Wythall RC. Contact: Chris Pettitt G0EYD Tel. 021 430 7267.

SOUTH WEST ENGLAND

Bath DARC. Contact: G4UMN Tel. Frome 63939.
Bristol: North Bristol ARC. Contact: Alan Booth Tel. 0270 690404.
Bristol: South Bristol ARC. Contact: Len Baker G4RZY. Tel. 0272 834282. Meetings: Whitchurch Folk House, East Bundry Rd., Whitchurch, Bristol BS14 0LN. Wednesdays. Jun 14 Microwave activity on Dundry Hill Jun 25 Longleat rally Jul 1/2 VHF national field day Jul 5 Lecture Jul 12 HF activity Jul 19 VHF activity/committee meeting. Jul 26 CW activity.

Cornish RAC. Jul 15 Cornish RAC Ralley, Richard Lander School, Truro. Trade, bring and buy, computer display and demo, refreshment, parking. Family attractions. Contact: Rolf Little Tel. 0872 72554.

Dorset: Aug 13 Hamfest '89, Flight Refuelling Sports Grounds, Wimbourne, Dorset. Trade, crafts and gifts, field displays. 10am. Parking, camping. Contact: John GOAPI 0202 691649 Rob G6DUN 0202 479038.

Evesham: Vale of Evesham DARS. Contact: John G3DEF Tel. Evesham 6407. Meetings: 1 Thurs at 7.30pm at MEB Club, Worcester Road, Evesham (B4084 on left entering town).

Exeter ARS. Contact: R. J. Doune Tel. 0392 78710. Meetings: Community Centre, St. David's Hill, Exeter 7.30pm. Jun 12 Surplus sale. Jul 10 Construction competition.

Plymouth ARC. Contact: G4SCA Tel. 0752 337980 Poole ARS. Contact: G0EQV Tel. 0202 674802.

Salisbury RES. Contact: Neil Tel. 0980 22809.

Salop ARS. Contact: Fred Hall G3NSY Tel. 0743 790457.

Meetings: 2, 4 Thursdays, The Olde Bucks Head, Frankwell, Shrewsbury 8pm.

Thornbury DARC. Contact: Tom Cromack G0FGI, Rose Cottage, The Naite, Oldbury on Severn, Bristol. 1 and 3 Wednesdays, 7.30 United Reform Church, Chapel St., Thornbury, Evesham Jul 5 Amateur tv Jul 19 HF activity.

Torbay ARS. G3NJA, G8HJA. Contact: Bob McCreadie G0FGX Tel. 03646 233. Meetings: the ECC Club, Ringslade Rd., Nr. Highweek. Natter nights most Fridays. 7.30pm

Trowbridge DARC. Contact: Ian Carter GG RA Tel. 0380 830383. Meetings: Usually 4 Wednesdays, 8pm, TA HQ, Bythesea Road, Trowbridge. Jun 21 6.30am 2 metre fox hunt Jul 19 6.30am Picnic.

Yeovil ARC. Contact: David Bailey G1MNM, QTHR. Meetings: The Recreation Centre, Chilton Grove, Yeovil. 7.30pm, Thursdays. Jun 15 Aerial directivity G3MYM Jun 22 Sky Wave Absorption G3MYM Jul 6 HF radio noise G3MYM.

SOUTH EAST ENGLAND

Basingstoke ARC. Contact: D. Deane G3ZOI Tel. 0734 332777 (hm) 0734 787930 (wk). Meetings: The Forest Ring Community Centre, Sycamore Way, Winkelbury, Basingstoke. 7.30pm. 1 Mondays.

Bedford DARC. Contact Ray G0EYM. Tel. 0234 244506. Special Event Stations GB2WW and GB4BOB commemorating World War 2. Jul 15 Cardington Airfield, 50th Anniv. 157 Squad. ATC.

Biggin Hill ARC. Contact: Geoff Milne G3UMI, 142 Hayes Lane, Hayes, Meetings 3 Tuesdays, Victory Social Club, Kechill Gardens, Hayes. Jul 18 PCBs.

Braintree DARS. Contact: N. Willcombe Tel. 0376 45058. Meetings: Braintree Community Association Centre, Victoria St. 7.30pm. 1 and 3 Monday. Club net C6BRH or G4JXG, 2m 2 and 4 Mondays, 8pm.

Bredhurst RTS. G0BRC. Contact: Kelvin Fay Tel. 0634 376991.



- Brighton DARS.** Contact: Peter Tel. 0273 607737. Meetings: 1 and 3 Wednesdays, Roast Beef Bar, Brighton Racecourse, Elm Grove, 8pm Jun 21 Sussex Mobile Rally briefing Jul 5 On air Jul 15 Saturday working party at Brighton Racecourse Jul 16 Sussex Mobile Rally (Sussex Amateur Radio and Computer Fair, Brighton Racecourse. Jul 19 Debriefing and ragchew.
- Bromley, Kent.** Tel. 01 462 2689. Meetings: The Victory Social Club, Kechill Gardens, Hayes, Kent. 7.30pm. 3rd Tuesdays.
- Burnham Beeches RC.** Contact: G6EIL Tel. 0628 2570. July 23 6th McMichael Rally with Maidenhead DARC at Haymill Centre, Burnham (Slough). CAMRA bar, food, parking, radio controlled cards, ATV group, packet and HF stations, £1, car boot area £5, from 10.30 (10.15 disabled). Contact Bob Hearn G0BTY Tel. 0494 29868.
- Cambridge DARC.** Contact: D. Wilcox Tel. 0954 50597.
- Chesham DARS.** Contact: L. Cabban Tel. 09278 3911. Meetings: The Stable Loft, Bury Farm, Pednor Rd., Chesham. 8pm Weds.
- Cheshunt DARC.** Contact: Roger Frisby G4OAA Tel. 0992 464795. Meetings: Thursdays, 8pm, Church Room, Church Lane, Wormley, Herts.
- Chichester DARC.** Contact: C. Bryan G4ZTD Tel. Chichester 789587. Meetings: St. Pancras Hall, St Pancras, Chichester. 7.30. Club net G8WSX S11 Mondays 7.15pm. 1 and 3 Tuesdays. Jul 16 Sussex Amateur Radio and Computer Fair, Brighton Racecourse.
- Clifton ARS.** Contact: Martin Brown G0DGC Tel. 01 691 2341.
- Coulsdon ATS.** Contact: Alan Tel. 01 684 0610
- Crawley ARC.** Contact: Jack Tel. 0293 28612.
- Dover: South East Kent YMCA ARC.** Contact: Des Edwards Tel 0304 203073. Meetings: Dover YMCA, Godwynehurst, Leyburne Rd., Dover, Kent CT16 1SN. Wednesdays. Jun 24-25 Waldershare Vintage Weekend special event station GB2 WVV Jul 19 Morse tests Nov 15 Morse tests.
- Dunstable Downs RC.** Contact: Tony Kelsey-Stead Tel. 0582 508259. Meetings: Room 3, Chews House, 77 High St. South, Dunstable, Beds. Fridays. Jun 18 DF/Treasure hunt. Sep 10 5th National Amateur Radio Car Boot Sale at The Shuttleworth Collection, Old Warden Aerodrome, Nr. Biggleswade, Beds. 10am. Fly in permission Northill 288.
- Eastbourne EARC.** Contact: G1BRC Tel: 0323 29913.
- East Kent ARS.** Contact: Stuart Tel. 0227 68913.
- Edgware DRS.** Contact: Ian Cope G4IUZ, Tel. Hatfield 65707. Meetings: Watling Community Centre, 145 Orange Hill Rd., Burnt Oak, Edgware. 2 and 4 Thursdays.
- Farnborough DRS.** Contact: Tim Fitzgerald G4UQE, Tel. 0276 29231. Meetings: 2, 4 Wednesdays, Railway Enthusiasts Club, off Hawley Lane (M3 bridge), Farnborough, Hants. June 28 HF FD summary, VHF FD planning Jul 12 Quiz Jul 26 VHF FD summary Aug 9 Linear Amps by G3HEJ.
- Felixtowe DARS.** Contact: G4YQC Tel. 0473 642595.
- Grafton RS.** Contact: Rod Harrigan G0JUZ Tel. 01 368 8154. Meetings: Holy Trinity Church Hall, Stapelton Hall Rd., London N4. 2 and 4 Fridays.
- Hastings ERC.** Contact: Dave Shirley Tel. 0424 420608.
- Hilderstone RS.** Mobile Rally and Convention, Hilderstone College, St. Peters Road, Broadstairs, Kent July 30. Traded, bring and buy, lectures, raffle, 10am on. Contact: Alan 0843 593072 or Ron 0304 812723.
- Horsham ARC.** Contact: P. Godbold Tel. Styning 814516. Meetings: Guide Hall, Denne Rd., Horsham, Sussex. 8pm. First Thursdays.
- Huntingdonshire ARC.** Contact: G8LRS Tel. 0480 56772. Packet GB7HXA. Meetings: 1 and 3 Thursdays The Medway Centre, Coneyeare Road, Huntingdon, Cambs 7.30am. Aug 28 "Junk 88" sale and auction 10.30-5.00. Talk-in and refreshment.
- Itchen Valley RC.** Contact: G1HPQ Tel. Southampton 736784.
- Loughton DARS.** Contact: J D Ray G8DZH Tel. 01 508 3434 (ev); 015083434 Micronet 800 mailbox, TeleGold 74:MIK1824; packet G8ZDH at GB7ESX. Meetings; Loughton Hall, Rectory Lane, Room 20, 7.45pm. Fridays.
- Maidstone YMCA ARS.** Contact: GOBUW Tel. 0622 20544. Meetings: YMCA Sports Centre, Melrose Close, Maidstone Kent. Fridays 8pm Jun 19 AGM Jun 23 RAE, CW tuition Jun 30 Homebrew tuition.
- Mid Sussex ARS.** Contact: G0GMC Tel. 07918 2937.
- Milton Keynes DARS.** Contact: Mike G0ERE Tel. 0234 750629.
- Norfolk ARC.** Contact: Craig Joly G0BGD 0603 485784 QTHR. Meetings; The Norfolk Dumpling, the Livestock Market, Hall Road, Harford, Norwich. 7.30. June 14 Informal and committee Jun 21 Domestic satellite television by Gordon Higgins G3PXT Jun 28 Practical antennas by Ron Huntsman G3KBR Jul 5 Sizewell A power station by Len Green of CEGB Jul 9 Visit to Sizewell A Jul 19 Inter-club quiz with Gt. Yarmouth and Lowestoft.
- Reading DARC.** Contact: M G Anthony G4THN, 9 Paice Green, Wokingham. Berks RG11 1YN.
- Peterborough RES.** Contact: Peter G4PNW QTHR.
- Petersfield — Royal Naval ARS. 29th Annual Mobile Rally, June 11 HMS Mercury, Petersfield, Hants, Adults £1, children free, 10am-5pm.** Contact: Cliff Harper G4UJR QTHR. Tel. 0703 557469.
- Reading ARC.** Contact: Mike G4THN. Tel. 7434 774042. 2 and 4 Thursdays, Caversham Conservative Club, Caversham, Reading Berks.
- St. Albans Verulam ARC.** Contact: George Christofi G0JKZ Tel. 01 427 4800 Meetings; RAF Association HQ, New Kent Rd., off Marlborough Rd., St. Albans. 7.30pm. 2 and 4 Tuesdays. Jun 27 Raynet by T J Groves G4XUJ.
- Sevenoaks DARS.** Contact: Barry Leggett Tel. 0732 741222 ext. 245 office hours. Meetings Emergency Control Centre, Sevenoaks District Council Office. 8pm 3 Mons.
- Shefford DARS.** Contact: Tom Stellar G6RCT Tel. 0707 372211. Meetings: Church Hall, Amphill Rd., Shefford, Beds. 8pm
- Southend DRS.** Contact: S. Blinkhorn G1XGP, 102 Lord Roberts Ave, Leigh-on-Sea, Essex SS9 1NE. 934MHz Club (Essex) Annual Mobile Rally Jul 23 10-5, Thorndon park, Brentwood (junct. A128/A127). Mobile on-air quiz, boot sale. Southend DARC on HF, 2m. Site open from 2pm Saturday, overnight fee £2. Pub. Contact: the Sec. 934 Club, 0702 712595.
- Southgate ARC.** Contact: Brian Shelton Tel. 01 360 2453. Meetings: Holy Trinity Church Hall, Winchmore Hill, London N21. 7.45pm. 2 and 4 Thursdays.
- South Kent (YMCA) ARC.** Contact: Des Edwards Tel. 0304 203073. Meetings: Dover YMCA, Godwynehurst, Leyburne Rd., Dover. Tuesdays. Jun 24-25 Waldershare Vintage Weekent GB2WV2 Jul 10 morse tests.
- Stevenage DARS.** Contact: G6EDA Tel. 0438 724991 Meetings: 1, 3 Tuesdays Sitec Ltd, Ridgemoor Park, Telford Av., Stevenage 8pm (7.30 for tuition).
- Welwyn Hatfield ARC.** Contact: Roger Curtis G0CYC Tel. 0707 324958. Meetings; Lemsford Village Hall, Brocket Rd., Welwyn Garden City, 1 Mondays, 8pm. 9th WGC Scout HQ, Kingtsfield, WGC 3 Mondays. Regular nets. Jun 19 VHF FD prep Jul 1.2 VHF field day, Hill Farm Jul 17 Fox hunt.
- West Kent ARS.** Contact: B. Guinnessy Tel. 0892 32877.
- West Sussex ARS.** Contact: M. Mundy, 142 Junction Road, Burgess Hill.
- Wimbledon DARS.** Contact: Nick Lawlor G6AJY Tel. 01 330 2703. Meetings: 2 and 4 Fridays, St. Andrews Church Hall, Herbert Rd., Wimbledon London SW19. 7.30pm.

IRELAND

- Armagh DARC.** Contact: J. Murphy Tel: 0861 522153.
- Donegal ARC.** Contact: E13BOB Tel. 074 57155.
- Mid Ulster ARC.** Contact: Jim Lappin Tel. 0762 851179. Meetings: 2 Sundays (not July and Aug) 3pm Guide Hall, Gilford, Co. Down.

NATIONAL AND INTERNATIONAL

- AMRAC.** Contact: Phil G6DLJ Tel. 0703 847754.
- British Amateur Television Club.** Contact: G8CJS or G8FOZP QTHR.
- British Amateur Radio Teledata Group.** Contact: Pat Beedie GW6MOJ Tel. 0558 822286. Ffynnonias, Salem, Llandeilo, Dyfed SA19 7NP. SAE for more information. GB2ATG amateur radio news service transmits on 1 and 3 Sundays, on 3.590MHz, 14.090MHz and 144.600MHz. Operated by volunteers, GB2ATG welcomes amateur radio news for possible transmission, especially concerning radio data activity (RTTY, Amtor, packet, fax, etc.).
- International Short Wave League.** Contact: Y. Blain, 167 Wombridge Road, Trench, Salford, Shropshire TF2 6QA.
- UK FM Group, Northern.** Contact: L. Laughton, Claremont, Main St., East Ardsley.

Free Readers Ads!

FOR SALE

FOR SALE bench frequency meters. Thander 600MHz. Also Stanley Lab/type 50MHz counter timer 8-channel oscilloscope multiplexer om 358 Thander digital multimeter. 28 ranges all units. As new/offers. Tel: 061-633-0824 after 6pm.

PRO 32 scanner WHH box, rechargeable batteries + charger + 1UHF antenna + 1 VHF antenna. Also a frequency list. Phone: Rugby 0788-543655. Price £200 ono.

FT101ZD 160-10 metre HF transceiver. New valves last year. £425 ono. Reason for sale? Ten-Tec on order. Phone Dave: 03224 32319 after 6pm or W/ends.

FT707 FC707, FV707, MMB-2. Not used. Mobile excl. condx. £600 ono. New Antenna? Acrylic aerosol protects against corrosion. Dries quickly. £3, 16oz tin. Ever Ready NiCads; PP3 £3 (ea). AA £3.50. (4) C £2.50 (2). D £3 (2). Postage 50p per aerosol/batteries. Mark G4RGB QTHR. (0634) 30822.

TEN TEC Argosy II complete with power supply and mic. Ready to go HF station first class condition 100W input SSB transceiver what offers phone Terry anytime. IOW 0983 68702.

1.3 Ghz Counter (1-1300MHz) antenna. Pouch case, instructions, mains, power unit. All in good working order £100 ono. Tel 061 748 9604 any time. K.J. Faulkner.

RACAL RA98 SSB adaptor in good condition but has two valves missing. £25. Levers-Rich studio mastering tape deck 30/60ips in steel case with some electronics. £30. PYE Vanguard AM25T TX/RX for spares. £10. Buyer collects. Tel: (0425) 622306 New Milton.

LAFAYETTE HA-350 shortwave receiver, 3.5-29.1 MHz. AM SSB and CW. Very good condition. £50 ono. Tel: (0532) 665568.

MARCONI Guardian marine RX. Mains, valves, large and imposing. £40. K150 keyer unused. Mint. £100. Ham International 'Puma' (mint). £75. Bendix D/F loop. LW/MW £40. Bendix D/F radios (WW2) cheap. Old "Wireless Worlds" (over 200) £30. Phone: (0639) 820356.

MARCONI XTAL calibrator MOD TF 1374. £12. Farnell dig. meter DM10 £25. Trio PWR-SWR meter PF810. £80. Airmec 700v PS. £10. FL3. £90. BRT 400. £145. HQ 180. £150. Brother Printer M1101. £100 12". TV Monitor Hantarex. £75. All

FB Condx. 0908 313507 NRD 525. £850+XTRA filters.

SALE of radio and other bits, getting married. BBC computer, lots of extras, FT902DM system, portable HF manpack, 40ft lattice mast. Portable masts. Sony ICF 7600D, PK88, 4CX250B's. May swap for PC1512/1640, SAE to G4SOL, QTHR, Norfolk/Suffolk, Yorkshire for lists.

REALISTIC DX-300 communications receiver, 10Khz-30MHz digital frequency display. As new. Condition with manual & boxed. £130 ono. 0708 755781. After 17.30hrs.

FR100B RX 160-10mtrs, AM, SSB, CW, FM. FL200 TX 80-10 mtrs. £199. (LCL 29 FM with repeater shift. £30/20w pa. £15). 2mtr J.Beam 4ele Quad. £20. 18ele para beam 70cms. £20. Tet 3 band vertical 10, 15, 20. £25./Hones 80 Metres RX. £20./ 1 HF Balun in plastic sleeve. £12. PYE W15u 70cms Westminster RBO, RB2, RB4, RB8, RB10, SU20, SU18. Very sensitive RX. Scans. £80. G4MTG 021-430 6764.

FOR SALE YAESU FT-480R SSB, FM, CW excellent transceiver. £280. Tel: 223 9171 G1VVH.

FOR SALE Uniden Bearcat UBC 100XL hand held scanning receiver with rechargeable batteries. Mains adaptor, charger, carry case, Rubber Duck antenna. All boxed. £160 ono. (074785) 639 Dorset.

FOR SALE Icom IC251E 2M multi-mode with Mutek front end. £400 ono. Phone Steve 0803 842166 after 7pm.

AOR 2001 £250. XP-Psion 64k. £125. Tandy model 100 computer 32k. £100. 3.5" disk drive for Model 100. £100. Disk/Video 2x5 1/4" drives for model 100/200. Electronic 88000 words spelling dictionary pocket size. £40. All in V/Good condition. Ring. 0473 85203 any time.

YAESU FT101E with spare valves FC902 A.T.U SP901 external speaker £400. Buyer collects. Ring Wendy G4XPB 0603 (Norwich) 38053.

ICOM ICR70 communications receiver with fitted FM board and car power supply unit, 12V, and manual. boxed and as new in mint condition. Little used hence sale bargain. £425 P/exch Sony or F320 CRF 330 Grundig satellite professional 3400 Zenith, Panasonic, etc. Tel: 0933 56087.

FOR SALE YAESU FL-2100Z linear amplifier plus manual hardly used mint, £600 ono offer. Tel: 0246-236496.

FOR SALE R532 air band RX 100 memory channels six digit read out. £110. Phone 03756 2476. North Hants. Or exchange for very good 2 metre RX.

YAESU FT707, FP707, FV707, Yaesu FT707 ATU and MD1 Base mic, complete HF station. No splitting. Must sell as complete unit. £460 ovno. FM board available if required. £40.

SINCLAIR spectrum 48k with SAGA keyboard interface one and microwave also software on cartridge OK for packet. £75 inc Sinclair ZX81 with memotech keyboard 16k RAM pack Datalogger. Also some software. £45. 50-144 MHz transverter. £30. Tel: 074571 3295. GW1AKT.

TRIO 2300 and 10 watt PA plus PSU. Approximate value £65, or swap for HF RX about same value. All data available or W.H.Y. VHF or UHF. Fred E8BBO 17, Blackberry Mead, Stevenage SE2 9PX.

DRAKE TR4C 28MHz-3.5MHz HF TXCR. Very good cond. 300W+ PEP with MS4 power supply speaker. £375. Prefer buyer to collect or will travel to meet. Please ring anytime G4OLC 0670 855953 Northumberland. May part/ex TS430 or similar.

YAESU FTC 4M 740A FM 4 channels fitted 40watts out base mobile. £80. NEC 2M 3 watts out portable mobile 12 channels. £60. FT73R as new FNB10 case DC adapter. £180 6M Tonna SEL new. £25. 01 801 8611 North London. **G2DAF** Mk2 all band SSB transmitter. Prof. built. Not known whether working. Handbook, collect only enthusiasts bargain. £25. Tel: 042-121-2735. Wanted, Icom ICR7000 UHF RX. Telephone with details please.

TRIO R-1000 communications receiver 30 bands between 200Khz and 30MHz with PLL synthesizer as new. Instruction manual and accessories. £295 ono. Chelmsford, Essex (0245) 352576.

TRIO TH-21E compact 2m hand held spare NiCad pack 'C' type battery case. Speaker/mic. £120. Collins VWM-1 TCVR plus PSU, Mic, spare valves and manual. Superb condition, collectors item. 'The first SSB amateur TCVR'. Offers G4KSE QTHR 021-743-7979.

FOR SALE Kam Packet radio, new unused, boxed. Computer Synco T88 VGC. £300. YAESU 690R II 6m. Ion linear MET, 3ele beam, VGC, boxed. £350. Tel: 0255-431953 after 5pm. Contact Roland.

2 MTR transceiver FDK 750E Multi-mode 1-10watts. £150. MM30W linear. £35. Phone 0343 820956 GM4 YWQ.

SALE CBM 272 Oscar 10 metre transceiver FM. Complete with Nevada 25W amplifier, microphone and handbook. £45. Rotator for 2m or 70cm aerials, never used outside, complete with original packing. As new condition with rotator cable £25. 0730 61859.

DRESSLER D70 432MHz PA 4CX250R valve 550W out for 10W input as new little use. £650. (cost new, £1000+). SSB electronics MV432 S 01 70cms. Masthead pre-amp 0.7dB NF. 20dB gain with DCW15 A control box. £80. Sony ICF2001D with PSU. £250. 0484 684369 (huddersfield)

FT101ZD YAESU transceiver. 160-10m. with 10m FM. Excellent condition, including mic. £575 ono. KW2000 in need of mechanical filter and some work. £60 ono. Tel: 0635 254855 between 6 and 7pm any evening.

FOR SALE Panasonic RF9000 digital world radio costing £2500 in mint condition. Only £900. 0462 421427. Exchange possible.

FRG 7770 HF Receiver all mode, pristine condition. £325 inc post by Securico. SMC SP4 speech processor boxed as new £30. Tektronix scope type 533. Excelent working order with probes offers. AK1G AIVA CB tester very good condition. £30. Spectrum computer 48k with JEP terminal unit morse and RTTY decoder programmes, also fitted with saga Emperor I keyboard. Lots of games and interfaces and joystick. £130. Tel: (0698) 357869.

ICOM 751A HF transceiver IC AT 500 auto ATU IC PS 15 mic hand book workshop manual recently serviced and aligned almost new condx. £1200 standard C500. 2m/70cm. Hand held mint with case mic handbook. £299. Tel: 3ele mini beam. 20/15/10. £120. Phone: 0487 823779 after 6pm.

STORNOPHONE 800 (UHF, model CQP 863U) as used by police force ETC, complete with microphone and technical manual, ready for conversion to 70cms. £125. No offers. YAESU FT707. £325 (100W HF solid-state) FTV-707 2m transceiver. £155. Luton (0582) 33885 G1 BNE QTHR.

FOR SALE ERA microreader plus morse tutor. £75. Tandy pro 31 scanner. £50. c/w NiCads both items excellent condition would consider exchange for FRG7 or

similar HF receiver. Phone Dave, Cardiff 342514 anytime.

TRANSVERTERS MMT 432/28-5. £119 ono. MMT 144/28. £95 ono. RC-pack and Lowe BBC ROM. £165 ono. Taylor 01-891-2820.

WRASSE SCISSTV converter (up to 96 secs) as new save £210. only £750. N. Wales. Phone 049083 681, A. Blair GW6UWT. Also Acorn teletext adapter, brand new, unopened. £90.

'SILENT KEY' YAESU FT726R with satellite unit. Icom 720-A, with 70cm Icom ATU automatic YAESU FT 200R. Offers. Tel: Malcolm 0236 724459.

YAESU FRG 7700 RX Mamgear pre-amp ATU. Call Books, all VGC boxed buyer collects £200 telephone 0634 404096.

FOR SALE one Philips D2935 receiver. £155, and one Kenwood R1000 receiver £200 or near offer.

FOR SALE realistic pro-2004 300 channel scanner purchased new December 1988. Boxed, perfect condition, £250 ono. Contact G. Cook, 44 Doune Gardens, Levan Meadows Gourock, Renfrewshire PA19 1EA.

REVTECK 934 20 channel. £60 also aerial for same. Tristar 777 best set for conversion to 10MHz. £80. Amplifier 40.60.160 watt input. 13.5volts. £45. Speech processor for CB. £25. 0283 221870.

ICOM IC 551 all mode inc FM 1yr old. Boxed as new condition. £450 ono. Icom IC251E all mode 143f148MHz boxed as new. £400 ono. Dressler D200 VHF valve linear 4CX250R 600W PEP. Immaculate condition. £530 ono. 01-517 8558.

ICOM IC701 HF rig and PSU 200W DC input as new. Hardly used. £450 ono. Phone: Bedford 214663.

FOR SALE Realistic pro 31 hand held scanner, 1 year old perfect condition. £115. Also R5375 pocket size airband receiver, 6 months old. Immaculate condition. £35. Buyer pays post & package. Tel; David on 0273-566178.

KODEN KS510 II automatic direction finder 150KHz to 4.6MHz in three bands with six crystal positions (empty). normal receiver operation plus SSb and CW modes plus manual. Swap for good communications receiver. Phone: 082-623 461.

FOR SALE Grundig satellite 650 FM, MW, LW, SW 1.6 to 30MHz continuous 60 memories 15watts output. 2 loudspeakers, sockets for external aerial, speaker elock with date, mains or batteries, base and treble controls, built like a battleship. Offers to 0472-358896 any time. Despatch by securicor.

YAESU FRG-8800 general coverage receiver 150KHz to

30MHz complete with FRV-8800 VHF converter 118MHz-174MHz. boxed in as new condition. £500 ovno. Buyer collects or pays carriage. Tel: Ian GOKRL 0359 70527 after 6pm (suffolk)

EDDYSTONE S770R receiver. Collector's item. 19-165MHz coverage CW/AM/FM. offers phone 0737 557700.

YAESU FT 101ZD MkIII with FM, mint manuals. £450. Extn. VFO digital memory FV-1010m. £125. Manuals ERA microreader plus tutor upgraded for RS232 mint. £80. Kit built RTTY terminal LED. Readout own power/supply. £25 GOE2W QTH. Tel: 0773 810010.

COLLINS R390A with manual, good condition. £260 ono. microwave modules 144 meg. Transverter. £70. ono. Tel: 09748 327 GWOFGM QTHR.

YAESU FT747 GX FM board fitted, as new, boxed, hardly used. Also 20 amp PSU first. £550 secures. Cash only. Please contact Mick on (0772) 424878.

SONY quality stereo stack. System glass cabinet dovedale 3 speakers. New condition £275 200 stereo records available. Pretriflex 35mm camers, flash, lightmeter, telephoto, mint. £65. Spectrum plus computer interface mauals games, mint. £85. Exchange/sell quality communications. Receiver. Hants. Lymington 76603.

ICOM IC2E FM handle 140-150 MHz 1.5W 2 NiCads 1x6AA case charger £130 12-15W amplifier 12V. £25. Satellite system 'C' band 3.7-4.2GHz 5foot dish ground stand amplifier converter receiver. Moscow 1. £230. 0932 247699 Surrey.

FOR SALE Super Star 2000 25.965-28.005MHz. Good condition, easily converted. £130. Tel: 0229 33932.

COMMADORE VIC20 computer, 16k RAM expander datesette joystick PSU, modulator, some games, inexpensive computer to start your RTTY station. £60. Or exchange WHY. also Zetagi B550 mobile linear 800W output £165 or WHY. Prefer ATU C/A, John 0734 411501.

FT101ZD FM, CW, filter fan, mic, manual. £475 ono. FT707 manual. £375. FT901DM, mic, manual spare PAs. £550 ono. YD844A microphone boxed. £15. J-Beam 10XY 2m aerial. £30. 18AVT vertical 80m-10m. £75. IC2025 2m SSB. £125. Dursley (0453) 860151.

STANDARD C58 2mtr multi-mode portable plus 25W linear, slide mount, mobile bracket, fist mic, 2 sets of NiCads, 3 different portable antennas 2 power leads (HD) original boxes, owners user, handbook, shoulder strap and ear plug. Sell for £380 ovno. Price includes P+P. Contact: G4XPP QTHR.

DATUNG FL2 audio filter, £55. Sony ICF7600D with PSU, case and handbook, £95. G4VXU QTHR 0462 53097.

FT690R MKII, 6M transceiver, absolutely mint, box, still under guarantee, also 15W 6M linear amplifier. Family reasons force sale. £350, or exchange for a receiver with cash adjustment either way. Tel: Bodenham (Hereford) 843.

ICOM 251E all mods transceiver two VFOs Mutex front end base station ICOM base mike, hand mike, mains or 12 volts DC. RF power control. Excellent condition £425. Ring 0282-51416.

YAESU FT480R complete mint cond. Boxed. £290. Possible p/ex IC2E with accs. Phone G01VA Stockport 061 456 8499.

TRIO com receiver, model JB500S 3MHz to 29MHz with breaks £75, ono. Pan Crusader gen con receiver + VHF. Also UHF. £150 ono. President Madison CB USB+LSB £60 ono. Tel: 0282 37768.

ICOM IC02A, brand new 140-160MHz. Retail £275. Two only for £195 each. Also Regency touch M200 scanner, used. £90. Keith Rodgerson, 10 Leigh Road, Bristol, BS82DA. Tel: 0272-733848.

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ADVERTISERS' INDEX

Allweld	21
Amateur Radio Communications	47
Arrow Electronics	55
Bredhurst	25
Cirkit Distribution	20
Datong Electronics	25
Davtrend Ltd	20
Dewsbury Electronics	9
ERA Communications	41
Garex Electronics	21
Ham Radio Today Subscriptions	29
Harrison Electronics	41
C M Howes Communication	5
ICOM Electronics	10
ICS Electronics	IBC
KW Communications/Ten Tek	47
Lake Electronics	55
Lowe Electronics	30
Marlec Engineering	47
Navico	OBC
Nevada	29
RAS Nottingham	55
Raycom	IFC
RN Electronics	4
Technical Software	55

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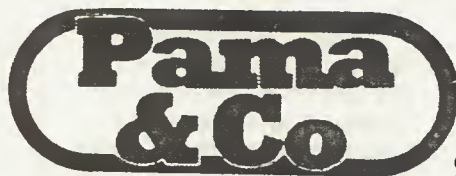
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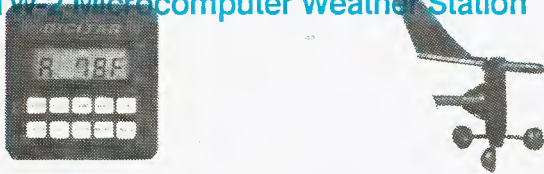
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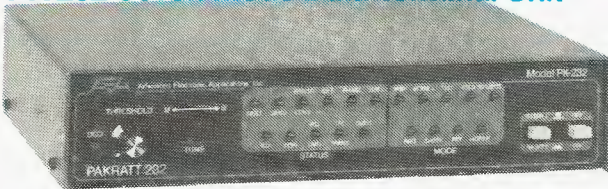


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The new AMR1000/S

It checks out from every angle



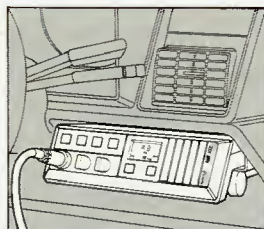
Whichever way you look at it, the Navico AMR1000/S sets new standards in 2m mobile transceivers.

The angled, reversible control panel, together with a range of inexpensive optional mounting brackets enables installation in any vehicle, whether under or on top of the dash, either side of a central console or even from the roof.

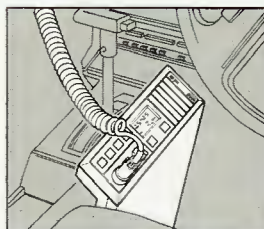
This means the display will always face you giving total access to the controls which are spaced to allow simple, safe, mobile operation. The front mounted loudspeaker will also face you, projecting the sound toward you and not at your feet or into the dashboard.

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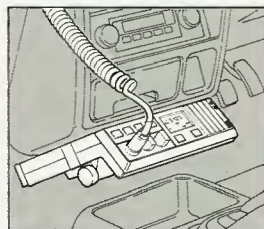
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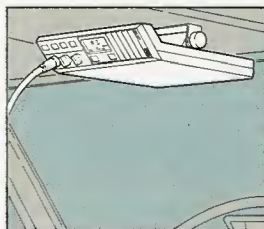
Under dash mounted (side)



Central console mounted



Under dash (central)



Roof mounted

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