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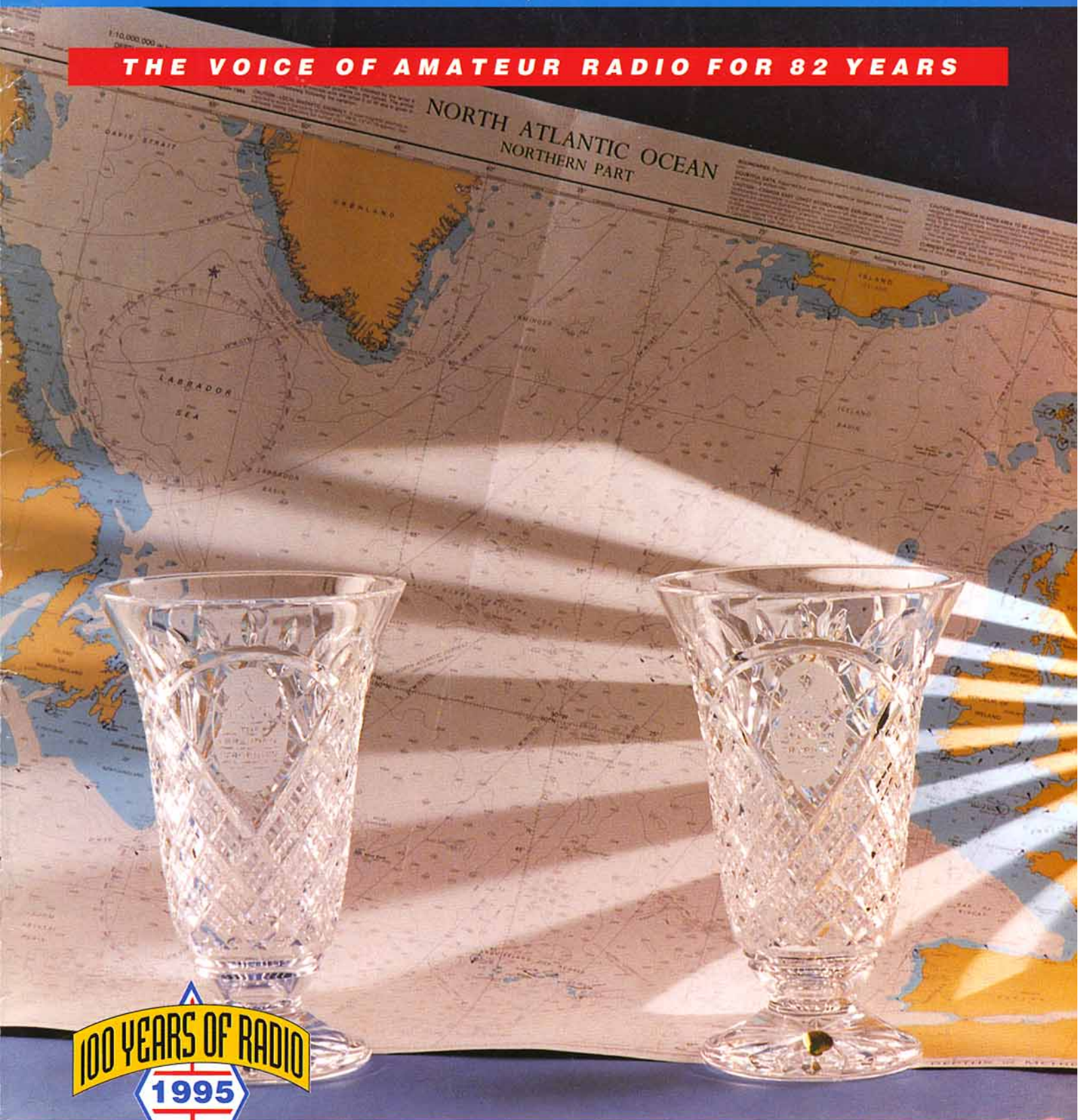
RadCom

Radio Communication

The Journal of the Radio Society of Great Britain

THE VOICE OF AMATEUR RADIO FOR 82 YEARS



100 YEARS OF RADIO 1995

The Brendan Trophies . . .

. . . or How to Span The Atlantic on Two Metres

FOR THE PRICE, YOU'D EXPECT THE WORLD.

YOU'LL GET IT.

The TS-950SDX is at the very pinnacle of the Kenwood HF transceiver range. And when you look at its specification, that's not surprising.

It boasts a number of highly advanced features like built-in digital signal processing, 50 Volt MOSFET finals, AIP (advanced intercept point), built-in sub-receiver and built-in automatic antenna tuner. To name but some of its world-leading technical tours-de-force.

Just as important, it's made with Kenwood's traditional attention to detail and reliability, to stand up to a lifetime's use.

The TS-950SDX is part of a range of HF transceivers priced from around £1000 to £3500. And although quality is never cheap, it's still a small price to pay to have the world of radio communications at your command.

KENWOOD

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RadCom

COVER PICTURE:
The magnificent cut glass trophies awaiting the pair who complete the World's first transatlantic 2m QSO.
Feature: page 13.

NEWS AND REPORTS

TECHNICAL FEATURES

REGULARS

PRODUCTS

IC-706

ALL MODE — £1,125

ICOM

An optional cable, OPC-581 or OPC-587, is required for separation.

HF ALL BAND **50 MHZ** **144 MHZ**

Icom technology has once again produced a history-making first — the IC-706 HF/VHF all mode transceiver. This miniature marvel is the smallest of its class in the world. Covering all ham bands to VHF in all modes (including RTTY) it features a detachable front panel for versatile mobile operation. Operating versatility for use as a base station, for mobile operation or for portable operation.

• When receiving on 2 m

• When receiving on 6 m

• Compact and feather light

The IC-706 is incredibly small with dimensions of 167(W) x 5(H) x 200(D) mm. A mobile-sized transceiver packed with base station features. Excellent performance allows this transceiver to be used as your main rig for the HF and VHF bands. Of course many will prefer to use the IC-706 for mobile operation and on DX peditions. Whatever your choice you can't go wrong.

• Covers 6 m and 2 m in addition to the HF bands

In addition to being a full blown HF rig the IC-706 covers the popular VHF bands — not only 50 to 52 MHz with a full 100 W of output power, but also 144 to 146 MHz operation is possible at 10 W! Convenient HF functions such as IF shift, CW reverse, CW pitch control and more are available for 6 m or 2 m operation. A wide range receiver which covers HF to VHF continuously* is included.

*Some frequency ranges are not guaranteed.

• Detachable front panel

The IC-706 sports a detachable front panel employing advanced technology. Both the main unit and detachable front panel have microphone connectors providing numerous mounting options in both a vehicle or a shack.

• All mode operation including RTTY

The IC-706 provides all mode operation (SSB, CW, RTTY, AM and FM) in all bands. RTTY capability is another first for a transceiver of its class. What's more, "real" RTTY operation is provided employing FSK rather than AFSK. RTTY tone frequency, offset for mark/space and polarization are all selectable.

• See also Icom's display on the inside back cover.

SPECIAL OFFER! — INTRODUCTORY PURCHASE

IC-706 £1,125.00	IC-706 £1,125.00	IC-706 £1,125.00
Minimum Deposit £135	P/X Value £405	P/X Value £750.00
18 x £55.00	Balance £720.00 18 x £40.00	Balance £375 12 x £31.25

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73 - Mike Devereux G3SED

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FT990	Save A Fortune	**£CALL**
FT736R	Save A Fortune	**£CALL**
FT 5100	Save A Fortune	**£589**
FT11R	Save A Fortune	**£CALL**
FT530		**£339**
FT290R	Save A Fortune	**£499**
FT2500M	Save A Fortune	**£CALL**
FT41R		**£339**

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TH-79E	Save £50	Our Price	**£399**

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WA3	HF Wavemeter (1.8 - 92 MHz)	**£32.95**
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DJ580	Twin Band H/Held	**£389**
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Icom 720A HF Trans. with matching PSU	**£695.00**
Icom IC-P4E 70cms Mini h/held	**£195.00**
Kenpro KT-22 2m thumb-wheeler handie	**£125.00**
Kenwood PS-430 20A P.S.U	**£165.00**
Kenwood PS-50S H/Duty P.S.U	**£225.00**
Kenwood TH-78 Twinband H/held..Ext.RX	**£345.00**
Kenwood TH-78 Twinbander....one owner	**£349.00**
Kenwood TS-120S Ham Bands only HF	**£450.00**
Kenwood TS-140S Gen. Cov. HF Trans	**£695.00**
Kenwood TS-830S Classic HF Trans. V.G.C.	**£595.00**
Kenwood Trio Ext.VFO..Ave. Cond	**£35.00**
Kenwood Trio TS-130V HF Tx/Rx.Ave Cond	**£395.00**
Kenwood Trio TS-520...Old But faithful..HF	**£385.00**
Sommerkamp 767GX...copy FT-707 HF	**£350.00**
Standard C528 Twinband Handie..G/Cond	**£325.00**
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Yaesu FT2700 Dualband Mobile 2/70cms.	**£300.00**
Yaesu FC102 ATU..Rare Piece of kit!	**£195.00**
Yaesu FT-23R 2m mini handie	**£130.00**
Yaesu FT-102 Base HF Transceiver	**£595.00**
Yaesu FT-209 2m Handie..with xtra's	**£145.00**
Yaesu FT-290R Mk1 2m M/Mode Portable	**£295.00**
Yaesu FT-480R 2m mobile Boxed as new	**£385.00**
Yaesu FT-707 HF Tx/Rx..digital Display	**£475.00**
Yaesu FT-726R Base M/Mode..Fitted 2mtrs	**£625.00**
Yaesu FT-727R Dualband Handie..Boxed	**£295.00**
Yaesu FT-747GX Gen. Cov. HF Tx/Rx	**£525.00**
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Yaesu SC-1 Station console..Very Rare	**£150.00**

PRESTIGE SECONDHAND

Every so often we get what can only be described as an "incredible bargain". Well we have just taken in a superb "Mint condition" Yaesu FT-1000. It has all its filter options fitted together with the BPF-1 and matching SP-5 speaker. At today's prices this little package will cost you close to £4,300. It is less than 8 weeks old and just has one small scratch on the top but it is fully guaranteed.
Priced for the serious buyer at **£2,995**

SHORTWAVE RECEIVERS

Drake SW8 Portable RX Boxed as new	**£549.00**
Icom R70E Gen. Cov. Receiver..G.Cond	**£395.00**
Icom R71E gen. Cov. Receiver..Nice Model	**£599.00**
Kenwood R2000 Digital Display Gen.Cov	**£375.00**
Sony SW15 Pocket Receiver	**£130.00**
Steepletone MBR7 Basic Beginners Receiver	**£45.00**
Yaesu FRA7700 Active Desktop antenna.	**£45.00**
Yaesu FRG7700 Gen coverage+VHF Conv	**£450.00**
Yaesu FRG8800 Later Mod+Int. VHF Conv	**£495.00**

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AOR 900..Good Starter model	**£75.00**
AOR1000....10 Channels, 1300Mhz	**£185.00**
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Bearcat 580XLT... mobile/base	**£120.00**
Bearcat 890XLT....Desk top/ Base Model	**£230.00**
Black Jaguar BJ200....Ave Cond	**£30.00**
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Fairmate HP1000 W.Band Cov1300MHz	**£195.00**
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Realistic PRO-2005 Base Satation.	**£185.00**
Trident TR-2400 Handheld with SSB	**£299.00**
WIN 108 Civilian Airband Receiver	**£105.00**
Yupiteru MVT-3100 H/held...Good Cond	**£185.00**
Yupiteru MVT-6000 Mobile/Base mode	**£195.00**
Yupiteru MVT-7100 H/held model c/w SSB	**£265.00**
Yupiteru VT-125 Civilian Airband	**£125.00**
Yupiteru VT-225 Dual Airband.Mil/Civil	**£175.00**

ACCESSORIES

Calvyn PSU..Ave Cond	**£75.00**
Daiwa 300 PSU..30A..Easy Pwr HF Tx/Rx	**£50.00**
Daiwa CN103 SWR/PWR Meter.	**£59.00**
Hansen Meter..These are always wanted!	**£50.00**
HX240 2m to HF Transverter..20W pep	**£195.00**
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Morse Key Basic up/Downer Model.	**£15.00**
Spectrum Comms. 6m Amp	**£49.00**
Timewave DSP9 Digital filter boxed	**£145.00**
Yaesu FL2100Z HF 1KW Amp (pep)	**£495.00**
Yaesu NC-15 Drop-in Base Chgr.	**£40.00**
Zetagi 1240/S 40Amp P.S.U.	**£75.00**
Zetagi Model M700 Swr/Pwr x-needle meter.	**£65.00**

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£169.95

IT'S A LOWE YAESU DAY!

MAKE A NOTE IN YOUR DIARY RIGHT NOW!

SATURDAY 10th JUNE

Barry Copper and his team from Yaesu UK will be on hand at our Bristol branch to give help and advice on the full range of Yaesu equipment. If you want to see the latest gear or just have your rig checked over by Yaesu engineers, why not pop along to Bristol on the 10th June and join in the fun. We'll have lots of special offers and package deal prices on a huge range of equipment and accessories, plus of course the usual refreshments from Tony and Dave.

Don't forget . . . 10th June

New!

Half catalogue, half price list -why not get your copy of our new CataList! Just send us four first class stamps and we'll send you one by return. Crammed full of interesting new products and some good old favourites as well.

New from JPS Communications ANC4

Antenna noise canceller
Effectively reduces power line noise, computer noise, TV timebase noise and many other interference signals.
See the review in this issue!

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Great New Wire Antenna Systems From

CHELCOM Aerials

Chelcom's CAHFV1 h.f. vertical antenna (see last month's ad) has become the fastest selling h.f. vertical in the UK, with over 250 happy users. Hot on the heels of this wonderful antenna, Chelcom have now produced a superb range of new wire aerial systems and components. Once again they've chosen to use only the highest quality components, from specially designed balun cases and dipole centres to the wonderful new FlexWeave™ antenna wire. Just wait 'till you see FlexWeave™ - a multi standard wire so flexible you can tie knots in it and undo it time and time again. It is used in all their ready to hang antennas and also available on its own for those who like to roll their own!

Chelcom Windoms - Ready To Hang!

Two Windom antennas, one covering 80 to 10m and 133 feet long and a shorter version just 66 feet long covering 40 to 10m for those with smaller gardens! Both made from the same high quality components including FlexWeave™ antenna wire and a 4:1 balun. Supplied ready to hang. Both antennas will let you loose with a whole 1000W p.e.p.!
CA80W for 80m is just £65.00 and the CA40W for 40m is just **£55.00**.

Chelcom G5RV's

These G5RV's really need to be seen to be appreciated. You really need to check out the quality compared to other cheaper varieties - there is no comparison! Again the components used are of the highest quality, specially designed for heavy duty use and built to last. For most people, erecting antennas is a major problem - better to do it just once! Chelcom offer the largest range of G5RV's catering for most installation requirements.

CAG5RVH Quality half size G5RV using FlexWeave™ and 300 Ohm slotted ribbon feeder. Supplied ready to hang at just **£35.00**.
CAG5RVF Quality full size G5RV FlexWeave™ and 300 Ohm slotted ribbon feeder. Supplied ready to hang at just **£45.00**.
CAG5RVHP Quality half size G5RV with FlexWeave™ balun and 450 twin feeder. Supplied ready to hang at just **£65.00**.
CAG5RVFP Quality full size G5RV with FlexWeave™ balun and 450 twin feeder. Supplied ready to hang at just **£75.00**.

End-Fed Antenna. For those that like the simple life or don't like feeders hanging about, the Chelcom end-fed design offers a simple, unobtrusive solution. Just 66 feet long, the CA66EF will fit nicely into many smaller gardens and costs just **£55.00**, ready to hang.
Chelcom MultiSystem Aerial Components For DIY Aerial Systems

CABALUN11 1 to 1 balun **£30.00**
CABALUN41 4 to 1 balun **£30.00**
CAINS Insulator (pair) **£1.50**
CABALUN51 5 to 1 balun **£30.00**
CADIPOLE Dipole centre.....**£3.95**
CAFLEX FlexWeave multistranded antenna wire 20m pack ..**£16.00**

Plus
CAHFV1 HF vertical antenna resonant on 80m.....**£119.00**

Lowe also stock a wide range of books covering all aspects of antenna design and construction. A full range can be seen in all of our branches. We also stock a superb range of quality test equipment that anyone building antennas really needs to have, including Diamond power and s.w.r. metres, MFJ antenna, s.w.r. analysers and AEA analysers.
Just send us four first class stamps for our complete Antenna Fact Pack which includes Chelcom's MultiSystem components and verticals, Hygain, Butternut, Vargarda and the full range of rotators from Hygain, Yaesu and Emotator.

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Membership is open to all those with an active interest in radio experimentation and communication as a hobby. Applications for membership should be made to the Membership Services Department from which full details of Society services may also be obtained.

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Corporate (Concessionary): £27.00 over 65 or full time student under 25. (Applications should provide proof of age at last renewal date and/or include evidence of student status.)
Affiliated club or society/registered group (UK): £16.00 (including *Radio Commmunication*). (Subscriptions include VAT where applicable.)

Special arrangements exist for blind and disabled persons. Details are available from RSGB HQ.

Membership application forms are available from RSGB HQ

RSGB Main Switchboard:
01707-659015

The RadCom Leader

Events

The past month has been extremely busy at Headquarters. Our Annual Open day on 22 April was a great success, and I was particularly pleased with all the kind comments that I received from members who took the opportunity to visit us. If you were unable to get along, please remember that we are open every third Saturday of the month throughout the summer. The book shop, GB3RS shack, library and radio museum will be open and we would be delighted to see you.

The rally team has also been busy, planning the summer programme which includes an important new event this year in the Bletchley Park Amateur Radio and Computer Show in June [see pages 49, 52 and 53 - *Ed*]. The RSGB National Amateur Radio Convention is hosted this year by the Stafford Amateur Radio and Computer Show which is to be held in August. This event, especially, will feature a large Society presence, with the majority of committees in attendance, lecture streams, Morse testing and help desks. The society is working in partnership with RadioSport Ltd on these two events and they should both be well worth a visit.

Morse Test Fees Increase

I have to announce that from 1 July 1995 the Morse test fee will be increasing to £18.00 for the 12WPM test and £13.00 for the 5WPM test. This may seem like a large increase. However, this is the first rise since 1990 and accurately reflects the current costs of running this service.

Peter A Kirby, G0TWW
General Manager

NOTICE BOARD

RSGB Annual Convention at the 1995 Stafford Amateur Radio & Computer Show

- Lectures (packet radio, repeaters, Novice licensing, contesting, learning Morse)
- All of the key RSGB Committees
- RSGB Books, including some new titles
- Information Service
- Morse Tests on demand

Don't miss it!

19 / 20 AUGUST, COUNTY SHOWGROUND, STAFFORD.

● SPEAKER OF the House of Commons, the Rt Hon Betty Boothroyd, will be opening the Victoria Infant School at Tipton, West Midlands on 9 June. To commemorate the occasion, Stuart McKinnon, G0TBI, will be operating special event station GB0VIS from the school, mainly on 80m, and he hopes to contact other school stations on the day.

● BETWEEN 10 and 15 June, the Rotarians will be holding their international conference in Nice, France. The ROARS special event station will be across the border in Monaco, using the callsign 3A2RAR - Rotary Amateur Radio. QSL this station via 3A2LZ.

● AT PENRHYN Castle, Bangor, in Gwynedd: between 15 and 19 June, when the Eryri Association will be holding a flower festival. The Dragon Amateur Radio Club will use the callsign GB2CPC (Castell Penrhyn Castle); and on 22 and 23 July, as part of the National Trust centenary celebrations, they will be using the callsign GB100NT.

Scottish Trophies

TWO TROPHIES are awarded annually in Scotland: The Jack Wylie Trophy to the Scottish club, society, or RSGB member thought to have done most for amateur radio in Scotland in general terms in the past year, and the Jock Kyle Trophy to the Scottish club, society, group or RSGB member thought to have done most in Scotland in the field of VHF in the past year.

In the case of the award being made to an individual, that person must have been resident in Scotland during the period the award refers to.

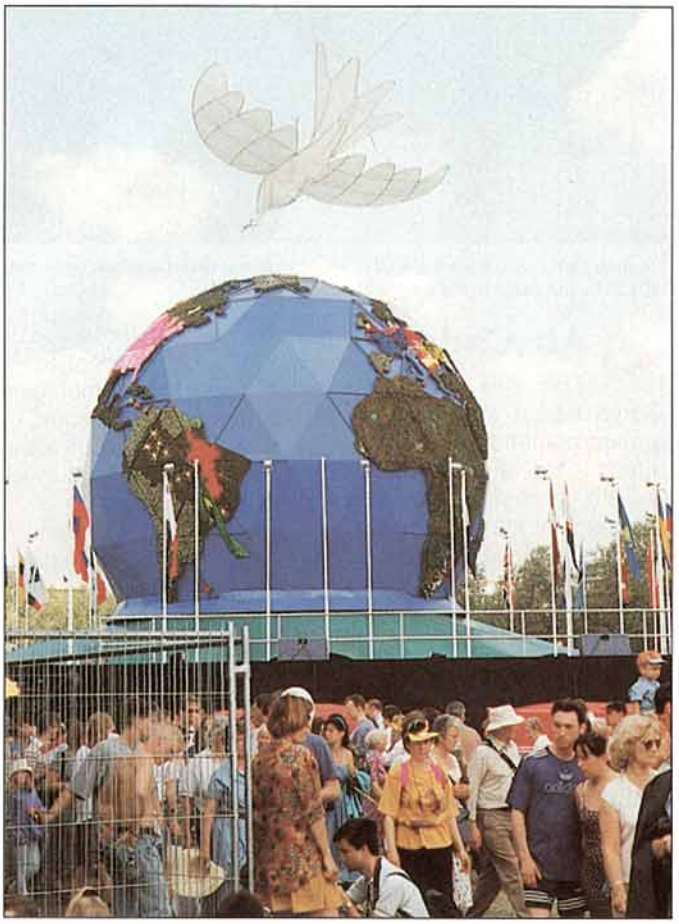
Nominations

Nominations and citations for each of the trophies in respect of the 1995 awards are required from at least five RSGB members resident in Scotland who should send them to Ian Suart, GM4AUP, by 14 August 1995.

In the event of more than one nomination being received for either trophy, the final decision on the award will be placed in the hands of the Scottish RLOs. In the event of no nominations being received, the trophy concerned will pass to the safe keeping of the Zone G Council Member until nominations are called in 1996.

We Join in with Hyde Park's Massive 50th Anniversary Show

RSGB & ATC Help Commemorate VE Day



The centrepiece of the show: a 70ft globe topped with a huge dove of peace.

Over the May Bank Holiday weekend, the nation went into a 50-year time warp and commemorated the anniversary of the end of the War in Europe. Events included street parties, concerts, many Royal appearances and a chain of beacons covering the whole of the UK. The Channel Islands had a particularly poignant time as the only part of the British Isles to have been under occupation.

In London, almost half of Hyde Park was set aside for a huge free show which included vintage and modern aircraft, the United Nations, a Veteran's marquee, replicas of an air raid shelter and an operations room, vehicles, marching bands, dancing 1940s style, and much more. The event was host to the Queen, the Queen Mother, the Prince of Wales and other members of the Royal Family, the Prime Minister and dignitaries from fifty nations, including HM King Hussein, JY1.

10

RLO Vacancy

FOLLOWING THE resignation of the RSGB Liaison Officer for Hampshire, a vacancy now exists. Candidates wishing to apply for the post should write to the Council member for Zone D, Julian Gannaway, G3YGF, Dean Hill Barn, E Dean, Salisbury, Wilts SP5 1HJ, enclosing details of their experience and qualifications.

● THE NORTH OF Scotland Amateur Radio Convention (the Gordon Rally), which was due to have taken place on 18 June, has had to be cancelled.

● SSL HAS informed the Society that as of 3 May, the latest callsigns allocated were in the G*0VZ* and G*7UQ*, and Novice calls in the 2*0AL* and 2*1DY* series.

The RSGB exhibit in the Air Training Corps tent in Hyde Park. The visiting policeman turned out to be a Class B licensee.

Council Brief

Notes of a meeting held on 1 April 1995.

Administrative

Parliamentary representation. The President reported that he had negotiated successfully with Lord Rix on this matter.

It was resolved that the 1995 AGM would be held in London.

The *RLO Newsletter* would be made available on subscription to any interested members and affiliated Clubs and Societies.

In future, recipients of Society trophies would not retain same but would receive a suitable replica. The trophies would be kept on permanent display at HQ.

A R Matters

ARDF Committee: *RadCom* would carry an advertisement for members for this committee, which would then make a recommendation for Chairman to Council.

E & R: Council agreed that the next VHF Convention should be held on 18 February 1996 at Sandown and that the National Rally should take place on 4 August 1996 at Woburn. It was noted that the E & R Committee was seeking new members to strengthen the team.

EMC: A small working group was appointed to draw up procedures for the administration of this difficult area of Society involvement. Members would be G0TWW, G3JWI, G3KVA and G4AOJ.

HF: The recommendation of the HFC for a Novice meeting frequency on 1.970MHz was approved.

IARU: R J Hughes, G3GVV, and M S Appleby, G3ZNU, would represent the Society at the Region II Conference in September 1995.

T & Ed: It was resolved that R Horton, G3XWH, be appointed to a new post of Schools Co-ordinator and that the proposals for the STELAR initiative be approved.

LAC / RA: It was noted that both LAC and RA are concerned at the dearth of candidates for the Young Amateur of the Year award. Publicity for this would be increased.

Financial Matters

It was resolved that negotiations with King's College University to provide a bursary be proceeded with to a conclusion. The Trustees of the Legacy Fund would in future be the current President, Honorary Treasurer and Company Secretary of the time.

The Honorary Treasurer reported that the Society's finances were satisfactory and that a small surplus was expected on the 1994 / 95 accounts.

Licensed amateurs from the ATC operated special event stations, including GB4VEC. The cadet in the centre is in WWII uniform.

Air Cadets

THE AIR TRAINING Corps had a special event station planned and they invited the Society to put on an exhibit in their radio tent. Manned by staff and volunteers, as well as licensed ATC members, the stand showed the part played by radio amateurs during the War.

Visitors were introduced to amateur radio and given copies of *RadCom* and *D-i-Y Radio*, as well as information on how to become licensed. A great many RSGB members were attracted to the stand by the tribander atop a 60ft tower which was visible from much of the showground.

A million people attended the show over the three days, mostly in scorching weather. In next month's *RadCom* we will bring you more details of the ATC's exhibit, and of the many special event stations operating.

Among the many overseas visitors attracted by the radio tower were Gun & Håkan (Hawk) Eriksson, SM5AQD.

Happy 95th Birthday, Norman Cooknell, G2CO!

ONE OF THE OLDEST members of the RSGB celebrates a special birthday on 4 June 1995. Norman Cooknell, G2CO, was born on that day in 1900 in the town of Blyth, Northumberland. During the First World War he gained a first class certificate in wireless telegraphy at the North East Wireless School in Newcastle and joined the Marconi Company. He was assigned to SS *Monarch*, which at the time was being camouflaged in dry dock on the River Tyne, before sailing to the Mediterranean - mainly by day so the crew could keep a good look out for mines and submarines.

The ship used 100V DC and the spark transmitter used a rotary converter to produce a 0.5kW spark. In those days it was not possible for the radio signal to cross the Atlantic, so contact was with coastal stations when near enough. In 1919, when sailing up the river to Philadelphia, Norman first heard speech being broadcast.

After the war, Norman set up a business in partnership with his brother, Walter, and the strong friendship of the brothers was only broken by Walter's death four years ago. Norman made two more journeys when ships in Blyth returning to Norway and Denmark required wireless operators. He operated a Telefunken Quench-Gap spark transmitter with 1000 c/s (Hz) tone on these, which he says was much more modern and unlike the Marconi 'stone-breaker' tone of 25 to 50 c/s!

He married Belle, and their daughter and son were born. He built a rig to listen to the shipping broadcasts and heard his first amateur

HQ Open Day - a Big Success

THE CORRIDORS and rooms of Lambda House were packed throughout the day on 22 April on the occasion of the RSGB's annual Open Day at Headquarters. A record number of people turned out despite the inclement weather and a good time was had by all.

In addition to guided tours of the building by Headquarters staff, visitors were able to browse in the library and visit the QSL Bureau, the GB2RS shack and the museum. The museum had recently been refurbished with smart new display cases and a new exhibit of valves through the ages, which was kindly donated by the widow of the late J W Tourtel, G2ATT.

Representatives of several RSGB Committees were on hand to answer questions from visitors, as were Roger Louth and other members of staff from the Radiocommunications Agency. The Society was also pleased to welcome representatives of SSL, the Air Training Corps, the 'big three' amateur radio manufacturers - Yaesu, Kenwood and Icom - and retailers Martin Lynch and Waters and Stanton, who took the opportunity to display a number of their latest goodies.

Three local radio clubs had stands and also provided operators for the RSGB HQ station, which was using a special callsign - GB100IMD - to commemorate International Marconi Day. About 850 contacts were made, including several with other Marconi Day stations, and RA staff took the microphone to make a number of contacts (under supervision!) themselves. There was also a Marconi exhibition to celebrate the '100 years of radio' anniversary, and it was pleasing that staff members of GEC-Marconi, who provided valuable assistance in the preparation of this exhibit, were able to find time to visit Headquarters on Open Day.

The newly-refurbished museum at RSGB Headquarters.

A young visitor took the opportunity of using the Special callsign GB100IMD.

radio contacts. Norman had the rig and crystal inspected and became a member of the RSGB in 1931. In those days the callsign was 'personalised' and included the first two letters of the surname, so he became G2CO. As well as the frequency of his crystal he was also given the frequencies of eleven other members of the North Eastern Radio Society.

At the outbreak of war in 1939 all amateur radio equipment was confiscated and a van duly arrived to take away the precious transmitter and receiver. Like most people, Norman took on an extra job to help the war effort and became a Special Constable. However, he was approached by GCHQ and asked to join the Listening Service. This was a very confidential appointment and involved intercepting enemy communications. He was provided with a special receiver and spent many hours through the night listening for codes and forwarding them to GCHQ. This was as well as running the family business single-handed, because his brother, an engineer, was working in the ship-building industry. The Listening Service, run mainly by amateur radio enthusiasts, helped in breaking the Enigma codes and provided a great deal of valuable information which saved lives and helped shorten the war. When the war was over, Norman received a letter from Herbert Creedy thanking him for his help.

There was also another exciting surprise: the van returning his beloved radio equipment arrived. It was rather dusty after its six year sojourn in the Post Office, but otherwise exactly as it had been when it was taken away, and was greeted like an old friend.

In 1950 Norman's son Frank, G3IPN, carried on the family tradition and became a member of the RSGB. The 1960s and early 70s brought happiness with the birth of five grandchildren and great sadness at the loss of Belle after 42 years of happy marriage.

Norman still lives in the house which has been his home for well over 60 years. His grandson Hugh Davison and wife Debbie are continuing the amateur radio tradition and have both passed the City and Guilds examination, although progress towards the Morse has been delayed by the arrival of their daughter, Charlotte, the first great-grandchild for Norman Cooknell [We wonder if she will be the fourth generation of amateur in the family? - *Ed.*]

G2CO still enjoys his daily walk around Blyth, weather permitting, and he still transmits regularly on the 10m band using a Drake TR7 transceiver and home-made roller-coaster ATU with long wire aerial - although not using 0.5kW!

Three of his friends, Walter, G4BMV, Jack, G4TMQ, and Colin, G4VNV, not only contact him on CW, but take time to visit him every week. All family and friends send 73 to G2CO and wish him a very happy 95th birthday.

The G7 Project

NO, IT'S nothing to do with class B licensees! On Thursday 15 June to Saturday 17 June the G7 nations will hold a summit meeting in Halifax, Nova Scotia, Canada to discuss financial and political matters of interest to the group.

To commemorate the event, the Dartmouth and Halifax Amateur Radio Clubs will operate two special event stations with the callsigns CG7D and CG7H for the whole of the month of June. Their primary (but not exclusive) objective will be to work amateurs in the G7 group of countries, which includes Great Britain.

Note that these stations have been granted the use of the prefix CG7 - normally a special prefix reserved for amateurs in British Columbia (VE7) - by the Canadian federal government, which makes them unique. The QSL will no doubt become a collector's item.

HF Awards News

TWO MORE countries have joined IARU Region 1, making a total of 76 member countries. Belarus, EU (ex-UC), and Latvia, YL, should be added to the list in the 1995 RSGB *Call Book*. A full list is available from the HF Awards Manager, Fred Handscombe, G4BWP, for an SAE.

The following awards have been issued up to 31 March 1995.

IARU Region One Award

(All Mixed mode unless otherwise specified)

Class 1 (for all countries on current list): G3EZZ (CW), G0ARF (RTTY), DL3JV (CW).

Class 2 (for 45 countries from the list): GI0KVQ (Mixed & SSB), DL-20064, DL3BZZ (CW), G0KRL, FS4PL, G8BQX (SSB, All 50MHz QRP), DL2KUZ (CW), G0MTN.

Class 3 (for 30 countries from the list): G0TYV (CW), G1EHJ (SSB, All 50MHz - First Award), LU1FBK (SSB 28 MHz), OE8GNK (SSB), DL9FCD, F-10997/91 (SSB), K4PMS (SSB 28MHz), G0EOD (SSB QRP), DE1SUA, G0IOX (Data modes), DL2VIC, DL7UKT (CW QRP), DE3HJM, DL4MDU, DE5HTH, EA1APA (CW), BV5CM (SSB), PT2CJ (CW), DL5GCH (SSB), JA9BLD(SSB), BV5DR (SSB).

Commonwealth Century Club

Standard (100 call areas): G3EZZ (CW), G0ARF (First RTTY).

5-Band Class 4 (200 call areas): G3EZZ.

5-Band WARC Endorsement Class 4 (150 call areas): G3EZZ (CW - first WARC award).

DXLCA (SWL DXCC)

ONL-7681 280 countries; UA9-154-101 - 175; OZ-DR2044 - 270.

Worked ITU Zones

Standard: EA2AOM.

28MHz Counties Award

Standard and 60 County sticker: CT3FT.

Correction

ON PAGE 49 of the May *RadCom*, under 'Manufacturer's Specifications' for the Alinco DR-150E, the figures for receiver sensitivity should read:

Sensitivity (12dB SINAD):
2m band -16dBμ or better,
70cm band -10dBμ or better.

ARDF Committee Vacancies

THE RSGB Amateur Radio Direction Finding (ARDF) Committee invites applications from members to join their ranks. Meetings are regularly held at RSGB Headquarters, in respect of which reasonable out of pocket expenses may be claimed.

Included amongst the Committee's terms of reference are: dealing with all matters relating to ARDF throughout the UK; to prepare rules, details and results of all Society-run ARDF events in the UK for publication in *RadCom;* to oversee the organisation of events and where necessary refer to Council in the event of dispute; to liaise with IARU; to maintain contacts with other committees eg VHF, HF, T & EC etc; to recommend to Council each year the award of the 1950 Council Cup; to be responsible for promoting ARDF matters and involvement throughout the UK and stimulate original designs for DF equipment.

Applicants should be members of the Society with an interest in ARDF and able to attend meetings on a regular basis. In the first instance, letters of application should be forwarded as soon as possible to the ARDF Council Liaison Member, Mr Michael Shread, GM6TAN, 15 Hardie Court, Aberchirder, Huntly, Aberdeenshire AB54 5TG, tel: 01466 780739, from whom further information is also available.

PHOTOGRAPH: GORDON ALLIS, G6LRS.

PHOTOGRAPH: GORDON ALLIS, G6LRS.

Big Guns on *HMS Belfast*; right: Bob Wilson, G0FEK; RSGB President Clive Trotman, GW4YKL; and Captain Crawford of HMS Collingwood School of Weaponry and Communications. Top: Visiting overseas representatives Nic Sifferlinger, OE8NIK; Rudy de Voss, ON4AGV; and Roger van den Bussche, ON6WR. Captain Crawford carried out an inspection of a Royal Marine guard of honour on board *HMS Belfast*, home of permanent special event station GB2RN, on 20 April.

50MHz Repeaters

THE Radiocommunications Agency has agreed in principle to the establishment of 50MHz voice repeaters in the shared portion of the six metre band, that is 51 - 52MHz.

They have also agreed to consider further voice repeater linking proposals on a case by case basis. Please note that only repeaters in remote areas will be considered.

PHOTOGRAPH: G3KPO

Rod, G3RSN (left), and Douglas, G3KPO, at the official opening of the 'Radio, da Marconi alla musica delle stelle' ('Radio, from Marconi to the music of the universe') exhibition in Bologna, Italy. Organised by the Marconi Company and the University of Bologna, the exhibition commemorates the one hundred years of radio anniversary and it is planned to bring it to England next year. Meanwhile, for anyone visiting Northern Italy this summer it is highly recommended. The exhibition is in the Palazzo re Enzo, Salone del Podesta in the main square of Bologna, opposite the town hall and cathedral.

Stolen Equipment

STOLEN from the car of G8BIX in early April, when parked outside his home in Portchester, Hampshire: AKD 2001 FM transceiver S/N ZM9501493, AEC SWR bridge, and home-built DC filter / battery charger / PSU. Information to Fareham police on 01329 236211 or direct to G8BIX, QTHR.

Stolen from the car of G3NDS when in Torquay over the Easter holiday period: Kenwood TS-50S transceiver S/N 50900129, Yaesu FT-480R transceiver S/N OM080502. Any information to Torquay police on 01803 841301, or to G3NDS, QTHR.

Stolen from the shack of G4GYN in late April: Icom IC-726 transceiver S/N 815001270 and PSU S/N 009094, Gould 1421 Oscilloscope S/N 104 and Fluke 8010A Bench Multimeter S/N 2181079. Any information to Amersham police or G4GYN, QTHR.

● QRPERS - (*AND QRO* operators) - take note: 17 June has been designated 'World QRP Day'.

THIS MONTH'S LEADING FEATURE

Announcing the Transatlantic 2m Challenge

The Brendan Trophies

THE IRISH Radio Transmitters Society (IRTS), the IARU member society for the Republic of Ireland, is pleased to announce a pair of Challenge Trophies to be awarded to the first stations to establish two-way communications across the Atlantic on the 2m (144MHz) band. A group of like-minded amateurs from Ireland, Wales and England, under the auspices of the IRTS, approached the Waterford Crystal Company (Ireland), who have kindly agreed to donate two inscribed Waterford Crystal cut glass vases (shown on this month's cover) as trophies for this 2m Transatlantic Challenge. They will be known as the Brendan Trophies, after Brendan the Navigator.

The Atlantic has always been an inspiring challenge to man. To be the 'first' to cross this ocean, in whatever category or by whatever means, has always been a goal which would stretch technology and imagination to their furthest frontiers. Since the Atlantic was first bridged on HF in November 1923 (see sidebar), radio amateurs have successfully worked 'across the pond' on many modes and frequencies, and by many methods of propagation. For at least four decades operators have thought, talked about, and tried for the elusive 2m 'first'. It is hoped that the announcement of these Trophies will encourage operators to persevere, with the ultimate goal being the first properly-documented 2m transatlantic QSO.

In this year of 1995, the 100th anniversary of radio, it is fitting that a new impetus be given to the challenge of the Atlantic on 2m. The spirit of experimentation which drove those early enthusiasts in the new science of radio will, no doubt, rekindle itself yet again, and be found in many a dedicated DXpedition, breathtaking antenna array or serious propagation study, in an attempt 'to be the first'.

Several expeditions to the west coast of Ireland have already been mounted in an attempt to make the first transatlantic contact on 2m, but none has so far been successful. There have been a number of reports of signals which may have originated on the far side being heard, one-way, although none of these has had sufficient documentary evidence to be widely accepted. However, leading radio propagation experts have predicted various ways that a 2m transatlantic contact may be possible, given exceptional conditions.

It is hoped that the Brendan Trophies will encourage those who are interested in making amateur radio history to co-ordinate and arrange serious transatlantic radio tests. Such tests will require dedication and peak equipment and operator performance - although if fate so desires the first contact could possibly be made even with simple or basic radio equipment, under very special conditions.

Some experts would say that this venture is much more difficult to achieve than Marconi's early transatlantic shortwave contacts. Do you want to follow in Marconi's footsteps and help to bridge the Atlantic Ocean on the 2m band? The challenge has now been set and radio amateurs in Europe and the Americas must now prove to the experts that the true spirit of amateur radio knows no bounds. Who will be the lucky people to achieve this milestone in the radio world and go down in the record books? *It could be you!*

IRTS President Jim Ryan, EI3DP, (left) being presented with the Brendan Trophies by Paul Martin, EI2CA.

The 2m Transatlantic Challenge project co-ordinator since its inception has been Paul Martin, EI2CA. The IRTS would like especially to acknowledge the valuable assistance and encouragement of Geoff Grayer, G3NAQ; Tony Jones, GW4VEQ; Aidan McGrath, EI8CE, and the many dedicated VHF DXers who have lent their support to the project.

BRENDAN THE NAVIGATOR

ST BRENDAN (Brendan the Navigator) was born in Tralee, Ireland, in 484AD. He was an abbot, missionary and explorer, whose exploits are documented in early Irish literature. The medieval epic *Navigatio Brendani (The Voyage of Brendan)* tells of how he and 17 fellow monks sailed the Atlantic. While there is speculation as to how far he actually reached, it seems likely that he did visit Iceland and probably Greenland. Some accounts mention 'a further place', possibly present-day Nova Scotia or Newfoundland. In 1976 Tim Severin crossed the Atlantic in the sort of leather boat which Brendan would have used, proving that such a voyage was possible. St Brendan later founded the monastery of Clonfert in Galway and died in Annaghdown, Galway, in 577AD. His feast day is celebrated on 16 May.

THE FIRST HF TRANSATLANTIC CONTACT

YOU HAVE TO go back over 70 years for an account of the first HF transatlantic contact. The following is an extract from *Two Hundred Metres and Down* by Clinton B DeSoto which details that historic night, 27 November 1923. Will people be writing about *your* VHF achievements in the year 2065?

". . . For an hour he called America, then sent two more messages. At 1030 he signed off, asking for an acknowledgement. Long calls from 1MO and 1XAM and then... there he was, asking Reinartz to stand by, and saying to Schnell 'R R QRK UR SIGS QSA VY ONE FOOT FROM PHONES ON GREBE FB OM HEARTY CONGRATULATIONS THIS IS FINE DAY MIM PSE QSL NR 12'. American and European amateurs were working for the first time, with strong signals, and to Deloy, after a year's constant and unremitting effort, it was a fine day!

"He then called Reinartz, 1XAM, whose transmitting circuit was in use at all three stations, and they also worked with similar ease. A message was sent via 1MO to the renowned General Ferrie, France's grand old man of radio. Further schedules were arranged. Signals were coming through on loudspeakers. A key and buzzer, actuated by the neighbour lad next door, would have been no louder; yet a mighty ocean, four thousand miles of trackless distance, separated these pleasantly-chatting friends, separating innumerable friends to chat in countless days to come.

"It was, indeed, a fine day."

How to Win the Brendan Trophies

by Geoffrey H Grayer BSc PhD, G3NAQ*

THIS ISSUE OF *Radio Communication* sees the announcement of the Brendan Trophies, to be presented for the first confirmed amateur transatlantic two-way contact on the 2m band not involving satellites (artificial or natural!) The questions which I suppose you will now be asking are "can it be done?", if so "how can it be done?" and, of course, "is there any chance I could do it?"

To help you reach your own conclusion, I will examine the various 2m propagation modes and their possibilities for transatlantic contacts. Included are details of some of my own investigations into transatlantic sporadic-E, details of which appear in *RadCom* for the first time.

I suggest that if you have access to a globe of the earth, you have it handy while reading this article, since the world maps with which we are most familiar use projections such as the Mercator, which grossly distort distances and directions of the shortest (great circle) paths between two points. **Fig 1** shows the nearest we can come to a globe in two dimensions. This Azimuthal Equidistant projection (commonly known as the Great Circle projection) gives true direction and distance from one point only - in this case London - but it won't be too far wrong for the whole of the British Isles. I will assume that you have a working knowledge of VHF propagation modes - if not, I recommend that you also have at hand reference [1].

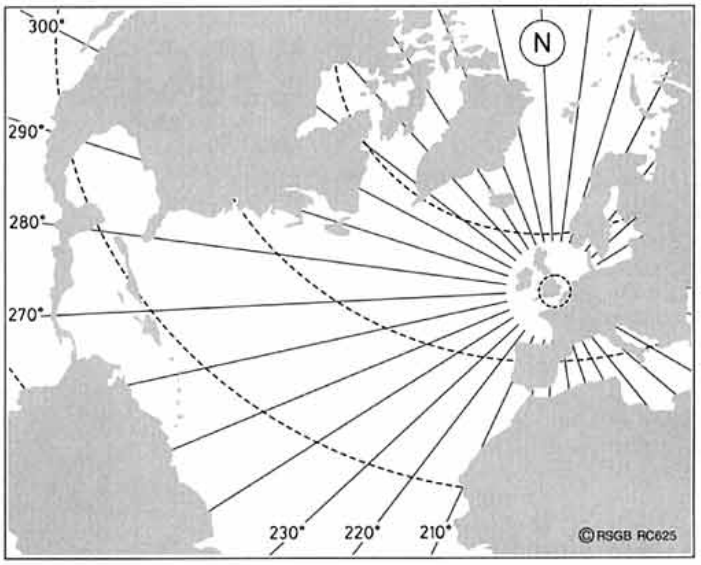


Fig 1: An Azimuthal Equidistant Projection (Great Circle) map covering the North Atlantic, centred on London. This projection gives true direction and distance, but from one point only (in this case, London). The accuracy of these quantities deteriorates as one moves away from this point.

DISTANCES AND SITES

FIRST LET'S REVIEW the problem. The closest distance between the two habitable parts of the continents of Europe and North America is from the most north-easterly point in southern Labrador, near a settlement known as Domino, to the north-westerly tip of the Republic of Ireland known as The Mullet; this I calculate to be 2956km. However, I can't imagine that 2m activity is high in either spot, so let's look at larger settlements. Domino to Ballina, Co Mayo (in the north of Ireland) is 3013km. If one goes a little further south in Canada, St John's on the east coast of the island of Newfoundland, to Ballina, or to Bantry, both work out to be around 3100km. But perhaps you could get a job as a lighthouse keeper on one of the offshore islands of Ireland (The Skelligs, Tearaght, or Black Rock), which would cut this down to between 3010 and 3025km. If you really want to rough it, Rockall (GM) is a mere 2820km from St John's - and good luck to you!

At somewhat greater distances, the Isles of Scilly off Land's End, England, are at 3350km, while Penzance in Cornwall is very little further at 3400km. On the European mainland, La Coruna on the north-west tip of Spain is but a little further at 3433km, and Brest, France, a little further still at 3524km. However, as we shall see, these locations could be more favourable than just going for the shortest distance!

Returning to North America, as one travels south-west along the eastern seaboard, one moves more-or-less along the Great Circle direction from the British Isles (Fig 1), thus becoming correspondingly further away as one passes through Nova Scotia and New Brunswick into north-east USA, the states of Maine, New Hampshire, Massachusetts, Connecticut and New York. New York (city) to Ballina is 4902km! Thus while there may be more activity in more southerly parts of the east coast, Newfoundland would seem to be the most promising compromise between habitation and distance.

Although St John's is geographically further south than London (comparable with Brest, France), its climate is more severe as it is subject to the cooling influence of the Labrador current, in contrast to the warming influence of the Gulf Stream on north-west Europe and this will have implications for tropospheric modes of propagation. However, in terms of *geomagnetic* co-ordinates, St John's is much further north than London (similar to Edinburgh), because it is closer to the North Magnetic Pole located in north-western Greenland. This influences F2, Es, and Ar propagation.

Let's now look at each relevant propagation mode in turn.

F-LAYER PROPAGATION

THE PRIMARY MODE for worldwide DX on the HF bands is reflection from the ionospheric F2 region. The typical effective height for an F2 reflection is 300km, giving a maximum geometric range for a single hop of about 3800km. This is ideal for transatlantic DX, as we find on the 50MHz band at the times when the F2 region reaches its highest ionisation densities - around the equinoxes at the peak of the sunspot cycle. In practice, the time of year when transatlantic propagation is at its best is skewed towards the winter season - presumably because of the added advantage of the tilt in the ionosphere as dusk approaches on the European side, while the opposite tilt occurs following dawn Stateside. The tilt reduces the angles of bend necessary, and hence increases the maximum usable frequency (MUF).

The peak probability of an opening between Europe and the Eastern seaboard of the USA is at around 1500UTC. We know the F2 MUF for 'normal' propagation reaches 70MHz at these times; could it ever reach 144MHz at the latitudes necessary for transatlantic DX? **Fig 2** shows the sunspot record since records began in 1749. So far, the most active cycle was number 19, peaking in 1957/8. As far as we know, the MUF never reached 144MHz during that cycle - at least, there were never any spectacular transatlantic openings! But we really don't know what MUF was reached - extrapolations based on vertical ionospheric sounding data do not

*'Bagatelle', Southend, Brightwalton, Newbury, Berks RG20 7BE.

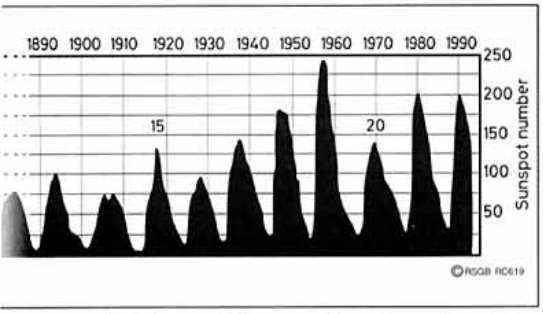


Fig 2: A potted history of the solar cycle up to the end of last year: the mean monthly Sunspot Number plotted against time. The numbering of the cycles is also indicated.

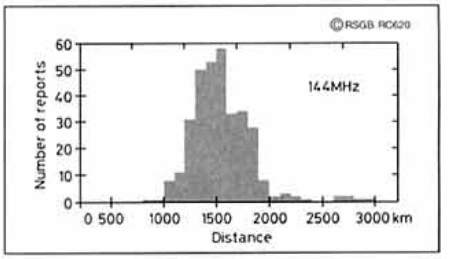


Fig 3: DX operators' maximum ranges by tropo ducting, taken from the 'Top List' in *DUBUS*, 1989 no 1. Redrawn from *The VHF/UHF DX Book* by kind permission.

work at these extreme frequencies, for the reasons given in [1], pp 2 - 16. It should also be pointed out that the number of 50MHz transatlantic openings far exceeds that which would be expected from an extrapolation of HF prediction programs to this band [2], probably for the same reasons. The next solar maximum is predicted for the years 2001 / 2.

There is one type of F-region propagation which does reach 144MHz, and therefore should be mentioned here. The F2 layer density is at its maximum between 10° and 20° latitude either side of the *magnetic* equator, and even using this maximum and chordal hops (which require less density as the angle of bend is less) the MUF only reaches 144MHz and above for a special type of propagation we call *Trans-Equatorial Propagation (TEP), field-aligned type*. This has enabled contacts on the 2m band over an astonishing 8000km or more, eg between South Africa and northern Italy. A combination of TEP with Es has extended this mode to England and Scotland on 50MHz. However, as the name implies, this type of propagation only works for paths which strictly follow the earth's magnetic field over the equator, linking points with the same geomagnetic longitude, and with equal geomagnetic latitude north and south of the equator. This obviously rules out transatlantic contacts.

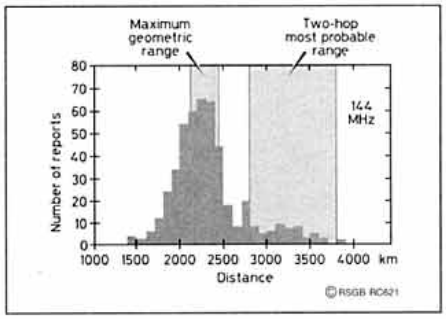


Fig 4: DX operators' maximum ranges by Es, taken from the 'Top List' in *DUBUS* 1989 no 1. Redrawn from *The VHF / UHF DX Book* by kind permission.

TROPOSPHERIC PROPAGATION

WE NOW MOVE from the very top of the atmosphere to the very bottom, for the next mode I will consider is tropospheric ducting. The current *official* Region 1 record for tropospheric ducting is from GD to EA8 at a distance of 3025km, which is in a north-southish direction, although I have been told of much more distant contacts: EA8 to GM at more than 3400km, or even EA8 to TF at around 4000km! Any of these distances are sufficient to cross the Atlantic if reproduced in an east-west direction.

Although these paths are almost entirely over the sea (and hence no elevated obstructions), the time these openings take place and the typical anti-cyclonic weather which characterise these openings, together with the fact that stations not so distant but inland have been worked at the same time, indicate that the ducting is caused by a subsidence inversion rather than a sea duct (see [1]). The 3025km path from the west of Ireland to the New World is also over sea, so the question is whether a suitable weather pattern can form to provide such an east-west duct. Such distances, however, are very rare - see **Fig 3** (which does not, however, include the record-breaking contacts).

In 1991, during a talk on tropospheric ducting at the RSGB VHF Convention, Ray Flavell, G3LTP, who has studied this mode extensively, said that he believed it was possible that a high pressure weather system could cover the north Atlantic in such a way as to make transatlantic ducting on 144MHz possible. A year later (1992) I gave a lecture at the same venue, in which I showed that a transatlantic sporadic-E contact on 144MHz was perhaps an even more likely possibility.

SPORADIC-E PROPAGATION

SPORADIC-E (Es for short), like F-layer

THE BRENDAN TROPHIES RULES

Qualification

The Brendan Trophies will be awarded to each of the operators of the two amateur radio stations which first establish two-way communication between the continents of Europe and America (North or South) within the 2m amateur band (ie, 144 - 146MHz, or as subsequently modified by the licensing authorities.) If a station has more than one operator at the time of the contact, the award will be made jointly to those operators who can show that they contributed materially to the contact at that time.

Arbitration of Award

The Trophies will be awarded on the unanimous decision of an honorary awards panel consisting of a sub-committee of the IRTS, formed of at least three people. In the case of a member of the panel leaving or being unable to act, for whatever reason, the remaining member(s) will make a recommendation for a replacement. However, the final decision on the composition of this panel rests with the executive of the IRTS. In the case of a claim in which one or more of the members of the panel is closely involved, the member(s) so involved will stand down and replacement appointments will be made. When considering a claim for the Trophies, the panel may co-opt whomsoever it chooses in order to reach an informal decision.

Location of the Stations

The two stations involved must be located on land or non-tidal waterways within the continental shelves of Europe and America, as defined in the map. Note that the limit of the continental shelf of Europe is deemed to lie along the line of maximum depth between the European land mass and Iceland, while that of North America is defined to lie along the line of maximum depth between Canada and Greenland.

Station Details

Operators applying for the award must have held a current amateur radio licence provided by their respective authority at the time of the contact, and have operated within the provisions of their licence during the contact, particularly in regard to frequency and power limitations. Any information regarding the stations demanded by the awards panel must be provided, and if required the stations must be made available for inspection by nominated representative(s) of the awards panel.

The Contact

The definition of a contact is conventional, ie two-way communication will be deemed to be established when each station has:

a) received both callsigns in full;

b) received a signal report (minimum two characters of any generally recognised system. Generally accepted systems of reporting are the RS and RST systems, and the meteor scatter system);

c) received confirmation (R or Roger) that the other station has satisfied above conditions (a) and (b).

The basic outline of the continental shelves is derived from *The Times Atlas of the Oceans* pp 222 - 3 (Times Books 1983; ISBN 0-7230-0246-0).

This information must be exchanged within a maximum period of four hours, after which the contact must be recommenced. The contact must be made via natural reflectors within the atmospheric mantle of the earth, which for these purposes may be taken as a distance of 1000km. Thus man-made reflectors (aircraft, satellites etc) as well as EME are excluded. The contact may be made in any mode, ie SSB, CW (including high speed) or digital.

The onus of providing proof of the contact satisfactory to the panel rests on those involved. The level of proof required by the panel will depend on the circumstances involved. For example, if the contact is the result of pre-arranged tests, then that panel will expect a higher level of proof than if the contact were 'random', such as complete recordings of the signals from both sides. If on the other hand, the contact is made spontaneously, the signed statements of both operators and witnesses on one or both sides may be acceptable. All relevant facts will be taken into consideration when evaluating a claim, and the panel will pursue whatever line of enquiry they choose to evaluate the claim.

Procedures Following a Claim

Applications for the award must be made in writing to the Chairman of the Awards Panel within three calendar months of the contact being made, setting out clearly their evidence of a valid contact, and include a signed Declaration of Honesty and Operation within the true spirit of amateur radio. The panel will make the claim public by providing details to the amateur radio press on both sides of the Atlantic, and invite relevant comments. Any representation concerning the contact will be carefully considered before their decision is made. For an award to be made, both stations must have satisfied the award conditions. The decision on the validity of the contact within these rules rests solely with the appointed awards panel. This panel will make their decision on a claim for the award within one calendar year of the claim being received, and will make their reasons known in the event of a refusal to award the trophy. However, they reserve the right not to enter into any correspondence subsequent to their decision.

propagation, is known to give 50MHz transatlantic contacts. Unlike the F2-layer, Es does not only occur during solar maximum, but occurs around midsummer each year, and seems to be somewhat more frequent in the quiet years around sunspot minimum. It was, however, difficult to prove that this applied also to 2m, because of the paucity of data. However, recently I analysed a compilation of 2m Es data spanning 15 years [3], and indeed found a weak anti-correlation with the sunspot cycle - so now is the time to try!

Since the geometry of an E-layer single hop restricts the distance to 2130 - 2150km ([1], pp 2 - 43), transatlantic contacts require two hops. Double hop Es is rare, but does exist (**Fig 4**); distances up to 3900km have been worked, but between 3000 and 3500km seems to be most probable - ideal for the paths listed at the beginning of this article.

Now compare Fig 4 with Fig 3 - you will see that the maximum Es distances peak some 50% further than those of tropo ducting, and that the extreme distance tail is relatively less important than for Es contacts. However, these plots are taken from stations distributed all over Europe. The probability of 'temperate zone' Es, however, decreases rapidly as the latitude exceeds 35°, although there are 'hot spots' like over the Mediterranean and over Japan (**Fig 5**). For this reason I would consider NW Spain far more favourable for this mode than locations further north. Actually, the contours of Fig 5 follow more closely the lines of geomagnetic rather than geographic latitude, which decreases even more the probability of finding Es along the great circle path to St John's. However, we know transatlantic Es propagation from the British Isles does work on 6m, has worked on 4m, and recent claims [6] indicate that 100MHz FM broadcast stations in the USA have been heard in the UK - although surprisingly late compared with the observed times of 6m openings and with my predictions (see below).

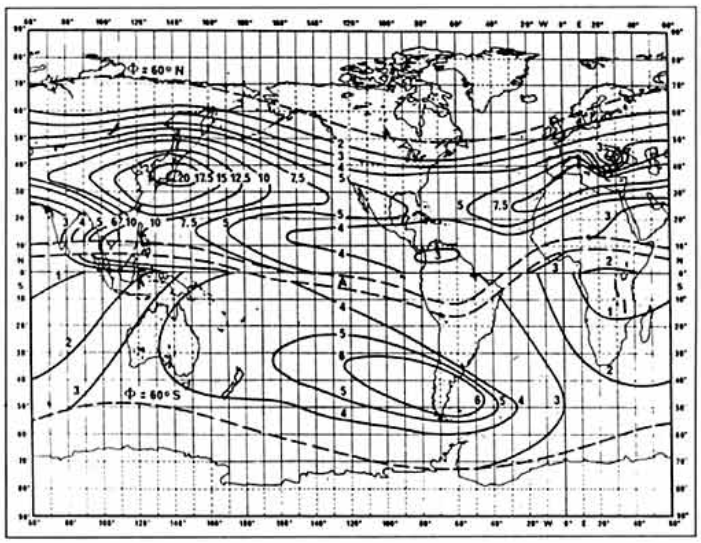


Fig 5: World map of relative Es probability. Reproduced from *The VHF / UHF DX Book* by kind permission.

Although there is still a long way from 100 to 144MHz - it is after all an increase in frequency of 44% - I have shown that, even though the probability is very low, it could work on 2m. How is that done? To put it very briefly, it turns out that one can predict (statistically) when Es paths open by taking the local distribution of Es activity throughout the day, and then moving the time scale so that it corresponds to the local time frame at the point where a reflection is necessary. The final (relative) probability curve is obtained by convoluting these distributions, ie by multiplying the distributions point by point. This might sound complicated, but it's not. In other words, one is multiplying the probabilities of Es occurring at the reflection points at the same time, thus producing an overall probability for the path. One can say with some confidence when the path will not be open, and also the *relative* likelihood of it being open at other times.

The fundamental idea was suggested by Kimball [4], but it was left to me [5] to do the actual calculations, which work very well on 50MHz for transatlantic paths to North America (**Fig 6**) and also for the beacon FY7THF (**Fig 7**). The same exercise can be carried out for 2m Es, and while the overlap in Es distributions are much smaller, there remains a small but finite probability of Es occurring at both reflection points at the same time (**Fig 8**), which shows that this two-hop path is possible. Thus I predict that the opening will occur between 1730 and 2130UTC. This is also the most probable time for an Es opening on 50MHz, although a significant number of openings occur both earlier and later than this period on that band. There will certainly be a massive opening on 50MHz at the same time, so the successful operators will have pulled themselves away from the 50MHz rat-race to carry out these tests.

METEOR SCATTER

METEOR SCATTER (ms) has in the past been the favourite mode for previous transatlantic tests, eg the Predannack Head tests of 1979 with VE1ASJ in Nova Scotia [7]. Since

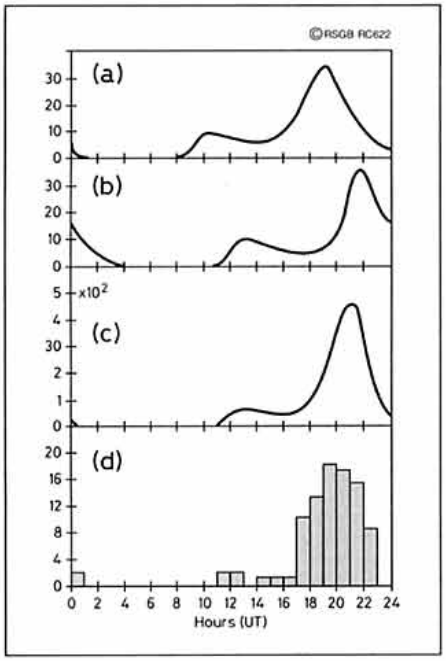


Fig 6: Derivation of the most probable time of day for 50MHz transatlantic Es (curves), and the actual time of contacts (histogram) [1, 5]. Redrawn from *The VHF / UHF DX Book* by kind permission.

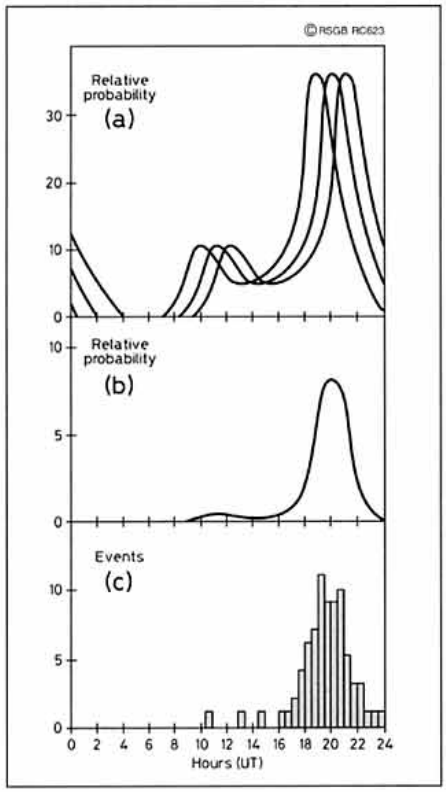


Fig 7: (a) The relative probability curves for the reflection points to the FY7THF beacon; (b) the combined probability curve; (c) the observed reception times, May to July, 1979 - 1985 [5].

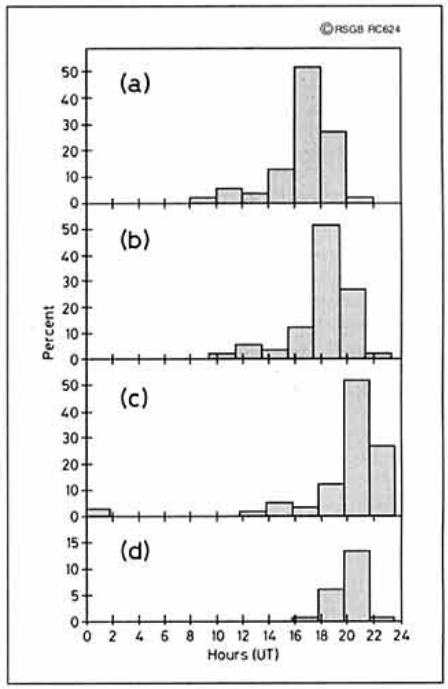


Fig 8: The prediction for the times of transatlantic openings on 144MHz, derived the same way as Figs 6 and 7.

a single hop ms reflection spans a similar distance as single hop Es, once again two reflections are necessary. The problem with ms propagation is two-fold; the trails last for such a short time that the probability of two trails in the correct positions occurring at the same time, and both surviving long enough to support a QSO, is very unlikely indeed. Add to this the fact that the reflection from a meteor trail is highly directional, and you begin to approach an incalculable but vanishingly small probability. Almost all the claims made from European DXers for ms distances are less than 2800km, though there are a few claims which appear to be double hop, eg 3100km; the author has no further information on the validity of these claims.

If double hop does occur, then it will almost certainly be during a major meteor shower (the occurrence of trails is so much higher), and the radiant must therefore be above or near the horizon on both sides of the Atlantic. The shower which has been most productive for ms contacts is undoubtedly the Perseids (during which the tests mentioned above took place). This shower offers the combination of high rate and long duration, but other showers sometimes yield higher rates at maximum, and these should not be ignored.

COMBINED AND OTHER PROPAGATION MODES

THERE ARE OTHER E-region modes which work at VHF: auroral scatter (Ar), field-aligned irregularities (FAI), and ionospheric forward scatter (IFS). However, all these modes are essentially confined to single hop E-layer distances. FAI and IFS are intrinsically weak modes; the path loss is so high that a second hop would put the signal way below any chance of detection.

The argument against the limitations of the single modes is that combinations of modes could occur at the same time to span that gap We know that occasionally these combinations do occur, giving extraordinary results, eg GM - Namibia on 50MHz, which seems to have been a combination of TEP and Es. Conditions seem to suggest that at least on one occasion, the reception of transatlantic 100MHz broadcast stations [6] was due to a combination of tropo ducting (European side) and Es (American side); this could explain the discrepancy in time mentioned above.

One could also postulate a combination of Ar and auroral sporadic E - Es(Ar). This might well take place if the active aurora was confined to one region, and Es(Ar) developed in a quieter region. Some reported contacts suggest that this mixed mode does occur. The difference in magnetic latitude suggest that the Ar reflection would be found at the west end of the path, while Es may form to the east.This is most probable in the hours after midnight, when the auroral oval is pushed by the solar wind towards the UK and North America (see [1] Fig 2.22).

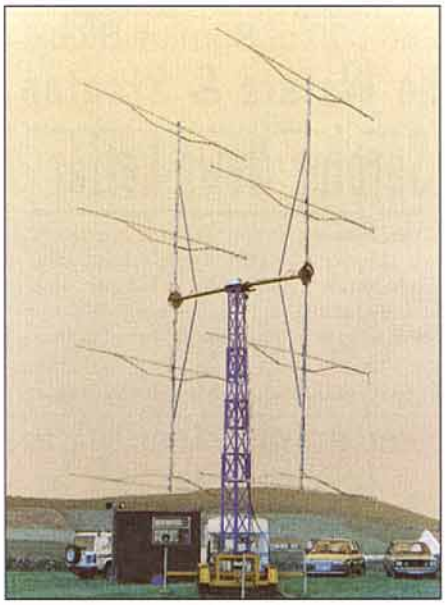
CHORDAL HOPS

CHORDAL HOPS are quoted by some as if this magic incantation would solve the problem. A moment sketching on the table cloth should convince you that (i) the maximum distance obtainable by a chordal hop is equal to that of a double hop at grazing incidence; (ii) a chordal hop avoids the intermediate sea reflection, but at grazing incidence, at least under calm conditions, the loss due to this reflection should be very small; (iii) the only advantage of a chordal hop is that the angles of refraction can be less than that required for an surface reflection, and so can take place with lower ionisation; the accompanying disadvantage is that the distance covered is shorter, so that a minimum of three or more rather than two ionospheric reflections would be needed. There is strong evidence that F-layer world-wide propagation on 50MHz usually involves chordal hops [1], launched by the tilts in the ionospheric layers at either end.

The geometry of Es at 2m (see [1] Fig 2.33) probably also allows chordal hops to take place. Indeed, this may be why double hop Es peaks at a distance significantly below the maximum allowed, which would correspond to minimum MUF for conventional hops. But any further reduction in angles (to effectively increase the MUF) would reduce the distance covered such that three hops would be necessary; clearly in the case of Es the probability against this occurring on 2m becomes astronomically large.

ANTENNAS

FINALLY, I think a few words of practical encouragement are appropriate. Although EME-type ERPs and antenna gain may not be necessary, they certainly can't do any harm - to the possibility of winning the Trophy, that is. However, you don't need the complication of EME, ie a *steerable* high-gain antenna. Your antenna can be fixed along the great circle direction to the USA and cover the entire east coast. Having first obtained your site, how about a 100ft long quagi - no boom, the elements held in the air by rope [8]. Alternatively, rhombics work well on 2m. If anyone is seriously interested, an SASE will bring a sketch of a rhombic successfully used for 2m EME in the UK and elsewhere, and incidentally in the 1979 transatlantic tests [7].



The East Cork group, EI7M, attempted transatlantic QSOs in July 1989 from Kerry Head using this 8 x 19 - element array. Although no transatlantic QSOs resulted, one report of being heard in the USA was attributed to reflection off the moon, and many random EME QSOs were completed in the off-sked times.

RECOMMENDATIONS

I WOULD LIKE to encourage permanent beacons to be set up at, say, St John's, Newfoundland, and near Land's End, England, running significant power (not less than 100W) with a high-gain Yagi directed along the great circle path. (How about it, Cornish beacon group?). In this way everyone can participate by listening for the beacons, and we all know how unpredictable Es can be. The reception of one or other beacon would demonstrate the feasibility of the project. It is understood that there will soon be a 2m beacon located in Canada beamed towards the UK.

I would like to invite donations, however small, in order to finance a 2m beacon located in the UK beaming towards Canada and the USA. A special account will be set up and managed by the RSGB Propagation Studies Committee. Please send your contributions to me. Cheques should be made out to 'The Special Beacon Project'. Any money which is not used for this beacon will be donated to other amateur beacon projects.

CONCLUSION

SO WILL THE BRENDAN Trophies ever be won? Of course, I don't know. But you now have enough information to make your own educated guess. In my opinion, if it is done it will be by simple double hop Es - but I wouldn't bet on it! And while on the subject of betting, another thing I can say with some certainty is that, you have more chance of winning a Brendan Trophy than winning the big prize in the British National Lottery!

ACKNOWLEDGEMENTS

THANKS ARE DUE principally to Paul, EI2CA, but also to Tony, GW4VEQ, and Aidan, EI8CE, for initiating the Brendan Trophies, inviting me to advise on the rules, and suggesting that I write this article. Last but not least, I thank Jon, GW4LXO, for checking my manuscript and suggesting improvements.

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[1] *The VHF / UHF DX Book*, chapter 2 (obtainable from DIR Publishing, or from RSGB HQ).

[2] 'Predicting Transatlantic 50MHz F-Layer Propagation', E Pocock, W3EP, *QST*, March 1993 pp 32 - 34.

[3] *RSGB VHF / UHF DXer*, no 1 May 1992.

[4] 'Transatlantic Propagation by Sporadic E at 50MHz', G F Kimball, G3TCT, *Radio Communication*, July 1986 pp 491 - 494.

[5] 'Sporadic E and 50MHz Transatlantic Propagation During 1987', G H Grayer, G3NAQ, *Ham Radio Magazine*, July 1988 pp 10 - 34.

[6] 'VHF / UHF News', *Radio Communication*, October 1994) p 22 reporting D Hilleard, G4CQM; also private communications.

[7] '4 - 2 - 70', *Radio Communication*, October 1979 p. 944.

[8] 'A Rope Ladder 2-Meter Quagi', J Ford, N6JF, *QST*, March 1995 pp 25 - 27. ♦

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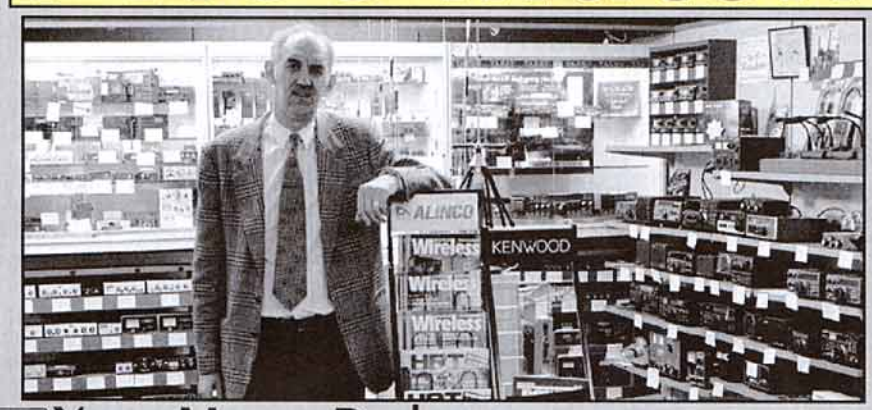

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HF NEWS

JOHN ALLAWAY G3FKM
10 Knightlow Road, Birmingham B17 8QB

SADLY, G8KG - THE man behind the propagation details which appear in this column - will be unable to continue producing his regular feature. His highly specialised knowledge has been invaluable and will be missed. I wonder whether anyone else is in a position to supply similar monthly information?

DXCC IN PRINT

THE *DXCC YEARBOOK 1994*, produced by ARRL, is now available. This fascinating publication is automatically sent to full or associate members of ARRL who are current members of the DXCC Honor Roll and/or have made a DXCC submission between 1 October 1993 and 30 September 1994. It has 32 A4 size pages and is priced US$5.00. Titles include 'Sunspots Fail to Dampen Enthusiasm', 'The Year in Review', 'The 100 Most Needed DXCC Countries', the 'DXpedition of the Year', and several other highly absorbing chapters. Also enclosed are tables showing members of the DXCC. There are over 60 UK stations listed in the Honor Roll 'Mixed' category, 35 in the 'Phone' list and 13 under the 'CW' list.

'The 100 Most Needed DXCC Countries' chapter is very interesting because most similar lists are looked upon from a particular part of the World. This one was generated by the DXCC computer and gives an overall view of the greatest need. The list is as follows: Yemen (7O), Bhutan (A5), Heard Island (VK0), Libya (5A), Andaman and Nicobar Islands (VU4), Tromelin Is (FR/T), Mount Athos (SV/A), Macquarie Is (VK0), Tunisia (3V8), Kermadec Is (ZL8), Glorioso Is (FR/G), Congo (TN), South Georgia (VP8), Laccadive Is (VU7), and Prince Edward & Marion Is (ZS8MI).

Dmitri, UA2FB, (foreground) recently visited the shack of Stanley, EA6ZY, in Ibiza.

CONTESTS

CANADA DAY CONTEST

0000 - 2359 1 July

Please note that the date of this contest *is* correct! 1.8 to 28MHz CW and SSB. Suggested areas of activity are around 25kHz up from the lower band edge on CW and near 1.850, 3.775, (7.225), 14.175, 21.250, and 28.500MHz on SSB. Work everyone and you are allowed to work the same station on each band and mode. QSOs with non-Canadians count two points, with Canadians 10, and with Canadian stations with RAC, VCA, or QST suffixes 20 points. Send RS/T plus serial number from 001. Canadians send RS/T and province/territory. The multipliers are the 12 provinces and territories on each band. Entries go to: RAC, P O Box 356, Kingston, Ontario K7L 4W2, Canada, to arrive no later than 31 July 1995. I have copies of the rules (SASE please).

PORTUGAL DAY CONTEST

0000 - 2400 10 June

Phone only on 3.5, 7, 14, 21, and 28MHz following IARU band plans. Single-operator all bands SSB only. Work anyone and send RS and QSO number starting from 001. Portuguese stations send RS plus a letter which identifies their District or Autonomous Region. QSOs between non-Portuguese stations count three points, with Portugal six. QSOs with own country count as multiplier only. A station may be worked on each band. Multiplier is different Portuguese Districts/Autonomous Regions and DXCC countries. Each counts once only. Post logs before 31 July to: REP Award/Contest Manager, P O Box 2483, 1112 Lisboa Codex, Portugal. I can supply photocopies of rules (SASE please).

ALL ASIAN CONTEST (CW)

0000 17 June - 2400 18 June

1.8 to 28MHz (no WARC bands). Single-operator single and multi-band and multi-operator multi-band categories. Exchange RST plus two figures giving operator's age (ladies send '00'). QSOs with Asian stations (other than US auxiliary military stations in the Far East and Japan which do not count) count three points on 1.8MHz, two on 3.5MHz, and one on the other bands. The multipliers are the number of different Asian *prefixes* worked on each band. Note that JD1 (Minamitori Shima) is in Oceania. Entries for the CW section should be sent to JARL, All Asia DX Contest, P O Box 377, Tokyo Central, Japan, postmarked no later than 30 July 1995.

In the **1994 ON Contest (3.5MHz CW) G4IQM** was placed third in the foreign entries with 3450 points and in the SSB section **G4IQM** was second in the same category with 5040 points while G3XYZ came fourth with 4785, and G/PA0FAW/P fourteenth with 126.

WORLD-WIDE SOUTH AMERICA CW CONTEST

1200 10 June - 1800 11 June

Work all the World on 3.5 - 28MHz (no WARC bands). CW only. Call 'SA Test' and exchange RST and two letters indicating continent - AF, AS, EU, NA, OC, SA. QSOs with South America count 10 points with others (including own) two. Multipliers are two for every different S American *prefix* worked. Logs to: WWSA Contest Committee, P O Box 282, ZIP 20001-970 Rio de Janeiro RJ, Brazil, to arrive before 30 October. I can supply photocopies of the rules (SASE please).

DX NEWS

A *DXCC NEWS RELEASE* dated 3 April revealed that the number of unprocessed applications at the end of March was 163 (16,389 QSLs). 561 applications were received (45,653 QSLs) for endorsements or new awards during the month. Applications being sent out at the end of the month were received less than a week earlier. A few applications received prior to that time were waiting for paper records to be converted, or were being audited, and so had not yet been completed. Documentation for the 3V8BB operation has been received and approved and QSLs may now be submitted. Cards from 3X0DEX are not yet being accepted as no documentation has been received.

Another expedition to **Scarborough Reef** took place in mid-April when BS7H came on the air. This was carried out by a multinational team consisting of BZ1HAM, BZ1OK, KC6KOU, KJ4VH, OH0XX and OH2BH and planned by the China Radio Sports Federation and the South China Sea DX Team. On 7 July 1994 the CRSA filed an application for DXCC status for Huang Yan Dao with the ARRL DX Advisory Committee and several items of supporting evidence have been sent since. BZ1HAM, JA1BK, and KJ4VH were due to present the BS7H story at the Visalia International DX Convention and also at the Dayton Convention prior to visiting ARRL HQ to present full documentation for the operation. An application for DXCC status is apparently already waiting for consideration by the DXAC based on Point 2(a) of the DXCC criteria (225 miles separation by water). The operation was extremely well conducted and made 12,000 contacts during the 80 hours that the DXpedition was there.

The Top List Award will be issued to those who have worked at least 1000 DXCC 'band countries' using all the available bands between 1.8 and 28MHz including the WARC bands.

According to the *Long Island DX Bulletin* YA/UT9XL has said that he will be in **Afghanistan** for a few months longer and will be active on all bands. He is hoping to obtain suitable documentation. *RSGB DX News Sheet* says that YA9XL was reported active on 7MHz and that this might possibly be the same operator with a proper licence. The information given about changes in **Kuwait** last month is obsolete! It seems that the authorities have had second thoughts and non-residents have had their former callsigns

28 MHZ COUNTRIES TABLE

G0AEV	109
G4OBK	101
G0DNV	83
G0MCT	55
G3XBM	32
G0NQC	31
GJ4GG	27
G2FQR	17
GM4CHX	16
G3ING	14

restored - hence N6BFM is 9K2ZZ once more.

The *RSGB DX News Sheet* has quoted a message on the UK DX Cluster from G0CGL who learned from Tim, 4U/KC0PA, in a recent QSO, that his previous operation as S0/KC0PA was not approved for DXCC purposes. 4U/KC0PA was also told this operation was unlikely to be approved even though he claimed that it was a legal operation. As a result, he is now using 4U/KC0PA which counts for S0 and he will send new documentation to the DXCC Desk for this operation. The problem seems to be the location of the station which is in disputed territory.

Lynx DX Bulletin reports that GJ4ICD will be in the **Cape Verde Is** between 1 and 13 June. He should appear on all bands between 1.8 and 50MHz using CW and SSB. TJ1JB was previously 5X1B who is now working in the US Embassy in Douala, **Cameroon**. 9Q1UE has been very active from **Zaire**. The reason for the change in prefix is not known. According to *DXPRESS* 5R8DS has improved his 3.5MHz station and now has an inverted-L antenna with 24 radials. He would like to make skeds (see *QTH Corner)* and his favourite frequencies seem to be 3.505 and 3.792MHz. He can also be contacted via packet and his BBS is ZS5S.ZAF.AF. Alex, formerly 9X5EE, has now moved to **Zaire**

BAND REPORTS

Many thanks for providing input for this part of the column go to G2HKU, G3GVV, G3JMO, G3ZEM, GJ4GG, GM4CHX, GW4KGR, and the UK Packet Cluster via G4PDQ. Loggings were made between mid-March and mid-April and as usual callsigns in italics indicate stations on CW.

1.8MHz

0000	*CQ1OF, S92SS, TA2BK, VQ9TP, Ws, 9H3UD, 9K2/N6BFM.*
0100	*FM5BH, HK0/G0SHN, OY1CT,* S0RASD.
0400	*KL7H/6, PY0FF, ZS1JX, 5Z4FO.*
0500	*HV4NAC, TI4CF, XE1/AA6RX.*
1900	*VK3EW, VK6APZ, ZL2JR, N6WW/4X.*
2000	*UA9AX, VK5BC, VQ9TP, 6W6JX.*
2300	*A92BE, S79MX, 5B4/DL8KWS, 5T5JC, 9X/ON4WW.*

7.0MHz

0000	*EP2MZ, J85M,* P39P, S0RASD, XE3AF, 5T0AS.
0600	CX8BR, *FG5ED, FJ/N8SW, FK8GJ,* FK8HC, KL7Y, *VK2AR, VK9NS, W7ZQ (Wyo), YJ0ADJ, ZL4AU,* ZA1AJ.
0700	*NL7J,* TI5/KB0HML, S0RASD, VK, ZL, *3D2CU.*
0800	EA9LZ, *FO5OK,* KP4KS.
1600	*BS7H,* VK2BJ, *YK1AO, 5H3CK.*
1800	DU7CC, *FR5HG/E, VU2TES, ZL4OK, 3D2CU, 5R8AL.*
2000	AP2NJ, *JA7BKX,* TR8XX, *V5UUO, VQ9XX, ZS6KJ, 5Z4FM, 9X5EE.*

10MHz

0600	*KL7XD, VK3AUK, ZL3BJ, 3D2CU.*
0700	*C53HG, FK8GJ, JW0I, R1FJL, TU2MA, AH0W/W7 (Az), WL7VO, 5B4ES.*
0800	*HH2MED, JA, SV2ASP/A.*
1400	*A71AN, FK8GJ.*
1600	*DU7CC, OY2H, UA0JH, ZB2JK.*
1700	*BV7FF, ET3BN, R1FJL, S79MX, ZC4HA, 5H3CK, 5R8AL.*
2000	*J6/DK1RP, JT1BH, ZF1DX, 9Q5MRC.*
2100	*FG5XC, J20SF, JD1AMA, VP2VE.*

14MHz

0700	AH8A, *AH8N,* KH3AF, KL7XP, NH6XM, S0RASD, 3D2CT, *3D2ER,* 5W1AU.
0800	BA4AE, BY4RRR, ET3AA, *KL7PJ, 3D2KM,* 5T0AS, 9G1NS.
0900	BS7H, *HL1AVS, JA,* PY0ZFB.
1000	C21DJ, JW/DF6JC, RX1OX.
1100	FO5OK, P29NB, V73C, XX9AS.
1300	A61AF, FK8HC, HS0/G4UAV, V85BG, 9M6/HB9TL.
1500	A71A, *KH0A,* VQ9XX, XV7TH, XX9AS, *YI9CW,* 8Q7AL, *9V1ZV.*
1600	*BV7WB, HL5CL, 5T0AS, 9M8FC.*
1700	KH6/W7GMH, KL7XD, S92DW, TJ1MG, *V85NL,* VR2KM.
1800	*FR5HG/G, HS7ECI,* J20SF, *VP8CQS.*
1900	*HS0ZAA,* PY0ZFB, S92DW, SU2MT, 5X4D.
2000	FR5DX, *FS5PL, OX3XR,* VP8CPC.

18MHz

0700	*R1JFL,* XX9GD, ZL, *9J2BO.*
0800	ET2BN, *NH2G, J28FD, JA, 3D2CT.*
1000	ET3KV, *HL1KTX, J20SF, TU4EV,* V73C, *5H3CK,* 5N0BHF, *7Z5OO, 9Q5MRC.*
1400	*FR5HG/E, S79MX, VQ9TP, XU9SHA, 9M2AX.*
1500	*J28FD, JW0I,* TR8LT, W6, *YI9CW, 3B8CF,* 7Q7JL.
1700	FY5GF, HH2/KB0QNS, *HK7AAG, ZS4NR, 9Q5ZP.*

21MHz

1000	BV4AS, VR2BJ.
1100	XX9X, 9J2PI, 9K2HN.
1200	A71EA.
1300	D68QM, HZ1AB, P4OR, VP5A.
1500	FH5CQ, V5IGB, 5H3JD.
1600	C6AHN, FM5GN, S92SS, VP8CPC, ZD7WRG, 5X4D.

and is hoping to obtain a licence. His place seems to have been taken by Mark, ON4WW, who is trying to get his own licence as 9X5WW or 4U9X.

Eric, OH2BBF, began a two month tour of duty in **Tanzania** in mid-April. He has equipment and hopes to get operating permission. He may also try to operate from Burundi, Rwanda, Uganda and Zaire.

The *RSGB DX News Sheet* states that FM5CD will be using the special callsign TO2DX in **Martinique** during major contests throughout this year. The Camel Trophy adventure which was on the air in 1994 will be on the air this year from **Belize** between 7 May and 10 June. The operators will be G4CVI, G3SED, G4CCZ, and G8SVC who will be using the callsign V31RD. Activity will cover 1.8 to 144MHz and they will have a variety of excellent equipment. On 31 May the National Hurricane centre is due to open its new facilities on the grounds of the Florida International University situated just west of Miami. This will be the first centre of its kind and amateur radio is included as an integral part of the centre. To commemorate the event the National Hurricane Centre Amateur Radio Station, W4EHW, will operate a special event station on 31 May from 1200 until 2400 on 14.325MHz. Special QSLs will be available and cards should be sent to W4EHW (see *QTH Corner*).

The South Sandwich Island DX Group has now been joined by W8BLA. A document applying for permission to land on the islands was submitted in mid-February.

If you still need to contact **Franz Josef Land** look out for R1FJL or RX1OX/FJL soon. The latter says that the base may be closed in the next few months and the personnel moved to the mainland. This will make the islands a DXpediton target in future. During major contests in 1995 I2PJA will use the callsign IU2P and UX2HO will be using EN2H. IK4AUY will use IR4B.

The 1995 Conway Reef DXpedition team encountered very bad weather when trying to land. Two boatloads of operators and equipment capsized in the heavy surf, dumping equipment into the Pacific. There were no casualties among the operators but much equipment (valued at US $10,000) was lost. The team was limited to operating with two stations instead of three.

1995 WARC BANDS TABLE

	10MHz	18MHz	24MHz	Total
G4YVV	63	85	47	195 (CW)
G3ING	56	52	6	114
GJ4GG	32	40	18	90
G4FVK	9	19	2	30

NINE BAND TABLE NO 14

Call	1.8	3.5	7	10	14	18	21	24	28	Total
G3KMA	191	279	320	275	326	306	326	293	320	2636
G4BWP	168	278	312	267	325	300	321	268	310	2549
G3XTT	191	250	297	236	323	278	317	248	294	2434
G4GIR	133	262	303	233	326	280	322	248	310	2417
G3GIQ	78	223	287	179	326	277	326	235	314	2245
G4OBK	136	184	240	199	307	262	282	221	252	2083
G3TXF	104	200	263	180	309	197	307	145	273	1978
G3WGV	86	156	219	223	258	247	259	199	230	1877 (CW)
GM3PPE	68	175	221	228	279	241	256	183	223	1874
G3NKC	133	170	228	203	252	228	233	196	228	1871
G3SXW	88	185	232	193	296	196	282	145	238	1855 (CW)
G3IGW	125	183	305	196	276	224	233	45	207	1794
G3VJP	72	163	237	119	321	170	303	68	262	1715
GW3JXN	79	168	222	163	263	223	244	150	174	1686
G3NOH	43	98	175	203	268	240	257	169	211	1664 (CW)
G3NOF	5	118	117	-	326	245	325	225	299	1660
G4ODV	88	184	307	167	254	123	244	69	200	1636
G4XRX	3	48	127	112	264	179	284	153	232	1402
G3IAR	72	106	132	136	247	168	220	124	150	1355
G4NXG/M	12	45	104	-	238	131	259	137	236	1162
G4CMZ	14	45	103	83	140	67	124	18	101	695
AVERAGE	90	168	226	171	282	218	273	169	241	1838

Next deadline - to reach G3GIQ by 8 July.
(Prepared by G3GIQ, 8 April 1995)

OK FOR DXCC

THE ARRL ANNOUNCED on 20 March that the following operations were accepted for DXCC: 3A/IK1QBT, 3B8/ON4QM, 3C1/TU4EI, 3DA0CA, 3V8BB, 4S7/JA4FM, 5N0ETK, 5N0GC, 5N0PYL, 5X1HR, 5X1KO, 5X1MW, 7Q7SB, 8Q7AB, 8Q7BX, 8Q7YF, 9A/SP3DPR, 9A/SP6MLX, 9G0ARS, 9G5JR, 9G5MB, 9G5MT, 9G5RM, 9G5TL, 9G5VT, 9G5WH, 9I0A, 9I30ZIN, 9J2AE, 9J2CE, 9L1/TU5EV, 9M2/GM0DEQ, 9M6/GM0DEQ, 9N1AP, 9Q5AGD, 9Q5RT, 9X/SM5DIC, 9X5EE, A51/JH1AJT, A51MOC, A61AH, A61AN, C4C, CE8SFG, CN2SK, D2EGH, D68RS, D68TA, DU7/KD6QV, DU7LA, FH/JA1IDY, HS0/DL2FDK, J55UAB, J8/F5LGQ, J8/F6AOI, J8/F6BFH, J8/F9IE, J87CO, J87FT, P43DWC, S21YO, S79ASM, SV5/DK1RP, SV9/G4OBK, TI/KB9CRY, TI2PDX, TK/IK1QBT, TL8JD, TO0P, TU4EG, TU4EX, TU5DX, TU5EV, TU5NC, US1U/PA3BUD, UT8U/PA3BUD, V26E, V5/N0AFW, V51T, VI0ANT, VP29EI, VP2EDK, VP2MDY, VP8CBC, VP8CRB, VP8CRC, VP8SGP, VP9/W1RQ, VR6AB, XE1/NT2X, XE1/RA3AUU, XE1/UA3AB, XF4M, XT2JB, XU3DWC, XW1, XW1A, YK0A, ZA/OK1CF, ZK1SRF, and ZK2ZE. Cards may be submitted now.

AWARDS

EA-WPX-100 AWARD

Available to licensed amateurs and listeners for contacts/confirmed reports since 1 January 1945 with at least 50 different prefixes assigned to Spain by the ITU. These consist of EA0 - EA9, EB0 - EB9, EC0 - EC9, ED0 - ED9, EE0 - EE9, EF0 - EF9, EG0 - EG9, EH0 - EH9, AM0 - AM9, AN0 - AN9, and AO0 - AN9. Spanish prefixes which have two or more numbers after the letters will only count for the first five years after activated unless reactivated. Send a certified list of contacts (in alphabetical order) plus Ptas 1,000 or US $10.00 to: EA-WPX-100 Award manager, EA5KT, Manuel Montes Mula, STL URE Manises, P O Box 100, 46940 Manises, Valencia, Spain.

PROPAGATION

G8KG'S REPORT THIS month goes as follows: "Solar activity in the second half of March and first half of April closely followed the pattern of the three previous solar rotations. In particular, the period of relatively high (c 90sfu) solar indices coupled with very low geomagnetic activity repeated in the second half of March, giving a welcome boost to band conditions during the *CQ* WPX SSB Contest. During the period under review the daily solar flux values lay between 70 and 90sfu with the 27-day average just above the 80 mark. Geomagnetic activity was low for a total of 17 days separated by disturbed spells late in March and for several days beginning on 7 April when the estimated Boulder A index jumped from 6 to 49."

Sadly, this is the last regular report - at least for the time being - to be prepared by 'Smithy' G8KG, who has been reporting regularly for nearly 20 years! He will not lose interest in propagation matters and has promised to supply snippets of interest in future. I am sure that I express the sincere thanks of all of us to him for a job exceptionally well done for a long period.

THANK YOU

TO ALL THOSE who supplied information for this month's column and especially to the authors of the following for items extracted: *Long Island DX Bulletin* (VP2ML), *RSGB DX News Sheet* (G4DYO), *DXPRESS* (PA3FQA), and the *Lynx DX Bulletin* (EA2KL). Please send everything for the **August** issue to reach me no later than **17 June.** ♦

QTH CORNER

BS7H	Kan Mizoguchi, JA1BK, 5-Sakuragaoka-chome,Tama City, Tokyo 206, Japan.
J20SF	Patrick LaBeaume, F5LBM, 38 Chemin du Plateau, F-67500 Haguenau, France.
V31RD	via G4SMC, S M House, School Close, Chandlers Ford Industrial Estate, Eastleigh, Hants, SO53 4BY.
W4EHW	P O Box 350641, Miami, FL 33135, USA.
3D2CU	Mats Persson, SM7PKK, Zenithgatan 24 #5,S-21214 Malmo, Sweden.
5R8DS	Box 404, Antananarivo-101, Madagascar.
9M0A	Yutaka Yoshii, JA9AG, 3-33 Nakataikoyama, Kosugi,Toyama 939-03, Japan.
9U5MRC	B Poole, G3MRC, 18 Grosvenor Avenue, Kidderminster, Worcs, DY10 1SS.

VHF/UHF NEWS

NORMAN FITCH G3FPK
40 Eskdale Gardens, Purley, Surrey CR8 1EZ

APRIL BROUGHT some reasonable tropospheric propagation and a very good aurora. Although the 50MHz band continued to be in the doldrums much of the time, the first 'summer' Sporadic-E propagation from the British Isles resulted in some QSOs towards the end of the month.

REPEATERS

THE SOUTH DORSET Repeater Group's *April Newsletter* lists the 50 members whose subscriptions fund the operation and maintenance of its two repeaters. They are the UHF voice relay GB3SD on RB14 and the VHF packet node GB7SD on 144.650MHz. The latter is WEY2 and is linked to WEY23 on 23cm. The stations are located at Bincombe Barn on the Ridgeway, 6km north of Weymouth at NGR SY 788858. For details of the SDRG, send an SASE to treasurer Ed Harland, G3VPF, whose address is correct in the current *RSGB Call Book* - or QTHR, as this is usually indicated.

The Jersey VHF repeater, GB3GJ on R2, was taken out of service on 9 April pending receipt of a site change notice of variation (NoV). It was reported in the GB2RS news broadcast on 30 April that the Mendip Hills VHF repeater GB3WR (R0) was QRT due to an antenna problem. Contact keeper Jon Ives-Whitaker, G0MBX, for details; he is QTHR. The Radiocommunications Agency (RA) has agreed in principle to the establishment of voice repeaters in the 51 - 52MHz shared portion of the 6m band. The RA has also agreed to consider further voice repeater linking proposals on a case-by-case basis. Only relays in remote areas will be considered.

PUBLICATIONS

DEREK THOM, G3NKS (GLR), sent the first 'proper' issue of his new quarterly publication *Four Metres News*. It is a neatly produced six-page A4 newsletter with a good variety of topics including a full list of all the 'dry' squares workable on 4m. See page 23 in the May *RadCom* for subscription details.

Although not an amateur TV operator, I always look forward to receiving *CQ-TV*, the quarterly journal of the British Amateur Television Club (BATC). The 170th edition, May 1995, includes an eight page supplement listing services to members, such as publications, project PCBs and hardware. The club has now deregistered for VAT, so many items are cheaper. In his 'TV on the air' column, Andy Emmerson, G8PTH, includes a disturbing section about possible health hazards from 23cm microwave radiation. He cites several cases of members suffering: "...a general sort of listless feeling (a bit like 'flu) after exposure to RF." One was off work for three weeks after looking down the boom of a Yagi radiating 10W. Another, while making field strength measurements on a system feeding just 10mW into a corner horn, felt his face muscles twitching after just a few minutes. The lesson is obvious. *Keep well away from microwave RF fields, even though you may think the power involved is too low to cause any tissue damage.* A separate 32-page Publications Index was included with this edition. It covers major articles which have appeared from issue 80 through 168. *CQ-TV* is now edited by Chris Smith, G1FEF. For details of the BATC send an SASE to membership secretary Dave Lawton, G0ANO. He is QTHR.

The Spring issue of *FM News*, the newsletter of the Central Scotland FM Group (CSFMG), includes an account of the commissioning of the Ayrshire VHF repeater GB3AY (R2) from its new site at Baidlandhill Dairy. Its keeper is Bob English, GM3YKE. Status reports on other CSFMG operational repeaters are included with a progress report on the paperwork for GB3PA. The group attended the Magnum Rally in Irvine and signed up 23 new members while others renewed. On 28 March the membership was 392 and they are all listed in this issue with their first names, towns and local repeater. *FM News* is edited by Dennis Cram, GM3NIG, and the secretary of the CSFMG is Alasdair Fraser, GM3AXX, both QTHR.

The Spring issue of *VHF Communications* is predominantly devoted to microwave topics apart from Carl Lodstrom's, SM6MOM/W6, article 'A Bi-directional Amplifier for 2m'. The same author also describes additions to his 1991 design for a detector for complex impedances. For information on this quarterly magazine UK residents should contact KM Publications at 5 Ware Orchard, Barby, Rugby CV23 8UF.

The April issue of *Six News*, the quarterly journal of the UK Six Metre Group (UKSMG), includes: "The most comprehensive beacon list ever" for 50MHz. It was compiled by Geoff Brown, GJ4ICD, with input from at least seven others around the World. Jim Smith, G0OFE, the SysOp of GB7DXD, has a piece on 6m and getting the best out of the DX cluster. F5EMT, who is a sound engineer at Radio France Puy de Dome, provides details of the frequencies used by studios to contact outside broadcast units in nine areas. There are four channels; 50.025, 50.050, 50.075 and 50.100MHz running 20W to ground plane antennas, with the mobiles and OBUs transmitting duplex 3MHz lower. For details of UKSMG membership contact secretary Chris Gare, G3WOS, at QTHR.

LOCATOR SQUARES TABLE

STARTING DATE: 1-1-1979

Callsign	50MHz	70MHz	144MHz	430MHz	1.3GHz	Total
G3IMV	460	15	525	125	52	1177
GJ4ICD	628	1	264	121	75	1089
GW4LXO	499	37	261	109	48	954
G6HKM	481	-	248	121	65	915
G4IGO	565	-	250	-	-	815
G4RGK	183	-	333	211	74	801
G4TIF	352	28	213	112	-	705
G0CUZ	199	-	394	80	-	673
G0EVT	286	-	278	71	-	635
G4DEZ	235	-	255	74	63	627
G1SWH	286	38	200	68	15	607
G0JHC	543	-	48	-	-	591
G8LHT	225	20	210	95	20	570
GW6VZW	400	-	143	6	-	549
G4MUT	200	26	159	97	34	516
G0FIG	200	-	212	70	29	511
G3XDY	-	-	226	160	105	491
G0GMB	135	-	226	108	-	469
G6RAF	129	19	172	117	-	437
G4YTL	-	43	303	54	-	400
G0HVQ	328	-	71	-	-	399
G4RRA	-	-	317	80	-	397
G8TOK	167	25	131	51	21	395
G1UGH	246	-	124	-	-	370
G0EHV	-	38	195	87	-	320
GW8JLY	-	-	284	36	-	320
G8XTJ	183	-	129	-	-	312
G1HWY	-	-	179	85	46	310
G1AWF	62	-	174	14	-	250
G7HUD	135	-	87	25	-	247
G3FPK	-	-	246	-	-	246
GW4FRX	-	-	239	-	-	239
G7CLY	102	-	122	2	-	226
G3FIJ	63	26	85	34	6	214
G7LIJ	24	-	181	-	-	205
G8ESB	31	21	89	34	23	198
GI1CET	100	-	79	12	-	191
GW0PZT	-	-	191	-	-	191
GJ7LJJ	102	-	54	12	-	168
G0SOO	115	-	41	-	-	156
G6ODT	-	3	62	73	-	138
GM0GLV	102	-	35	-	-	137
G4OUT	-	23	106	-	-	129
G4OBK	83	-	1	-	-	84
GU4HUY	-	-	84	-	-	84
G0HIK	1	1	59	17	-	78
G3UOL	11	-	66	-	-	77
GW7SMV	9	-	58	-	-	67
G3NKS	2	44	2	2	-	50

No satellite, repeater or packet radio QSOs. If no updates received for a year entries will be deleted. Next deadline is **22 June**.

CONTESTS

THE 13TH ANNUAL *Practical Wireless* 144MHz QRP Contest takes place on 18 June, 0900-1700GMT. Tx power output is 3W maximum. Exchange reports, serial numbers and locators. Scoring is one point per contact multiplied by the number of different

locator squares worked, such as IO91, IN92, etc. The adjudicator is Neill Taylor, G4HLX and full rules are in the June issue of *PW*.

Joe Lynch, N6CL, posted the rules for this year's VHF Contest organised by *CQ Magazine* on the Internet on 16 March. There were three A4 pages of data on this 27-hour event which starts at 1800UTC on 8 July and covers all bands from 50MHz up. Exchanges to comprise callsigns and squares - grids as they are called in the USA - eg JN37, KO23, etc. Signal reports are only optional and need not be included in the log entry. Entries have to be submitted on new log sheets which you get from: The CQ VHF Contest, CQ Magazine, 76 N Broadway, Hicksville, NY 11801, USA. An SASE is required but sufficient IRCs with an SAE would doubtless fill the bill for non-US folk. If you need a copy of the Internet message, send me an SASE. There are seven other RSGB events in June; please consult the Contest Classified section and/or *The 1995 Call Book and Information Directory*.

NET ACTIVITY

DAVE JARRETT, G4DCJ (NOR), faxed details of a 6m net which he runs in Norfolk on Sunday evenings. It starts at 1830 local time using SSB on 50.180MHz. Participants use both vertical and horizontal antennas and they leave plenty of breaks for others to call in. Dave is in the Kings Lynn area. Newly licensed members frequently ask about net activity so, if you take part in any, please send in details of dates, times and frequencies.

PROPAGATION

THE MARCH *Report*, published by the Six and Ten Reporting Club, records that the sunspot numbers were again well above the predicted values, the mean being 31.1, 4% up on the February figure. The mean solar flux was 85.4, little different from the previous month. From June onwards, the *Report* will be edited, printed and distributed by Professor Martin Harrison, G3USF (SFD), assisted Dr Steve Read, G0AEV (WLT). The group urgently needs a volunteer to act as treasurer. Offers to Ray Cracknell, G2AHU, at QTHR or telephone 01568 780614.

METEOR SCATTER

THERE ARE THREE 'daylight' meteor showers in June with reasonable Zenithal Hourly Rates (ZHR). The first is the Arietids whose maximum should occur at solar longitude (LS) 76.7°, which equates to 2050UTC on the 7th. UTC times when the reflection efficiency exceeds 50% are: NE/SW 0400-1000 and around 1430; E/W 0700-1200; NW/SE around 0430 and 0900-1500; N/S 0300-0800 and 1100-1600. The radiant is above a mid-UK horizon 0100-1730.

The Zeta Perseids should peak on the 9th around 2030 at LS 78.6°. Optimum times are: NE/SW 0600-1100 and 1430-1730; E/W 0830-1330; NW/SE 0430-0730 and 1100-1600; N/S 0430-0930 and 1200-1730. The radiant rises at 0200 and sets at 1930. The Beta Taurids should peak on the 28th at LS 96.7°. Add two hours to the Arietids figures for the best times. These data are derived from the *1995 Meteor Shower Calendar* compiled by Alastair McBeath, vice-president of the International Meteor Organization (IMO) and from the OH5IY MS program.

MOONBOUNCE

MICHAEL OWEN, W9IP, has established Moon-Net on the Internet, with the support of his employer, the St Lawrence University. In an E-mail dated 3 April he stated: "This reflector is devoted to exchange of information regarding all aspects of EME operation. It is an unmoderated list open to anyone with interest in EME. It is not archived."

To subscribe, address a messageto:LISTSER@VM.StLawu.EDU and in the body of the message put "SUBSCRIBE Moon-Net" followed by your name eg SUBSCRIBE Moon-Net John Doe.

Conrad Farlow, G0RUZ (IO93), has now launched his six 11-wavelength DJ9BV Opt-70 Yagis. He was first QRV on 70cm with this array on 8 April completing with K0RZ and K1FO before the elevation screwjack clamp slipped. At moonrise on the 9th, JA9BOH was loud and VK5MC, with a 439 signal, was heard in QSO with him. Conrad then completed with ON4KNG, SM2CEW, WA4NJP, DL3BWW and N4GJV. A 'CQ' resulted in QSOs with G4ALH, I5CTE, DL4XX and HB9SV. On 10 April he completed skeds with PY5ZBU and JH4JLV; on the 12th, W0RAP, DL8OBU and EA3DXU; 15th K5JL and I5TDJ. A sked with N9AB illustrated a classic example of so-called one-way propagation. Andy's signal was 569 and Conrad's echoes were 559 but N9AB could not hear G0RUZ.

Shirow Kinoshita, JF6DEA, recently visited the RSGB HQ at Potters Bar. A keen 6m operator, Shirow was interested to see the GB3NHQ beacon, which operates on 50.050MHz. He is pictured here with station manager John Crabbe, G3WFM, under the GB3NHQ antenna on the roof of HQ.

Andy noted similar conditions but they eventually exchanged O/M for initial number 54. He would like to try with smaller stations now, including weekdays. His packet address is G0RUZ@GB7WRG.#19.GBR.EU and conrad@g0ruz.demon.co.uk is the Internet route.

50MHZ

THE SPANISH licence situation has been resolved. EA2LU telephoned G0JHC on 28 April to say that permit holders had received their renewals. Some new applicants were granted permits so the number of EAs on the band this year could be around the 120 mark. Neil also reports that the new Svalbard beacon JW7SIX on 50.047MHz was heard by SM3EQY (JP73) for five minutes from 1940 on 16 April.

Ex-ZB0T told GJ4ICD that he will leave for VP8 in July or August for a five month stay. Mark will be QRV on 6m and HF. The PY2AA beacon is QRV again on 50.059MHz from a new site 850m ASL near the Atlantic Ocean, some 50km east of Sao Paulo. It runs 5W to a ground plane 18m AGL. Reports to PY2AA LABRE SP, PO Box 22, 01000 Sao Paulo, Brazil.

Ela Martyr, G6HKM (ESX), operated in the major aurora on 7 April working into DL, F, G, GM, GW, LA, OH, ON, OZ, PE and SM. Squares worked were IO77, 81, 83, 85, 90, 92, 95 and 95, JN09, JO02, 10, 20, 23, 31, 33, 44, 49, 53, 59, 67 and 86, KP01, 12 and 20 confirming just how extensive this event was. Ted Collins, G4UPS (DVN), had similar results, his best DX being S59A (JN76). Most signals had faded out by 1840

Paul Baker, GW6VZW (GWT), detected the aurora at 1500UTC, working and hearing EI, GI, GM, ON, PA, SM stations and Gs. It was very intense for short periods until 1800, the QTE for optimum signal strengths varying rapidly between 350 and 045°. There were a few brief returns till around 2100. The first Es opening of the 'summer season' for UK operators seems to have occurred around 1000 - 1115UTC on 15 April when southern Gs heard signals from I, S5, YU and 9H. The next opening was a selective one on the 20th to Poland but the first long event was on the 25th, the same date as last year according to G4UPS. It started about 0925, mostly to Italy, stations fading out around noon.

144MHZ

DURING A GOOD tropo opening to France and Spain on 2 April Alec Trusler, G0FIG (SXW), worked EA1s in IN73, Fs in IN96 and JN04, DLs in JN39 and JO30 and HB9DFG in JN39. Terry Chaplin, G1UGH (SFK), worked EA1BCB and EB1EVP (IN63) on the 2nd, other DX being LX/DL2FZN/P (JO30) on the 14th, GD8EXI on the 16th and next day EI3GE and EI9HW (IO63).

Dave Dibley, G4RGK (BUX), thought the 7 April aurora the best for several years with more southerly stations than usual being worked, such as F6CRP (IN96) and IK4WLV (JN54). HA4ZZ (JN97) was a good catch. G6HKM had a few G and GM SSB QSOs in this event.

Paul Pasquet, G4RRA (SRY), completed numerous SSB QSOs with Fs and northern EA1s on 2 April. He has installed a vertical 15-ele Yagi and has made some long distance FM QSOs, including F6CBM via the FZ8VHF repeater in JN15. On the 5th, he accessed the EA2G repeater on R0 in IN83. Direct SSB mode brought contacts with EAs in IN53, 63, 82, 91 and 93.

Andy Stafford, G4VPM (SOM), worked down to JN13 and IN73 on 2 April. During the SSB Cumulatives session on the 4th, his best DX was GM4AFF/P (IO86) in rough conditions. On the 5th, he completed tropo QSOs with four EAs but missed the aurora on the 7th as he was in France. Derek Brown, G8ECI, sent a fax from Oman (A4) to say he will be back in JO03 in July for 30 days. Anyone needing a QSL for any contacts with G8ECI for September 1994 should send their cards to his home address. He has rebuilt his big 2m PA so should be a loud signal.

Rik Royall, G8ESB (YSN), enjoyed the SSB Cumulatives though conditions were quiet in the first session. The 12 April session brought 57 contacts with a further 43 in the final leg on the 20th. R Thompson, G6ORC (DVN), has been making what seem to be aircraft reflection contacts with G1AJI near Blackpool and G3NBQ in Bolton. He wonders if other members recognise and/or use this mode.

Edward Allely, GW0PZT (GDD), has re-erected his antennas now that the winter gales have passed. On 2 April he worked stations in JN04, 05, IN63 and 96, best DX being F5EPB/P in JN13. In the first leg of the SSB Cumulatives he made 64 contacts from the fairly rare IO72 square. In the second leg he made 40 QSOs before a PSU failure. He very much likes this kind of event. He found the Lyrids meteor shower to be "almost a complete washout," a sentiment echoed by Graham Daubney, F/G8MBI (JN04).

Joe Ludlow, GW3ZTH, was out portable at IO81FP for the 2 April tropo lift and made 120 QSOs; 10 EAs, 97 Fs, 5 HB9s, 2 ONs and some locals in 39 squares. Other -/P sessions on the 3rd, 8th and 15th did not result in any great DX. Jamie Ashford, GW7SMV (GWT), also enjoyed the 2 April tropo, best DX being F6GTP (IN94), DF2VJ (JN39) and EA2CNG/P (IN93). From the Dordogne, F/G8MBI made many good tropo contacts into GW and EI on 1 and 2 April, but propagation stopped at the Midlands. The 5 April tropo was not well supported by Brits so Graham looked south to find good signals from EA2 and even EA4. There was 49MHz Es on the 25th around 1100UTC and he heard weak Italian speech on 144.300MHz peaking at 60 degrees. Signals were weak, probably FAI.

430MHZ UP

BEST DX ON 70cm on 2 April for G0FIG was F/G8MBI. Alec also worked Fs in IN97, JN17 and 18 on 23cm. Mike Jupp's, G1HWY (SXW), best DX on 70cm and 23cm on that day was HB9AMH/P (JN37). In the 7 April aurora, G4RGK worked UT1PA (KO21FC) on 70cm at 1655 but lost PA3FPC a few minutes later. G4VPM worked Fs in IN96, 97 and JN06 on 70cm on 2 April, while 23cm saw F6HLV and F6APE (IN97), F6CRP (IN96) and F5EAN (JN06) in Andy's log. On the 5th he contacted EA1BLA and EA1TA (IN53) on 70cm but 23cm was inactive. In the 23cm contest on the 9th he worked nine stations in grim conditions.

G6HKM was QRV on 70cm on 2 April and had QSOs with Fs in IN96, 97, JN09, 19 and with HB9AMH/P (JN37). Ela worked the same stations on 23cm. In the 23cm contest on the 9th she had 15 contacts, best DX being GD4GNH in very poor conditions. Gerry Schoof, G1SWH (MCH), made 14 QSOs in the contest, best DX being G4RFR (IO90). G8ECI will be QRV on 70cm and 23cm again in July from JO03. Derek will have new antennas to complement the 6ft dish on 23cm. Best DX on 70cm on 2 April for GW3ZTH/P were F5VBW and F8CH (JO03). Joe made 11 contacts with Fs in seven squares.

DEADLINES

THAT'S IT for another month. The **August** deadline is **22 June** and the **September** date is **20 July**. My CompuServe ID is 70630,603 and the Internet address is 70630.603@compuserve.com. The telephone answering/fax machine is on 0181 7639457 and the BT Gold mailbox is 87:CQQ083. ♦

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HF F-LAYER PROPAGATION PREDICTIONS FOR JUNE 1995

The time is represented vertically at two-hour intervals UTC for each band, ie 00=0000, 02=0200, etc. The probability of signals being heard is given on a 0 (indicated by a dot) to 9 scale; the higher the number the greater the probability with 1 meaning 10 to 19 per cent of days, and so on. Additionally F-layer openings at 50MHz and 1.8MHz are indicated by a plus (+) sign in the 28 and 3.5MHz columns, with these latter bands having a probability of 9.

Time / / GMT	28MHz 00001111122 024680246802	24MHz 000001111122 024680246802	21MHz 000001111122 024680246802	18MHz 000001111122 024680246802	14MHz 000001111122 024680246802	10MHZ 000001111122 024680246802	7MHz 000001111122 024680246802	3.5MHz 000001111122 024680246802
** EUROPE								
MOSCOW	....	....	....111..22.	...233212452	2145666656887	7665544457789	7532222224688	42.......35
MALTA	....	.........1.	....11...23.	...133222562	2.1666656897	8566555567789	9864222235788	++3.....24+
GIBRALTAR	....	....	.........2.	....2111134 1	1..2654447866	7336655567789	9865433335788	++42....24+
ICELAND	....	....	....	11	1..1244333365	7445655556788	7765433334568	4432.....23
** ASIA								
OSAKA	....	....	....1.....	...1122122.11	1122433344354	1..1211124633	2318	....
HONGKONG	....	....	....111.11..	..1233213311	1122443356455	2...1111247 5	2438	..........2.
BANGKOK	....	....	...1221.21..	..1234224441.	1122343356654	31...111247 7	1.........2558	22
SINGAPORE	....	....	...1221.....	..1344 22....	2122343322...	41..1111222.	2.........2448	23
NEW DELHI	....	.........1..	...1221124 1.	..1334324664.	2132233357744	631...112478	41........2568	23
TEHERAN	....	...11..122.	...2231135 5.	..2444325772	2243333357787	7531...112578	63........2568	4.........23
COLOMBO	....	...11..1...	...2231133...	..2334335...	.1322333511.	431...111245 5	51........2568	2.........23
BAHRAIN	.........1..	...11..132.	...2232146 51	..2444336773	3243223357788	853...112578	73........2568	4.........24
CYPRUS	.........11.	...1121.133.	...3443246 62	1.2566546885	5366666668899	9763333346 89	8631 1..11367	53........34
ADEN	.........11..	....11123..	...2133356 11	..1424446843	5243223457787	8641...12478	751.....2568	42.......24
** OCEANIA								
SUVA/S	....	....	....	....11....21	1133331..253	.1342111.441	...1....11.	....
SUVA/L	....	....	11	1..1.....23	2114.....64	113411..1242	..11....12.	....
WELLINGTON/S	....	....	....	...1.....21	2233.....64	2244211 1163	..11....131	....
WELLINGTON/L	....	....	1	2.........3	421.......5	3343.....43	.122....131	....
SYDNEY/S	....	....	...11.....	..132.....1	114541..1215	212421.12455	...1....252	..........2.
SYDNEY/L	....	....	1.........3	3.........3	51.2.....6	3224 1....44	...2....142	....
PERTH	....	....1.....	...231.....	..2452.....	213453.....	521221..134.	2.......255	23
HONOLULU	....	....	....	....1..1111	1122331.3322	.144311 1221.	..11.....	....
** AFRICA								
SEYCHELLES	.........1...	....1.112...	...2213351..	..1442446 3..	..4422345 61.	2331..112463	741.....256	42.......24
MAURITIUS	....	....11111...	...2233334...	..1445445 2..	..4434335511	4.42.111 2456	732.....257	43.......24
NAIROBI	.........11..	.....1133..	...2223466...	...4334578 1.	..4522335751	5252...12477	763.....257	44.......24
HARARE	.........21..	.....11242..	...2234465...	...4445577..	2.1643335722	72531.112467	7641....257	44.......24
CAPETOWN	.........1....	....1.12.....	....32352....	...2545 54....	....5543352..	22.421.12422	6611....246	54.......24
LAGOS	.........124..	....1.12462.	...1313468 5.	...3524 5788.	3316522357 83	8854 2...2478	7741....256	54.......24
ASCENSION Is	.........131.	....1..1253.	....3213586.	....5434688 1	....5433578 5	2...21..2478	71.1....146	44.......24
DAKAR	.........132.	....1..1255.	....3223578 2	2..1533458 95	6315532336 88	985431..1378	7742....146	44.........3
LAS PALMAS	.........12.	....11..1241	....4323357 3	2..2654557 96	7316766667 99	9866543335 89	8863211112 67	+53.....35
** S. AMERICA								
Sth SHETLAND	....	.....11...	.....242..	.....1465..	....123464.	223..1.12464	6641....146	44.........3
FALKLAND Is	.........1..	.....1221.	.....23454.	.....3567 6.	..1..2335578.	2352.111 2464	7642....146	44.........3
R DE JANEIRO	.........12.	11351	2233683	1....4345786	51...433358 9	862.1111 1268	7741....36	442........3
BUENOS AIRES	.........12.	11341	1....1336 74	3....1345787	731..3334579	9851.111 1258	7742....26	442........3
LIMA	.........1.	21	1....1222 54	4....3333 67	82.2313333 57	8744311 1..25	7742....2	44.........
BOGOTA	....	21	1....1111 44	3....1333 256	82.1133322 47	8744211 1..14	6642....1	34.........
** N. AMERICA								
BARBADOS	.........1.	21	1....2121 254	3....4333367	82.2243322 57	8744311...25	7742....3	44.........
JAMAICA	....	11	1....1111 33	3....1232246	72...3332236	7742111...3	4642....1	24.........
BERMUDA	....	1	1....1111.33	3....3222246	72..1432224 7	7742211...24	5642....1	24.........
NEW YORK	....	....	.....11.12	2....1222124	621..3332246	6742111...13	3642....1	.3.........
MEXICO	....	....	12	2....121134	521...2322 4	4742...11...1	1542....	.2.........
MONTREAL	....	....	12	2....1122124	621..3332246	6742111...13	3642....1	.3.........
DENVER	....	....	....	1.....1111	421...1222 23	3553111 1..1	1342....	....
LOS ANGELES	....	....	....	1.....1111	3211...2322 2	2453 1.112...	.242....	....
VANCOUVER	....	....	....	111	3222111 12222	2454 2111 2111	.142....	....
FAIRBANKS	....	....	....	....	2232322 12222	1234 3111 2211	...11....	....

The provisional mean sunspot number for April 1995 issued by the Sunspot Data Centre, Brussels was 14.6. The maximum daily sunspot number was 48 on 17 April and the minimum was 0 on 5, 6, 7, 8, 23, 24, 25, 26, 28, 29, 30 April. The predicted smoothed sunspot numbers for June, July and August are respectively: (classical method) 17, 16, 15, (±4); (SIDC adjusted values) 11, 10, 9 (±2).

NOVICE NEWS

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THE CITY AND Guilds report on the March NRAE has highlighted some key areas of the exam where students are struggling. The analysis was based on results of 309 papers with eight others arriving too late to be included. Some 251 candidates gained a pass, giving a pass rate of 81.2%.

It emerged that some questions may have been answered incorrectly because students did not spend enough time listening on the air. For instance, a question asking about the band most suitable for 500km daylight communication "showed that many candidates lacked listening experience on the various amateur bands", the report reveals.

This lack of experience is partly because few candidates have their own listening equipment. Also, classes seldom run during daylight hours and on many evenings, when most classes take place, bands have been too poor to allow good listening.

Another common problem related to the third band on a resistor. Getting this right could simply involve a little more practice at reading the values of resistors and the use of the colour code.

The report focuses on six out of the ten questions in the transmitters and transmitting techniques section. Some 65% thought "DC input of a transmitter" was the total power provided by the power supply with only 12% giving a correct answer. Meanwhile, 28% confused a beat frequency oscillator with a crystal control and 30% thought a harmonic filter should be used in the mains lead of a TV receiver to reduce mains borne interference. Many candidates thought that AM would be the mode least likely to cause interference. The results also showed that many, in response to complaints of interference from a neighbour, would send a report to the RIS rather than try a friendly approach.

Questions on construction and safety were very well answered as were the questions on licensing conditions. The report stressed the importance of reading questions carefully. Care should be taken not to misread questions such as "which band should *not* be used".

The report made me realise that, when I have instructed in the past, there were perhaps areas my students did not grasp as well as I thought they did. A close look at the report may help all instructors, taking into account that exam nerves can cause carelessness in reading questions.

The number of students who took the March NRAE reveals that more than 60 amateurs gave their time to instruct and help others to enjoy the hobby.

Instructors are still needed; if only to ease the burden for those who instruct almost non-stop. You do not need formal teaching qualifications nor do you need masses of equipment and space. But as an 'ordinary' amateur you must be willing to listen to the questions asked and discuss answers. It also means not being afraid to say: "I don't know - but we will find out." In other words, to talk about your hobby which, when you think about it, is what you do in every QSO anyway. The City and Guilds report is available by sending a SASE to RSGB marked 'NRAE Report'.

A GOOD IDEA?

A YOUNG LITHUANIAN amateur has contacted me proposing the idea of an international contest for Novices only. Gintaras Banevicius from Vilnius believes that such a contest could become good training for beginners prior to taking up contesting seriously. As a first step he is keen to discover the level of support for the idea. He appreciates that various obstacles exist, such as different band allocations, but feels these could be overcome.

He also acknowledges that provisions are often made for Novice entry into contests with care being taken that the Novice frequency allowance is specifically included. There are provisions for Novices to try to gain awards with due consideration for their frequency capabilities.

Gintaras informed me that, being a student, he cannot yet afford any equipment and therefore has no callsign of his own. He occasionally operates from LY1BZB which is a Young Technician's Club station. There are other similar stations (LY1BXB, LY1BZZ) usually operated by Novices, which are fairly active and have 'D category'.

There are four types of licence in Lithuania. A and B are Novice classes - with Class B being the equivalent of our Class A. Novice callsigns always have N as the first identifying letter - as in LY3NFW and LY4NAT. Class A Novices can only use SSB and CW on 160 metres with 5 watts maximum power. The higher Class B Novice can operate 160, 80 and 10 metres using SSB and CW, and only CW on 40, 15 metres and VHF with 10 watts as maximum power.

Class D is the full licence with D being the equivalent of our Class A. This makes D the highest class.

Talks are under way between the Lithuanian government and the country's Amateur Radio Society to prepare new rules under the recommendation of IARU and they should be ready by this summer. There will probably be three classes - VHF users only, Novices and full.

Remembering that Novices, and indeed all radio amateurs, are a highly diverse breed enjoying a hobby that has more facets than a well cut diamond, there must be many out there who have the time, interest, equipment and determination to excel in yet another field.

If you have any constructive ideas or opinions, please send them to me and I will try to push them in the right direction. Although a contest contact is often brief, with the limitation that an event is for Novices only, there could perhaps be a better chance to enjoy a longer chat.

WORK A NOVICE

FIVE NEW NOVICES came on-stream after the December NRAE at Dollar Academy to join Alisdair, 2M1CEJ, and they are making full use of their new callsigns. They will be adding to their experience this month when GB0DAS comes on the air.

DAS stands for Dollar Academy Sports and the callsign will be used on the weekend 23 to 25 June. When you work the station you are almost certain to be speaking to a Novice because Geoff Collier, GM0LOD, the Novice Instructor and organiser of the station, sees his role that weekend as non-operative.

This will be the fourth such event and Geoff says it will be totally pupil-operated. He will be brewing up, talking with visitors and generally making himself useful. If severely pushed, he will stick markers on the map - in other words, he will be filling the role often designated to Novices.

The weekend is a celebration by pupils, parents, former pupils and friends of the Academy. There will be many activities including a pipe band display, a highland dancing demonstration and, of course, the radio station.

If you can spare the time and want to chat with a Novice, here is your chance.

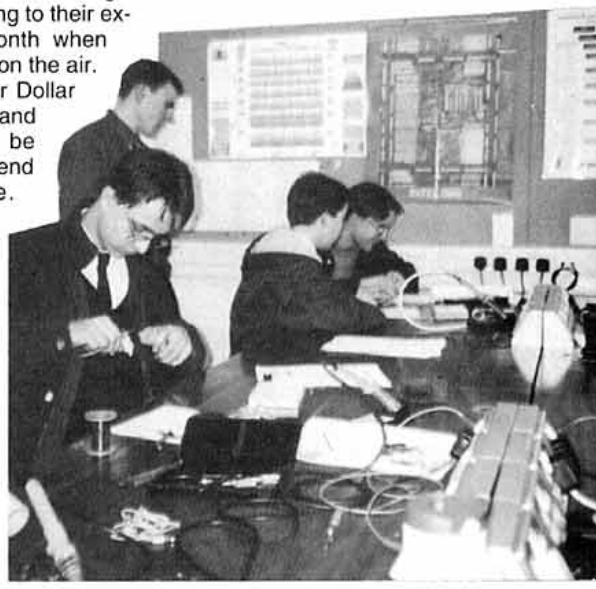
ADVICE OFFER

IF YOU ARE the secretary of a radio club in the Greater London area, and think your members would like to hear more about the Novice licence and the training course, I can suggest someone to help you.

Robert Snary, G4OBE, is the Chief Instructor for the area and tells me that he is more than willing to come and speak to club members to describe the Novice concept and all that is involved in their training.

His talk lasts about an hour and a half which includes a question and answer period. He will turn up loaded with information leaflets and application forms for intending instructors. If you would like to try instructing but feel that you have no qualifications, Robert will be able to reassure you and give advice.

Obviously, dates will have be arranged around his work and training commitments, but he will do his best to help. He is QTHR, and is hoping to hear from you. ♦



Schoolchildren set about the task of constructing radio receivers during Bradford University's Interactive Day.

Proposals for Changes to European VHF / UHF Bands

THE EUROPEAN Radiocommunications Committee (ERC), a body of CEPT, recently published the results of their Detailed Spectrum Investigation (DSI) Phase 2. A summary of the recommendations in section 10.4 of the document, which deals with the Amateur and Amateur Satellite services, appeared on pages 9 - 10 of last month's *Radio Communication* and an explanation of the background to the DSI Phase 2 document was given by Dr Julian Gannaway, G3YGF, Chairman of the Licensing Advisory Committee in *The RadCom Leader* on page 8.

The whole document runs to 220 pages, and gives a very clear description of the complex pressures on the spectrum. The full text of the six page section which deals with the Amateur services is reproduced below. It was felt important that members should see this in full, so as to give them an insight into the issues involved and the thinking of those who are managing the spectrum. It is emphasised that these proposals do not necessarily represent the views of CEPT, ERC or the administrations. They are only proposals at this stage and may change significantly as a result of the public consultation process.

The RA have asked the RSGB to collate input from amateurs, and to submit its response by the beginning of June, so that it can be taken into account in the preparation of the UK administration's response, which has to be sent to the ERC by September. While the RSGB's *initial* response was required by the RA by the end of May, members' views on the proposals are still being sought. Any further comments should be sent to the Chairman of the LAC, c/o RSGB HQ, as soon as possible.

10.4.1 Introduction

THE ITU RADIO Regulations define the Amateur Service and the Amateur Satellite Service separately. Their objectives are, however, essentially the same and the same users are involved who use terrestrial and / or satellite means of communication according to their needs and possibilities.

In approximately 170 countries worldwide there are over three million licensed amateur stations. This number is growing at a steady rate of 7% per annum which will lead to a total of 7.5 million in the year 2008. The amateur population varies from country to country and is related to a large degree to the standard of living, political freedom, and availability of equipment. There are at the present time over one million amateurs in Japan and half a million in the USA. In the most advanced CEPT countries the average amateur population density is one amateur per 600 inhabitants.

The ITU Radio Regulations define the amateur services to be used for self-training, intercommunication and technical investigations, that is by duly authorised persons interested in radio techniques solely with a personal aim and without pecuniary interest. These services have many objectives which include, providing essential communications in the event of natural disasters, training of operators and technicians in radiocommunication and telecommunication technology at no cost to the State and community; contributing to the technical advancement of radiocommunications and the enhancement of international understanding and goodwill.

Contributions were received from the IARU and a number of national amateur organisations. In addition several administrations included text covering the amateur service.

10.4.2 Propagation Factors

PRACTICALLY ALL propagation modes are used by amateurs in the range 27.5 - 960MHz. In the lower part of the DSI range mostly ionised modes are utilised whilst in the upper part non-ionised modes are employed. Use of mixed modes is also common. The following are the most attractive:

- sporadic-E 'clouds' (noted up to 225MHz)
- E and F2 multi-hop (up to 70MHz)
- transequatorial spread-F (TE - so far contacts made up to 225MHz with advanced experiments in the 430MHz band)
- E-layer FAI (field-aligned ionisation irregularities; so far up to 225MHz)
- aurora backscatter (all DSI Phase II bands with increasing difficulty above 225MHz)
- meteor scatter (50 - 148MHz optimum)
- earth-moon-earth (using the moon surface as a passive reflector, 144MHz and up)
- tropospheric super-refraction and ducting (results improving with frequency)
- tropospheric scatter (50 - 450MHz)

Spectrum Issues

EVEN RECOGNISING the relatively high population of amateur radio operators, many in remote areas of the world, it is still possible that propagation paths go unnoticed much of the time. In order to enhance knowledge of the way the radio spectrum can be utilised it seems that the amateur observation and beacon programme should be given every encouragement to extend and improve.

29.7 - 30MHz

In view of the increasing population of radio amateurs which is expected to triple in numbers, a number of contributors requested that the band 29.7 - 30MHz be reallocated to the amateur service. The DSI Management Team was not fully convinced of the need for this allocation, even on a secondary basis and suggest that this question be re-addressed when this frequency range is reviewed in a future DSI.

30 - 50MHz

Currently there is no allocation to the amateur service in this part of the spectrum in any of the ITU Regions. However in propagation study terms the absence of reliable continuous and identifiable signals in this range causes problems and means that the progress of a propagation event starting in the HF range and identified using beacons at 28MHz cannot be reliably tracked as it progresses towards 50MHz.

It has been suggested that the DSI Management Team consider the feasibility of identifying a small sub-band or individual frequencies in the vicinity of 40MHz where beacons could be established in Europe. These could be located at appropriate geographical sites, chosen in order to minimise the possibility of interference to other radio services. The beacons would operate with an ERP of around 10 dBW and would utilise FSK Morse identity signals with low deviation and minimal bandwidth. The DSI Management Team are generally sympathetic to this proposal, the ISM band centred on 40.68MHz would seem appropriate, the beacons possibly using frequencies interleaved with on-site paging. A secondary allocation to the amateur service would also seem appropriate alternatively these stations could be considered as operating in the fixed service.

50 - 54MHz

The band 50 - 54MHz is allocated in Article 8 of the Radio Regulations to the amateur service on a primary basis in Regions 2 and 3. In addition No 559 of the Radio Regulations allocates the band to the amateur service in a number of African countries in Region 1. For CEPT countries Recommendation T / R 02 - 01 provides a mechanism to allocate all or part of the band 50 - 52MHz to the amateur service in accordance with No 342 of the Radio Regulations and a large number of CEPT administrations have provided facilities for the amateur service in this band.

It is believed that these arrangements should now be confirmed with the band 50 - 51MHz being allocated on a primary and exclusive basis and the band 51 - 52MHz allocated on a shared primary basis with the mobile service. It is noted that the amateur service successfully shares with defence users in a number of VHF / UHF bands.

54 - 70MHz

In common with the concept of propagation beacons outlined for 40MHz, a similar allocation at 60MHz may prove to be of scientific value. It is believed that this possibility should be re-assessed when television broadcasting is no longer operating below 68MHz. Arrangements could be considered in the overall planning of the band 51 - 61MHz for the fixed and mobile services.

70 - 70.5MHz

In several CEPT countries the amateur service operates in this band on a secondary basis whilst in others it is used for sound broadcasting or mobile applications. From a propagation standpoint, 70MHz is understood to be at the currently known extent of F2 ionospheric propagation. Sound broadcasting in eastern Europe is likely to cease in this band within the next 15 years, and it is hoped the plan outlined in this document for the mobile services in the range 68 - 87.5MHz will be acceptable to these administrations. This plan is based on a 9.8MHz transmitter-receiver spacing. The radio astronomy requirement at 79.75 to 80.25MHz is also recognised and the band together with its 9.8MHz complement 69.95 - 70.45MHz are considered most appropriate for single frequency mobile applications, perhaps optimum for defence users with arrangements to protect radio astronomy. It would therefore seem possible to agree to a limited amateur transmitting facility of at least 100kHz centred on 70.2MHz in the band 70 - 70.45MHz. It is also hoped that the existing beacon network between 70 and 70.150MHz can be maintained and extended.

144 - 148MHz

As the only exclusive amateur band in the VHF and UHF range it is heavily used throughout the world for both terrestrial and satellite amateur communication. A wide variety of modes of emission are in use. Various terrestrial voice and data networks are complemented by a number of amateur satellites.

In addition to popular propagation mechanisms like tropospheric scatter or super-refraction, amateurs make use of communication by reflection from the surface of the moon, meteor trails and auroral scatter. Sporadic-E communication events appear much more frequently than was believed to be possible; amateurs have observed other propagation phenomena either previously unknown or believed to be extremely rare at these frequencies. Many amateur beacons support monitoring of propagation conditions.

In many areas the already heavy occupancy does not allow for the accommodation of any additional activity despite the rapid growth of the amateur population. Therefore, the IARU has requested the retention of the existing exclusive worldwide allocation of 144 - 146MHz and suggests consideration of global harmonisation by allocating the 146 - 148MHz segment to the amateur service in CEPT countries.

The DSI Management Team could not agree to this latter suggestion in view of the current and foreseen extensive use of the band 146 - 148MHz by the land mobile service.

220 - 225MHz

This primary shared allocation in Region 2 is actively used by amateurs providing communication opportunities complementary to that of the overcrowded 144MHz band. Ideally access to the band in CEPT countries was considered desirable by the IARU.

This band falls within the band 216 - 240MHz proposed for terrestrial digital audio broadcasting (T-DAB). The DSI Management Team agrees with the IARU that such an allocation would be generally impracticable in CEPT countries.

430 - 440MHz

This band is of particular importance to the amateur service. Propagation properties at 430MHz allow for interesting combinations of propagation modes to be used. The educational aspect of amateur radio is again fully explored, eg amateurs predict tropospheric ducting from meteorological maps; similarly they learn astronomy to establish a position of the moon in a cloudy sky when attempting to communicate by reflection of waves from its surface and / or by means of meteor scatter. This is the only band below 1GHz where amateurs may use conventional C3F TV and emissions of similar bandwidth.

The amateur-satellite service relies on the sub band 435 - 438MHz (RR664) which presently is the only allocation between 146MHz and 2.4GHz allowing amateur space-to-earth emissions.

Amateurs in CEPT countries, particularly suffer from ISM interference in the 433.92MHz ISM band. Similarly manufacturers of low power systems using this band are concerned at the interference potential of amateur emissions.

The DSI Management Team were concerned with this situation and it is hoped that the recommendation (see section 10.10.1) to open up the band 403 - 404.5MHz for low power devices and establish the band 915 - 920MHz as a low power and ISM band will, after an appropriate transition period, render the ISM band at 433MHz obsolete in the very long term.

On the other hand, additional spectrum in the low UHF range is urgently required for land mobile services in the major European cities. As a consequence the DSI Management Team has determined that the band 432 - 438MHz and the band 435 - 438MHz be allocated to the amateur and amateur satellite services respectively on a primary basis. It is believed that amateur television activities should be transferred to bands above 1GHz, unless modern digital processing techniques can facilitate such emissions in the available bandwidth.

It is hoped that the loss of 4MHz, 430 - 432MHz and 438 - 440MHz will be balanced by the improved status of the remaining 6MHz together with a gain of up to 2.95MHz to the amateur service from other parts of the DSI range.

902 - 928MHz

Several contributors requested consideration of a secondary amateur allocation in the range 902 - 928MHz to align with the situation in ITU Region 2. If the recommendation to introduce ISM to the band 915 - 920MHz is accepted it would seem feasible to allocate the band 919.5 - 920MHz to the amateur service on a secondary basis.

10.4.4 Other Matters

THE DSI MANAGEMENT Team have been asked to deliberate on two other matters, the first concerns a current problem with regard to Recommendation T/R 61 - 01, the CEPT amateur licence. It has been requested that amateurs which are licensed to operate in the 50MHz band be able to use their equipment when travelling to other countries that authorise 50MHz, under the same conditions that apply to nationals of that country.

The second is also a regulatory matter where it appears that some amateur operators are unable to participate in propagation research, because they are not authorised to listen to amateur beacons in a band in which they are not licensed to transmit.

Both issues would not seem to the DSI Management Team to be insurmountable problems and it is hoped that administrations can solve these short term difficulties within the normal work of the ERC.

10.4.5 Recommendations

THE DSI MANAGEMENT Team recommend in the context of the European Table of Allocations and in accordance with the foregoing, that:

- the band 50 - 52MHz be allocated to the amateur service on a primary basis, the band 51 - 52MHz additionally to be allocated to the mobile service;
- frequencies in the vicinity of 40.68MHz be considered for amateur propagation beacons;
- a minimum of 100kHz in the band 70 - 70.45MHz be allocated to the amateur service on a secondary basis according to national considerations, if feasible, centred on 70.2MHz;
- the band 144 - 146MHz be maintained with its current status;
- the band 430 - 440MHz be reduced to 432 - 438MHz with primary status for the amateur service. The band 435 - 438MHz to be allocated to the amateur satellite service on a primary basis. It is additionally recommended that the 433MHz ISM and low power band be reviewed after an appropriate time period to ascertain whether alternative arrangements for ISM and low power render its retention unnecessary;
- the band 919.5 - 920MHz be allocated to the amateur service on a secondary basis.

It is further recommended that the regulatory issues outlined in section 10.4.4 be addressed by the appropriate constituent body of the ERC.

The RSGB would like to thank the ERC for their assistance in the publication of this material. ♦

SWL NEWS

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THERE IS certainly a contest theme to this month's column with the Rules of the RSGB's Annual SWL Contest (both SSB and CW sections), the results of the White Rose ARS LF Bands Contest and the rules for its Midsummer SWL Contest.

LF SWL CONTEST

THE WHITE ROSE Club was disappointed that this year's LF SWL Contest attracted only 30 entries (**Table 1**). Nonetheless, this represents a fair response and fully justifies the club organising it each year. There were first time entries from CX and UA this year. A Belgian SWL, George deBaets, ONL3647, won the SSB section. I was surprised to find myself in third spot. In the CW leg, there were six entries with Jean-Jacques Yerganian coming home first. The full results package is available from the White Rose ARS, P O Box 73, Leeds LS1 5AR with return postage.

MIDSUMMER SWL

THE OBJECT OF the White Rose ARS Midsummer SWL contest is to log a maximum of five stations from each DXCC country on each of the following bands - 3.5, 7, 10, 14, 18 and 21MHz. The contest takes place on 25 June from 0900UTC to 2100UTC and is open to all SWLs and there will be SSB and CW sections. One point can be claimed for each station, but a 'bonus' of five points can be claimed for each new country on each band. So, as an example, your first G scores 1 point plus a bonus of 5, with your second, third, fourth and fifth Gs scoring 1 point for each.

Logs have to show the following: Date, time (UTC), station heard, station being worked, and RS(T) at SWL's QTH. If both sides of a QSO are heard, they may be claimed but each callsign must appear in the 'station heard' column. Each station can only appear once in the 'station heard' column on each band. A separate log is required for each band as is a list of the different countries heard on each band.

Rules can be obtained from the WRARS, c/o 57 Green Lane, Harrogate, North Yorkshire HG2 9LP. Entries should be sent to this address too, postmarked no later than 24 July 1995. For a copy of the results send a large SAE and return postage.

The remote site used by Peter, VK6APZ, at Esperance, Western Australia (PK06WC). He was heard by several British listeners earlier this year.

ACTIVITY UPDATE

UNDER THE RSGB's Islands on the Air Award scheme, Robert Small, BRS8841, has now heard 700 islands. He is the second SWL to hear this number of islands. Conditions in the month under review were very mixed, but many reporters commented that conditions were poor. 9M0A (Spratly Is) and BS7H (Scarborough Reef) were about the best in your logs. The latter stands a good chance of becoming a new DXCC country. After the last few months, 1.8MHz was poor, but at least the QSLs are being received - FG5BP, T93M, TU4EX, VK6APZ and ZA1AJ being mentioned. 7MHz provided some interesting DX, especially in the shape of D U 7 / S M 0 C N S, TN2M, HK0/ G 0 S H N, V P 8 C Q S, V 5 2 U U O, YA9XL and 8 Q 7 S S. 18MHz provided Robert Small with two new ones - ZL7ZB and 8R1Z.

The *CQ* WPX Contest resulted in its usual explosion of big signals, but as it clashed with Mothers' Day some complained that much of the Sunday was lost to other activities! Interesting callsigns noted included E20AT, KG6DX, PY0FM, TO5GI, VP2MDE, many VE5s and VE6s on 14MHz on the Saturday evening, 5H3CK and 5X4D. Philip Davies, RS95258, heard over 100 different DXCC countries during the contest and reported hearing the 3D2CT expedition on 7, 14 and 18MHz. Two reports from the Russian contest on 18/19 March were also received, including one from Bill, BRS88921.

FINALE

THE DEADLINE FOR the **August** column is **14 June**. ♦

SSB SECTION

SWL	40m	80m	160m	SCORE
ONL3647	19902	24288	288	44,478
BRS25429	5967	20301	7740	34,008
BRS32525	5130	11908	1633	18,671
KCA6ARC	12496	5236	208	17,940
UA3-122-1393	6768	5619	400	12,778
BRS52543	2580	6680	2820	12,080
UA3-122-1906	1170	8988	400	10,558
G-11195	3410	4750	528	8,688
BRS95258	1474	3852	1500	6,826
BRS25209	1944	1610	2670	6,224
NL-1000/A	1679	3990	416	6,085
DE3BOR	210	4256	532	4,998
F-11734	2050	1628	49	3,727
G-16741	1235	2349	-	3,584
SP-4696-KA	300	3060	-	3,360
F-12082	442	2800	9	3,251
OH2-836	630	1924	585	3,139
F-15222	1056	1364	16	2,436
OE-934	504	1725	147	2,376
DE2OLI	-	1738	-	1,738
DL-SWL/ROSE	940	585	-	1,525
ONL4505	210	1120	9	1,339
G-SWL/CLARE	384	464	9	857
CXN020	85	105	-	190

CW SECTION

SWL	40m	80m	160m	SCORE
ONL383	12087	6031	2755	20,873
F5JBR	11990	3996	2044	18,030
OH5-202	2176	1003	1540	4,719
BRS8841	2666	378	430	3,474
DE1DZZ	612	6	1	619
OH3-007	64	-	-	64

Table 1: The results of the 1995 White Rose ARS LF SWL Contest.

RSGB SWL CONTEST RULES 1995

DATE AND TIMES

1 1200UTC 8 July to 1200UTC 9 July 1995.
2 Only 18 hours listening is allowed.
3 A continuous six hour rest period must be clearly shown in the log.

SECTIONS AND BANDS

4 There are two sections: a)SSB and b)CW. Only one section can be entered.
5 The 28, 21, 14, 7, 3.5 and 1.8MHz bands may be used.
6 British Isles entrants must be RSGB members.

SCORING

7 The station logged must be in QSO with another station. Stations heard making CQs or announcing QRZ or similar cannot count for points.
8 One point can be claimed for each station heard on each band.
9 Each country multiplier heard on each band may also be claimed for points. The ARRL Countries List should be used to determine what is a country, except that each W, VE, VK, ZL and JA call area also counts as a multiplier.
10 The final score is the total number of points (Rule 8) multiplied by the total number of multipliers (Rule 9).

LOGS

11 Logs must show in columns:
(a) time (UTC);
(b) callsign of station heard;
(c) callsign of station worked;
(d) RS(T) report of signals at the SWL's QTH;
(e) whether the station is a new multiplier; and
(f) points claimed.
12 If both sides of a QSO are heard, both stations can be claimed in the 'station heard' column as follows:
1021, JA7xxx, G3xxx, 57, JA7, 1; 1021, G3xxx, JA7xxx, 55, -, 1.
13 Each callsign may only appear once in the 'station heard' column on each band. In the 'station worked' column, a callsign can only be shown once in every three QSOs logged unless it is a new multiplier. The same 'station worked' cannot be used for more than three successive new multipliers.
14 A separate log is required for each band.
15 A separate sheet listing multipliers for each band must be included.
16 Duplicate loggings for which points have been claimed will be penalised at 10 times the point value of the logging.

ENTRIES

17 Logs must be sent to R A Treacher, BRS32525, 93 Elibank Road, Eltham, London SE9 1QJ, England.
18 Logs must be postmarked no later than 31 July 1995.

QSL

JOHN HALL, G3KVA
Corfe Lodge, Ipswich Road, Long Stratton, Norfolk NR15 2TA.

THE NEW RSGB QSL sub-manager for the G4P series is: M I Humprey, G0SWY, 4 Bluebell Road, Bassett, Southampton SO2 3LQ.

We have not, as yet, been able to obtain the stamped addressed envelopes lodged with the former G4S QSL sub-manager. We are working on the problem and assure all G4S QSL collectors that the service will not suffer.

Whilst at the Bureau the other day, I had a call from a lad at Oxford University who was over here for four years from Brazil. He had a reciprocal call for use whilst over here and wanted to know what QSL sub-manager to use. I told him to send envelopes to the G5 and reciprocals sub-manager, R Pasquet, G4RRA. However, I am still a little unsure about the reciprocal calls situation and how it is supposed to work QSL-wise, and if anyone can enlighten me in words of one syllable I would be grateful.

SPECIAL EVENT STATIONS

GB100IMD WAS the special event station callsign from RSGB Headquarters on International Marconi Day, 22 April. The station made about 850 contacts and all QSOs are being QSLd via the RSGB Bureau.

RSGB QSL Bureau, PO Box 1773, Potters Bar, Herts EN6 3EP, England

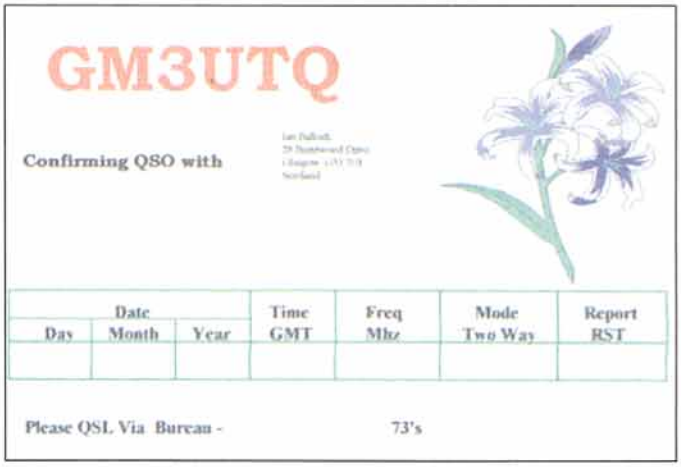
I had a letter recently from a special event station operator saying that he had misread the notes of guidance we send out with the 'GB' Letter of Variation, and sent envelopes to the wrong QSL sub-manager. He goes on to suggest that it might be a good idea for us to send the list to all operators with dos and don'ts for them. Well, the simple answer is that that would be impractical. What never fails to amaze me is the number of experienced amateurs who obviously have no idea whatsoever about how to use the QSL Bureau services. There is no excuse for that because the information is published in a number of places. Obviously it isn't having much effect!

On the subject of special event stations, I must say I rather agree with Ted Allen, G3DRN, who wryly remarks that they now seem to be issued for anything upwards from the death of a pet canary! But perhaps that's my natural cynicism creeping in. I wouldn't mind if all these 'special' stations QSLd as promised, but the figures don't support that. The burden for that incompetence falls on the poor old QSL sub-manager who has enough to do without sorting thousands of cards in order that he can throw them away in an orderly fashion!

GOLDEN RULES

I OFTEN RECEIVE letters saying that the return rate on QSL cards sent out via the Bureau is abysmal. The percentage figures differ widely, but my own success rate is about 45%. I cannot offer any remedy for increasing that figure substantially. All I can say is that there are a few golden rules to follow to avoid shooting oneself in the foot. They are:

1. Write clearly on your outgoing cards. If you do that at least you can be sure that the QSL Bureau will send your card to the correct destination!
2. Lodge stamped and addressed envelopes with your appropriate QSL sub-manager. If that seems obvious all I can say is that I have lost count of the numbers of letters from punters complaining they haven't received any cards for months, only to find they have no envelopes with their sub-manager!
3. Don't expect a return card via the Bureau for *at least* one year. The Bureau may not be fast, but it is cheap, it's efficient and it's reliable.
4. If you don't get a card from that rare country you worked, consider whether it's worth sending another card with a tearful message on it pleading for an acknowledgement - but don't hold your breath. If the station didn't QSL the first time, then it's odds on he will ignore a reminder.
5. If, after all that, you are still unsuccessful - take up hang gliding or something similarly less stressful!



DIY QSL from Ian Balloch, GM3UTQ (see text).

QSLING DIRECT

NIGEL KEIGHTLEY, G0BNR, tells me he has just returned from Fiji where he met Raj, 3D2ER, who is the QSL manager at P O Box 184, Suva. Raj says there are only about 25 licensed amateurs in Fiji and only six are active on HF. Consequently, the pressure on those few to QSL is quite strong. Raj receives large numbers of QSL cards direct to P O Box 184 and is always happy to respond. He does, however, work to a routine and any UK hopeful would be advised to take note:

1. If Raj receives a QSL, IRC and addressed envelope, the reply is immediate.
2. If he receives a QSL and IRC only, the reply waits until Raj finds the time to write out an envelope. Raj runs his own business so his time is valuable.
3. If all Raj gets is a QSL then he will send one back via the bureau - eventually.

The motto of all this is simple. If you expect a QSL card back from one sent direct, then your chances are much improved if an IRC and an addressed envelope accompany your card.

A reader recently asked if, when a contact asked for a QSL card direct, the Bureau would still handle the card. The simple answer is 'yes'. However, in such circumstances the chances of receiving one back via the Bureau are fairly remote. But it can happen.

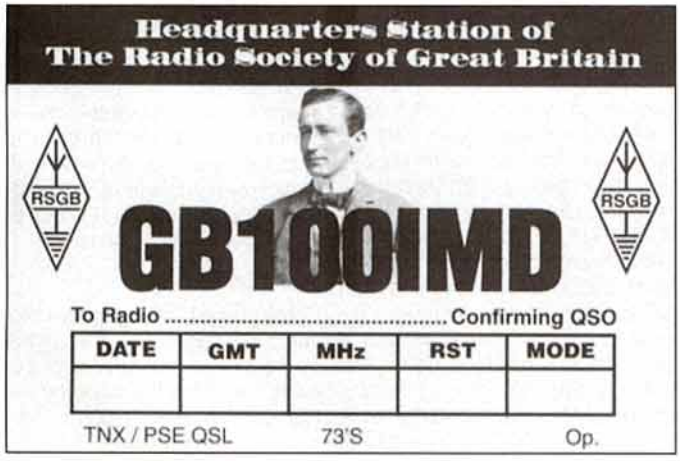
OVERSEAS BUREAUX

GASTON, ON4WF, the UBA President no less, has written to say the official Belgian QSL Bureau is still at P O Box 400, B-8400 Ostend. The address I mentioned in March is for a small non-IARU and unofficial bureau. I am happy to put the matter straight.

Tim Hughes, G3GVV, tells me that the latest edition of *IARU Region III News* shows that the Indian bureau has two addresses - one in Bombay and one in Madras, and says he thinks it is a strange arrangement. I agree, but my understanding is that the Madras address is a sub bureau of the main one. Why the VUs have done this is beyond me.

DIY QSLS

IAN BALLOCH, GM3UTQ, has sent me some remarkable DIY QSL cards (see above). Ian uses Microsoft Publisher, but he says that any DTP program will do. Printing is carried out on an HP500c deskjet to produce what I think is a real professional job at little cost. He prints three QSLs on each sheet of A4 card which can be obtained from any decent stationers. ♦



RADCOM NEWS FEATURE

World's First Cave-to-Cave Link-up

by Mike Bedford, G4AEE*

JUST NORTH of the small town of Ingleton in the Yorkshire Dales National Park, White Scar Cave burrows its way under the lower slopes of Ingleborough. Discovered in the summer of 1923 by C F D Long and explored throughout the intervening years, the known passages now total over four miles in length. Although this fact alone doesn't secure the cave a place in the record books, the first two-thirds of a mile of passageway, to the impressive Battlefield chamber, does constitute England's largest show cave. This major tourist attraction draws an estimated 70,000 visitors each year, and for many of these White Scar provides a first taste of the underworld.

One hundred and fifty miles away, in another country and another national park, lies a cave called Ogof Ffynnon Ddu. Although not a household name, this is a cave of superlatives which acts as a magnet to potholers from around the world. Located in the Brecon Beacons National Park, Ogof Ffynnon Ddu boasts a total length of over 30 miles and a depth of 1,000 feet, making it both the longest and the deepest cave in Wales. Unlike White Scar, however, this cave has no concrete footpaths, electric lights or handrails - this is nature in the raw. However, those who are sufficiently experienced and equipped for 'real caving' will find a fascinating world of stalactites, stalagmites, large chambers, tight crawls, underground cascades and rivers in the dark recesses of Ogof Ffynnon Ddu.

The GB4CRO underground operators. Left to right: Mike Bedford, G4AEE; Larry Norman, G0LRE; Brian Parker, G0USM; Bill Dingley, G0UCS; Gordon Humphrey, G0MAM; Tom Stokes, G7NER; Steve Cocker, G7PHM and Vernon Sandiford, G0KSM.

If you were listening on 3.775MHz at 0945UTC on Sunday 16 April 1995, you'd have witnessed history in the making. OK, perhaps a slightly melodramatic turn of phrase, but when GB4CRO in White Scar Cave made contact with GB2CRO in Ogof Ffynnon Ddu, the operators of these two special event stations achieved a world first for amateur radio. **Fig 1** (over page) shows how they did this. Never before had a radio communication link been established between underground stations in different cave systems.

The Technology

FOR SOME TIME NOW, cave rescue groups in the north of England have relied on a cave radio known as the Molefone, developed by Bob Mackin of Lancaster University. Cave radios differ from 'normal' radio transceivers in a couple of important respects. First of all, since HF, VHF and UHF radio signals are very heavily attenuated by the earth, cave radios operate in the LF or VLF bands. Whereas a radio transmitter on 144MHz may, at a pinch, work to a depth of 10m, at the bottom end of the radio spectrum hundreds of metres of rock can be penetrated with ease. However, this choice of frequency presents its own difficulties which, in turn, accounts for the second fundamental difference between conventional and cave radios. Once we get to frequencies in the 800Hz to 200kHz range typical of cave radios, the wavelength gets long - very long in fact. Efficient radiators therefore become impractical, especially within the confines of small cave passages, so magnetic induction is used instead. Although induction is inherently a very short range communication method, it can nevertheless cover the few hundred metres between even the deepest caves and the surface. More important, however, induction has one major advantage over 'proper' radio - there is no need for a large antenna, a small loop is quite effective. A more thorough treatment of cave radios appeared in January's *Radio Communication* [1].

In both White Scar Cave and Ogof Ffynnon Ddu, cave radios operating on the principle of LF or VLF induction were used. However, because cave radios achieve a range of perhaps 500m at the most, another element was required to achieve communication over the 150 mile path between the two caves. In the following paragraphs I'll provide a brief run-down of the equipment used at each location.

White Scar Cave

Underground, sitting in a cold, damp passage, and interrupted by the occasional stream of bemused tourists, the operators of GB4CRO used a Molefone. This

*4 Holme House, Oakworth, Keighley, W Yorkshire BD22 0QY

Tom Stokes, G7NER, operating GB4CRO from White Scar Caves.

well-known cave radio operates on 87kHz SSB, putting about 15W PEP into a 1m diameter multi-turn loop. On the surface a specially designed interface unit routed signals between another Molefone and a Yaesu FT-890. The surface antennas were dipoles for 20m and 80m, 40ft above the ground.

Ogof Ffynnon Ddu

No tourists, but cold, damp and dark conditions still prevailed - the bemused onlookers were cavers here. For the underground to surface link, GB2CRO used an experimental cave radio operating on 27kHz FM, and designed by Stuart France. As in White Scar, the *de facto* standard antenna - a one metre ribbon cable loop - was arrayed on the cave floor. Once again, on the surface, another 27kHz cave radio, an interface unit, and a Kenwood TS-830 made up a cross-band repeater or 'talk-through box'. The HF antenna was a G5RV.

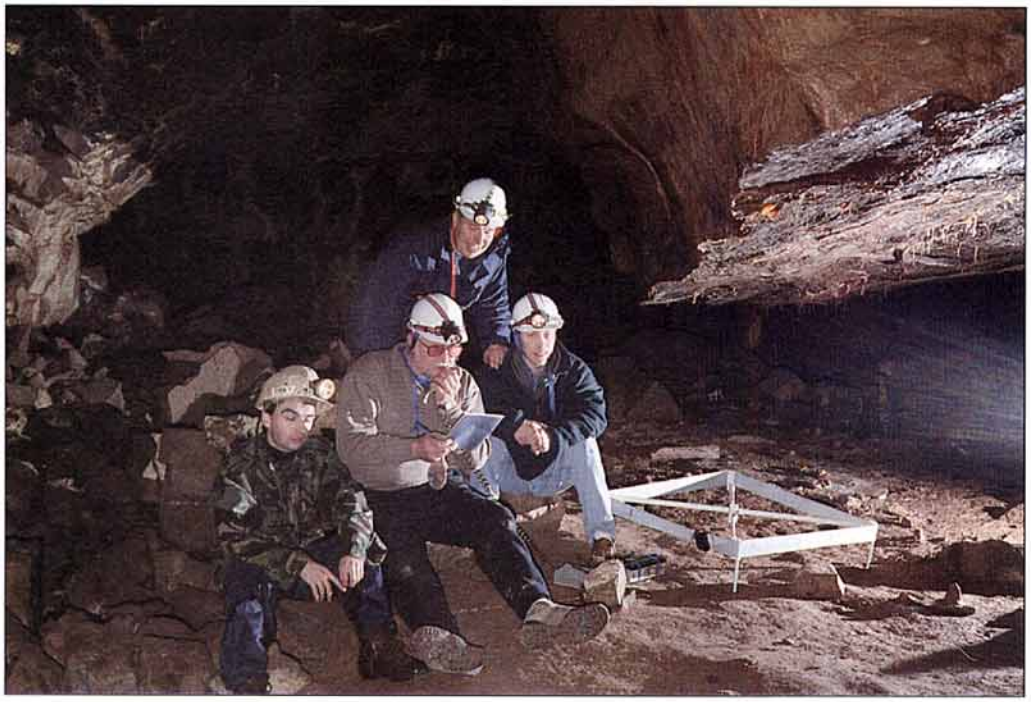
The Objectives

MOST AMATEURS contacted by GB2CRO and GB4CRO over the Easter weekend were full of admiration for our endeavours. However, a handful of people were clearly perplexed at why anyone would want to spend their holiday weekend engaged in such an apparently bizarre activity. So, what were the aims of the exercise? Why did we do it? Well, I have to admit, the phrase 'because it's there' does come to mind. However, this wasn't just a case of pitting ourselves against nature, of proving that it could be done, and that we were the first ones to do it. There was a serious side to all this. A common theme to the weekend's activities was one of cave rescue, in fact the last three letters of both the callsigns stand for 'Cave Rescue Organisation'.

As you're no doubt aware, the UK's cave rescue groups are all volunteer organisations, with members giving up their free time to help those in difficulty underground. But time is only part of the picture, cave rescue is also an expensive business. Maintaining premises, buying and maintaining four wheel drive ambulances, medical equipment, communications equipment, and caving gear can cost many thousands of pounds per year. With this in mind, the first objective of the Easter cave radio activity was to raise public awareness of, and funds for, the cave rescue groups. As a major tourist attraction, White Scar was our primary focus, with the Cave Rescue Organisation, based in Clapham, North Yorkshire, providing a display next to the surface radio station. In addition to photographs showing something of the scope of rescue activity, members of the public were able to eavesdrop on GB4CRO using a spare Molefone, and watch a video recording of the recent *Cutting Edge* C4 TV documentary about the CRO. Leaflets on the CRO were handed out, and collecting tins were, of course, prominently displayed. Significant press coverage has also been secured, further raising the profile of cave rescue.

A second rescue-related aim was more technical. As mentioned earlier, cave radios are regularly used by rescue groups, specifically the Molefone in Yorkshire, and the Ogofone in Wales. However, it is widely acknowledged that as they stand, cave radios do not provide the universal panacea. Although not all the rescue groups share this desire, there is a growing call for a means of interfacing cave radios to surface radios such as VHF or UHF handhelds. This way, a relay person on the surface is not required, yet the rescue controller, perhaps distant from the cave, can discuss details with rescuers underground. To take this line of argument to its ultimate conclusion, we can envisage a doctor in a hospital talking directly to someone attending a casualty in a cave. The interface units used to achieve the GB2CRO - GB4CRO link-up were first steps towards providing this sort of technology. Admittedly the units used were experimental, and not intended for rough handling, but they certainly proved the technique to be feasible. It is hoped that the success of this venture may encourage further development work in this area.

And finally, we aimed to use this event to publicise cave radio



GB2CRO using the Ogofone and 1m loop antenna on the floor of Ogof Ffynnon Ddu cave.

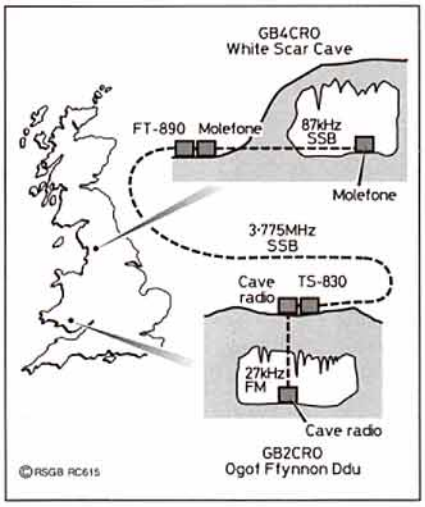


Fig 1: VLF and HF links between the two cave systems.

amongst the amateur radio community. Quite unashamedly, we hope to encourage radio amateurs to get involved with cave communications. Furthermore, we expect that the hitherto unrelated areas of cave radio and amateur radio will start to converge as and when the UK amateur LF / VLF allocation comes into fruition. Once again, this is in accord with our theme of cave rescue. As more people work with cave radio, we expect equipment to improve, to the ultimate benefit of the cave rescue groups.

Achievements

IN TERMS OF THE spectacular, the number one achievement must surely be the world first: cave-to-cave communication using amateur radio. Whilst on the subject of purely amateur radio results, the two stations between them made about 350 contacts in 29 countries and on all continents except Antarctica. Although some of the GB4CRO contacts were made from above ground, notable underground QSOs included a number with North American stations, and one with G3UXO/MM in mid-Atlantic. [For a description of G3UXO/MM's activities from on board the QE2, see the August 1994 *RadCom - Ed.*]

Moving on to the financial, the CRO collected about £330 to add to the £1,000 pounds collected over the previous two years during amateur radio activities at White Scar Cave. Less tangibly, many of the visitors to the cave had opportunity to see amateur radio and cave radio in action, and learned something of the work of the cave rescue groups.

As far as the technical is concerned, a couple of different designs of interface unit were proven, and many lessons learned in the process.

So, where do we go from here? Well, thinking once again of the spectacular, a number of possibilities come to mind. Cave-to-cave links over a greater distance is an obvious extension. Members of the Alberta Speleological Society in Canada had already expressed interest in a transatlantic cave-to-cave link, and a station in Virginia, contacted by GB4CRO, was interested in doing likewise. Other possibilities are amateur radio operation from deeper caves, caves which present a greater caving challenge, and - mindful of the fact that rescues often take place well away from civilisation - more remote caves.

Moving on to more down-to-earth developments, it is our hope that readers of this article may decide to get involved in cave communications. Improving cave radios, and further developing interface units, are just two areas which are of potential interest to the cave rescue groups. If you're interested in this area, from either a theoretical or a practical viewpoint, and want to make contact with like-minded people, please send an SAE to Mike Bedford, 4 Holme House, Oakworth, Keighley, W Yorkshire BD22 0QY. In return, I'll send you information on the Cave Radio and Electronics Group.

The whole theme of this article is one of safety. If you decide to experiment with cave communications, therefore, please do make contact with some local cavers or the Cave Radio and Electronics Group first. Caving is not unduly dangerous, so long as you're careful, but if you're not an experienced caver, please don't be tempted to go underground unescorted.

An Opportunity to Help

IF YOU DON'T see yourself crawling down potholes trying out your latest cave radio, you still have opportunity to make a financial contribution to the rescue groups. The Cave Rescue Organisation is the UK's largest rescue group, and assisted 46 cavers, 23 walkers, and 16 animals during 1994. The South Wales CRO comes a close second, and during the last year came to the assistance of 39 cavers, three hikers, and a handful of animals. Both these groups would be very grateful for any donations. The Cave Rescue Organisation's address is Calpham, Lancaster LA2 8HH. Donations to the South Wales Cave Rescue Organisation may be sent c/o Stuart France, The Smithy, Crickhowell, Powys NP8 1RD.

Acknowledgements

AS YOU'LL NO DOUBT appreciate, an achievement like this doesn't come together overnight, nor is it the result of a single person's efforts. The success of the link-up is a fitting testimony to what can be achieved by team work. It would be nice to be able to mention everyone who had a part in staging this event, but space doesn't permit. However, there are some people whose efforts really should be acknowledged. GB4CRO was planned, set-up, and operated by members of the Central Lancashire Amateur Radio Club, under the guidance of Brian Parker, G0USM. In South Wales, Roger Luke, GW3XJC, and the Mid Glamorgan Amateur Radio Group performed a similar role with GB2CRO. It is interesting to note that this was the first portable operation ever organised by the Mid Glamorgan group. The club was founded less than a year ago, is still quite small, but is actively recruiting new members and is running a Novice class.

Both amateur radio clubs were aided and abetted by members of the Cave Radio and Electronics Group of the British Cave Research Association. Specifically, Bob Mackin provided Molefones at White Scar, and also designed and built the interface unit; Nick Negus, G6AWT, designed and built the interface unit for GB2CRO; and Stuart France provided his 27kHz rigs and also acted as an underground guide in Ogof Ffynnon Ddu.

Thanks are due to the South Wales Cave Rescue Organisation for their loan of a Land Rover and a generator, and to the Cave Rescue Organisation in Clapham for their assistance. Thanks also to Mr A P Bagshaw, owner of White Scar, for giving us free access to the cave, and to John Connaughton, manager of the cave, for his support. Last, but by no means least, we would also like to express our gratitude to the RA for their granting us special dispensation to link amateur radio equipment to non-amateur cave radios.

References

[1] 'Venturing Underground with VLF Radio', Mike Bedford, G4AEE, *Radio Communication*, Jan 1995, pp16 - 21. ♦

The CRO ambulance and exhibition at White Scar Cave.

IARU

JOHN ALLAWAY, G3FKM
and
TIM HUGHES, G3GVV

THE WORK WHICH the Society's IARU Committee carries out is by no means confined to IARU Conferences. Within the committee, Chairman Tim Hughes, G3GVV, represents the RSGB on the STARS (Support to The Amateur Radio Service) Working Group, and on the Euro-Com Sub-Working Group, as well as being the IARU Liaison Officer for RSGB. Malcolm Appelby, G3ZNU, the vice-chairman, co-ordinates documents for regional conferences and liaises with other committees. John Allaway, G3FKM, (council representative) is Secretary of IARU Region 1. Professor Les Barclay, G3HTF, is chairman of the ITU Radiocommunication Study Group 3 on Radio Wave Propagation. John Bazley, G3HCT, represents the Society on the Common Licence Group. Also, Ron Broadbent MBE, G3AAJ, remains active as secretary of AMSAT-UK while David Butler, G4ASR, and Mike Dixon, G3PFR, are members of the VHF/UHF/Microwaves Committees of Region 1. G4ASR is also the Region 1 VHF Beacon Co-ordinator and Chairman of the 144 - 145MHz Working Group. Ron Glaisher, G6LX, is chairman of the IARU Region 1 HF Contests Sub-Group and Graham Shirville, G3VZV, represents BATC. Chris Cummings, G4BOH, is co-ordinator for the RSGB Monitoring System, which is part of the IARU Region 1 Monitoring System.

Almost all of these tasks are achieved by correspondence for the benefit not only of RSGB members, but for radio amateurs throughout Region 1 (Europe, Africa and the Middle East) and the rest of the World.

NEW SOCIETIES

THE RECENTLY FORMED Uganda Amateur Radio Society has applied for IARU membership. Elsewhere, certain officials of the Tanzanian administration are apparently anxious to start up a club in Dar es Salaam and the RSGB is sending a small sample of books to assist its efforts.

There is now an amateur radio society in Mali and by the time that this appears in print CRAM (Club des Radios Amateurs et Affilies du Mali) will be undergoing the election process.

CLUBS IN CHINA

DETAILS HAVE reached us from Region 3 that - although no reciprocal agreement on amateur radio operation in China has yet been signed - several hundred visiting foreign amateurs have operated from club stations in various parts of the country. This has taken place with the approval of the Chinese Radio Sports Federation (CRSA). At the end of 1993 the Chinese authority released a document outlining new procedures for foreign amateurs to apply for the necessary permission; this will shortly be put into operation. Applications should be sent to Liaison Department, Chinese Radio Sports Federation, P O Box 6105, Beijing, China 100061.

The following information should be sent: Planned date and duration of visit; purpose of visit; which cities or clubs it is hoped to operate from; any specific operating requirements; a photocopy of a valid home licence and passport. US $5.00 or 20 IRCs must also be sent to CRSA at the same time and, if possible, a recommendation from the applicant's IARU Member Society. On behalf of the radio administration of China, CRSA will send the applicant a special amateur radio courtesy certificate which will be useful when applying for transmitting at designated Chinese stations. The callsign for a certificate holder will be his or her home call followed by the station callsign where operation takes place. The application should be submitted as early as possible, at least three months prior to the visit. An overseas visitor is not yet allowed to set up his or her own station in China.

The above information was kindly sent by Chen Ping, BZ1HAM, whom we met again at the recent Region 3 Conference.

CEPT PROGRESS

THE EUROPEAN Radiocommunications Office *Newsletter No 18* (March 1995) reports that two more CEPT member countries - Portugal and Latvia - have implemented Recommendation T/R 61-01. This means that visitors to these two countries will no longer need to apply for formal operating permission for a temporary stay of up to three months.

There was also good news on another front with the arrival of an application from the Canadian administration to participate in the Resolution. Germany has recently implemented T/R 61-02 which is the Recommendation on HAREC (the Harmonised Amateur Radio Examination Certificate). And last, but certainly not least, the Former Yugoslav Republic of Macedonia has become the 41st member of the CEPT.

ADMIN TRAINING

THE UNITED STATES Telecommunications Training Institute (USTTI) has offered Amateur Radio Administration Courses *for members of administrations* and these are jointly sponsored by ARRL and IARU. This year's course was scheduled to take place in Newington between 15 and 19 May. Invitations were sent to 53 countries and 22 IARU Member Societies.

PERMIT PROPOSAL

IARU REGION 2 has entered into talks with CITEL (Conferencia Interamericana de Telecomunicaciones) and various administrations in a bid to create an international licence for travelling radio amateurs. This would be similar to the International Driving Licence. CITEL has approved the concept, text and various formats which govern the issuing and recognition of an International Amateur Radio Permit with the CITEL member countries. The process has passed through various working groups and committees to gain the approval of COM CITEL, the Executive Committee of CITEL. This committee has decided to ask the OAS General Assembly to consider and approve the matter at its meeting in Haiti this month. Simple approval by the OAS General Assembly will result in the IARP coming into force in Region 2.

Credit must go to Region 2 which, in 1982, started an initiative for amateur radio licences to be recognised World-wide for travelling amateurs wishing to operate outside their home country. Its first success was to obtain the Lima Convention which established multi-lateral licensing privileges in Region 2 and which invited administrations to join. The Lima Convention was the first treaty within the Organisation of American States exclusively for the benefit of amateur radio. It is now firmly in place and available to all countries which are a member of the OAS. ♦

ETHIOPIANS MAKE THE GRADE

OUT OF A GROUP of 13 students entered for the RAE by The Ethiopian Amateur Radio Society last December, 10 passed an element of the exam, Sid May, G4CTQ, reports. He says he is very pleased with the results bearing in mind that the society has to operate with very limited resources and under difficult conditions. EARS intends to arrange a Telecommunications Symposium in Addis Ababa during which it hopes to run a live station, possibly located in the United Nations building.

Three new members of the Ethiopian Amateur Radio Society proudly display their City and Guilds' certificates.

RSGB Annual Meeting

Saturday 3 December 1994

ROYAL SOCIETY OF CHEMISTRY, LONDON

THE MEETING WAS in three parts; the Annual General Meeting as required by the Companies Act, an Extraordinary General Meeting, and an Open Meeting comprising the President's speech, presentation of awards and a question and answer session. The minutes of the first two meetings were published in the April edition of *Radio Communication* and the minutes of the Open Meeting are reproduced below.

The President declared the informal meeting open by announcing the presentation of major Society trophies for 1994 / 1995. These were reported on page 45 of the February *RadCom*.

The President congratulated all the trophy recipients and announced that he had one further presentation to make. This was a cheque for £3000 to AMSAT (UK) to assist that organisation in the valuable work they did on behalf of amateur radio. It was received on behalf of AMSAT UK by Mr Ron Broadbent MBE, G3AAJ.

Ian Keyser, G3ROO, was awarded the Wortley-Talbot Trophy for outstanding experimental work in amateur radio for his *RadCom* article 'An easy-to set-up Amateur Band Synthesizer' (Dec '93).

The President thanked the Trophies Manager, Dave Simmonds, G3JKB, and the General Manager for all the administrative arrangements in connection with the presentation of the trophies.

The President then made his annual address to the meeting in which he highlighted the rather difficult business year experienced by the Society with book sales and advertising revenue down on the previous year. He went on to mention the new computer system recently installed at Headquarters and the benefits this would bring to the Headquarters administrative function. He reminded members present that the subscription level had been pegged at the present level during 1994.

Turning to the amateur radio side he highlighted the advantageous changes in licence conditions, the difficulties of EMC, and the negative attitude of some members to the work of the Society. He said those uninformed critics studiously avoided taking into account the fact that thousands of hours of work were put in by many volunteers without benefit of payment.

Turning to international matters, he reported that the Society had been represented at the IARU Region III meeting in Singapore, the DARC Hamfest in Friedrichshafen and the UBA conference in Belgium. On the domestic front, Society representation had been present at the dedication of the RSARS headquarters station. He finished by mentioning the changes to the Articles of Association and placed on record his sincere thanks to all the dedicated staff and volunteers who had worked so hard to make his Presidency a success.

The Calcutta Key was awarded to Tim Hughes, G3GVV, for outstanding service to international friendship through amateur radio.

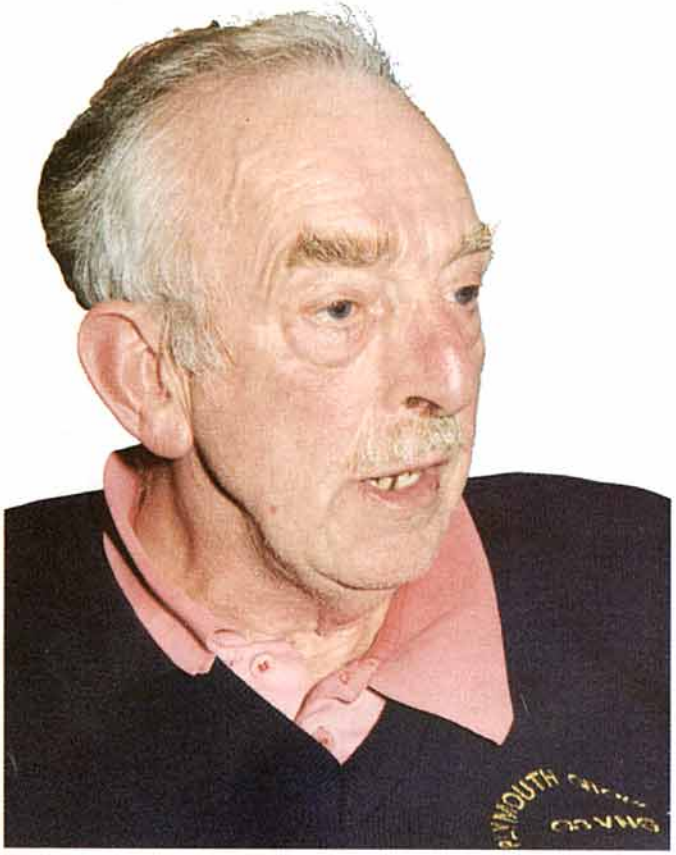
Questions

THE PRESIDENT then opened the meeting to questions from the floor.

H Bellfield, G3SBV, asked for a report on the updating of membership categories. The Honorary Treasurer answered by explaining that progress was being made on reducing the numbers of categories and he hoped this would be finalised in 1995. However, there were real difficulties in having a membership category without *RadCom*. This was an economic one in that the costs of producing the magazine were largely fixed and to offer membership without it might produce substantial falls in subscription and advertising revenue.

H Bellfield, G3SBV, then asked for a report on greetings messages. J N Gannaway, G3YGF, explained that work on extending the greeting message facility to all amateurs was in hand. However, because progress depended on the agreement of other governments and administrations, he could not foresee a conclusion before the middle of 1995.

P M Madagan, G3RQZ, asked a number of questions on EMC and R Page-Jones, G3JWI, said the main snag was breakthrough. Although the EMC Committee had most of the technical problems under control there were still difficulties on the administrative side and, in particular, the legal considerations that were raised by the interface between the Committee's work and the responsibility the Society had to support members in appropriate cases. They were to be addressed in the near future. Turning to the problem of the 'unreasonable neighbour' that had been mentioned by the questioner, R Page-Jones said that being reasonable was a two-way responsibility. The amateur operator who lived in an urban environment could not expect to behave with impunity and expect the Society to support him whatever the circumstances. He accepted, however, that there were a few cases where neighbours were totally uncooperative, despite all that the amateur had done to alleviate the problem and these types of cases were of real concern to the EMC Committee. H Bellfield, G3SBV, remarked that his circumstances had led to Society involvement in an attempt to resolve a complaint by a neighbour, but with little success despite the offer of remedial measures. As a result the RA had imposed a Notice of Variation on his licence. R Page-Jones, G3JWI, said that the basis for the issue of the NoV was excessive field strengths and the defi-



David Hind, G3VNG, asked whether the RSGB was lobbying for compulsory membership for all amateurs.

nition of excessive caused real difficulty. The President thanked the EMC Committee for their sterling work and said their efforts were much appreciated.

G P Stancey, G3MCK, asked what directions were given to the General Manager regarding the closure of GB2SM and what advice he had taken before its closure. The General Manager explained that the station was wholly the responsibility of the Science Museum but had received support over the years from the Society. After taking up his post he had visited the station during school half term and found it to be deserted at a time when it should have been fully manned and operating. Subsequent discussions with the museum authorities established that they were dissatisfied with the type of exhibit the station provided and wished to relocate and refurbish it. The next thing he learned was from a member of the press telling him that the station was to be closed. Further discussions with the museum authorities confirmed this and, although the Society was still in negotiation with the Science Museum about the future of GB2SM, that decision would stand. The museum authorities considered the station less than user-friendly and in much need of updating to bring it in line with contemporary technology. Whilst the Society had done all it could to maintain the station, the decision had been taken without reference to it. As to the specific question, the General Manager said he was not given any specific directions and he did not approach any volunteers for advice.

R H Biddulph, G8DPS, asked why, when proposed changes to the Articles were published, the original articles and the changes were not printed side by side for comparison purposes. The Company Secretary said he would bear the suggestion in mind for the future. He said that all members received a copy of the Articles on joining the Society.

J R Bolton, G3HBN, asked why the editorial column in *RadCom* was dominated by news from the General Manager. The General Manager replied that the leader column in the magazine was available to anyone with something relevant to say. He would be encouraging more Council Members to write the leader during 1995.

G J Bond, G4GJB, asked whether anyone had experience of a mast falling due to adverse weather and members present were asked to relate their experiences to him outside the meeting.

P D Tucker, G4DWZ, asked why hardly any details of Council's activities appeared in *RadCom* over the past year. The President reported that Council minutes were available to any member who requested them and that the method of reporting Council proceedings in the magazine was currently under review.

D M Lauder, G0SNO, asked whether the Society was aware of the benefits of electronic mail information and was told the Society was examining its usefulness. The General Manager said that the Headquarters station was on air at various times during the week and the Chief Operator, J Crabbe, G3WFM, said the station was open on Tuesdays and Thursdays and that licensed members were always welcome to use it on those days.

A Duggan, G0LAX, asked whether the Society was satisfied with the service provided by SSL Ltd. J N Gannaway, G3YGF, said that the RSGB was not and had expressed its concern to the RA. However, it was hoped that the new contract would prove to be more satisfactory. The Society would continue to monitor the situation. Other members present expressed their concern at the performance of SSL Ltd although the General Manager did point out that the level of complaints had dropped somewhat over the past few months. He said he hoped that trend would continue.

D J S Newton, G3JJZ, asked about the publication of HF and VHF Contest rules in *RadCom*. The Editor replied that he was not aware that any had been missed out - certainly not intentionally. Providing the rules were supplied promptly they would be published and the same considerations applied to results.

H Kay, G0FAB, pointed out that the Society Open Day in 1994 clashed with National Field Day and could he be assured that conflict would not occur again? The General Manager assured him it would not.

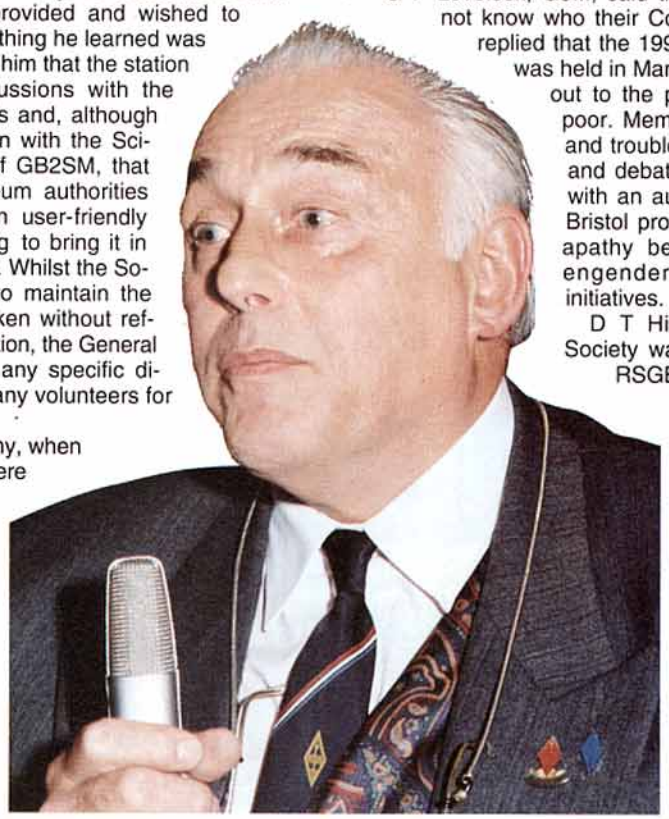
D McQue, G4NJU, asked whether it would be better if more Council Members represented Zones and that the Zones were smaller. There were a number of members who considered the present Zones were too large. The President indicated that that consideration would be borne in mind when any future revision of the Articles of Association took place.

G P Lovelock, G3III, said that many members in his area did not know who their Council member was. The President replied that the 1993 Society Annual General Meeting was held in Manchester in order to take the Society out to the provinces, but the attendance was poor. Members of Council also took the time and trouble to attend the Scottish Convention and debated matters concerning the Society with an audience of 18. A similar venture at Bristol produced 19 people. With that sort of apathy being displayed it was difficult to engender enthusiasm for further such initiatives.

D T Hind, G3VNG, asked whether the Society was lobbying for membership of the RSGB to be a prerequisite for the issuing of an amateur licence and was told that it was not.

A Gard, G4LWA, asked whether there was any prospect of RSGB Headquarters being accessible by packet. The Chief Operator, J Crabbe, G3WFM, replied that it was not practicable to operate a BBS facility because it would need constant supervision and, as a volunteer, his time available for attending HQ was limited.

The President then thanked all for their attendance and interest, wished everyone present a safe journey and a peaceful Christmas. He declared the informal meeting closed at 5.15pm. ♦



Harry Bellfield, G3SBV, asked a series of questions on membership categories, greetings messages and EMC problems.

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Contest Exchange

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MY QUOTE of the month goes to ZL2AL who, in the New Zealand magazine *Break-In*, described modern contesting as similar to being on the bridge of the Starship Enterprise; great if your di-lithium crystals are working and your shields are up but not so great if you are up to your armpits in Klingons and your phasers are down to 20%! Although I didn't entirely agree with the sentiments, I liked the quote! The top line of contesting is certainly rather high-tech and some stations would make Captain Kirk's hair curl, but it's still possible to have lots of fun with the radio equivalent of a shuttle-craft!

STEPS TAKEN TO BOOST CONTESTS

TYPICAL MEETINGS of the RSGB contests committees are held on weekday evenings and tend to last no more than three hours. This works fine for handling the committee's normal day-to-day business such as adjudicating contests, dealing with correspondence, setting rules but every so often it is good for the committee to meet for longer and to review some of the bigger items which it can't tackle during the short meetings. Just such a meeting of the HF Contests Committee took place one Saturday during April, and a number of very significant proposals and changes were laid down. Representatives from *RadCom* were present at the meeting.

I'm pleased to report that from 1996 you will have a far easier way to access contest rules. All the rules for next year's contests (HF, VHF and probably ARDF) will be published in a pull-out supplement in *RadCom* before the start of the year, probably in the September issue. This is going to mean hard work to get all our rules into their new shape before the July deadline. The new approach will limit the flexibility for the committees to make changes at short notice to accommodate good new ideas, but it should provide many more benefits than disadvantages.

A number of ideas are being considered in the hope of encouraging participation in contests, and in particular to try and persuade more newcomers into contesting and give some incentives to people who do not have access to a big station. There is talk of introducing restricted sections similar to those in the Field Day contests (perhaps 100W and a single element antenna no higher than 35ft) into a number of major contests. In the USA, in particular, guest operation is a common occurrence. This is where a station owner invites another person in to operate their station during a contest. This type of operation has two main effects. Firstly, it tends to lead to a fair number of very good stations being built up by station owners who, while perhaps not being overly keen on contest operation themselves, do have the technical expertise and drive to build up a very competitive station. While this is important, it is a second effect that we are particularly keen to try and encourage; that less experienced operators get an opportunity to discover what it is like to use a bigger station. In these cases, big is always relative. I can remember very well the first occasion in which I used a 400W linear, and a 3 element tri-bander during the ARRL 10m contest in 1988. Before this, I had only ever used a 100W or less and low wire antennas on HF. I was astounded at how much fun HF contesting could be with a competitive system, and this really impelled me to try some more HF contests! This sort of experience can really open people's eyes to what is possible and either encourage them to do more themselves, or perhaps to form a group or work with the local club to do some more contesting.

It is clear that the team part of the Affiliated Societies contests is very popular, and that it plays a big part in leading to ever increasing participation in these events. There are plans to introduce a team event into a few contests to try and encourage a little healthy inter-club rivalry! Also on the club front, it is intended to put together a contesting video which can be made available to clubs to show at their meetings. If you have any suitable material for this video - perhaps people operating, or setting up either single op or multi op stations - please contact the HFCC Chairman, Chris Burbanks, G3SJJ who is QTHR.

A contest in the USA called the Sweepstakes is enjoying renewed interest after slipping into the doldrums some years ago. This is an internal North American event where the multiplier is basically US States and Canadian provinces. The fortunes of this dying contest were turned around by offering for sale small mementoes (mugs, pins, even a broom) for stations who managed a 'clean sweep' (all states and Provinces). Sweepstakes is now one of the most popular and well supported contests on the American calendar, and there is much speculation of what colour the mugs will be this year! The HFCC aren't suggesting they plan to copy this idea wholly but that they are considering the possibilities of running something similar over here.

One of the big moves in the HFCC is towards automated, computerised log checking. In the past, log checking has been a very laborious affair, involving a great deal of manual cross-checking between individual logs. Chris Swallow, G3VHB, has spent a lot of time developing a piece of software to read logs in electronic form and then to do a thorough cross-check between the information in all of the logs. The software then generates a list of discrepancies in the log, which the adjudicator can check to see what correction must be applied to each station's score. Obviously, using this system does mean that logs have to be in electronic form though, and this means a lot of work for the adjudicators in typing in those logs which arrive on paper. It would help everyone if entrants were to submit electronic logs to HF contests wherever possible. Even if you don't want to use a logging program in real-time during the contest, the computer can be a great help in dealing with the drudgery of the paperwork after the event. All the common logging packages can be run in a post-contest mode where the QSOs are typed from the paper log book into the computer after the event. Hence, at the same time as helping the adjudicators get the results out more quickly, the computer helps you by sorting out all the dupe checking and multiplier listings. This is also a good way to get to grips with the computer package without the white-knuckle experience of having to do it for the first time in the heat of the contest. In time, you may want to take the extra benefits from running the computer during the contest, but you can do that when you feel ready for it. Chris' software can take files in G3WGV's LOG, K1EA's CT, K8CC's NA, EI5DI's Super Duper and of course RSGB format! Again, it's important to stress that the paper logs and electronic logs are all subject to the same degree of checking.

If you have any comments or suggestions on any of these proposals and changes, please contact Chris, G3SJJ.

The home of keen contest operator Don Beattie, G3OZF, where the HF Contests Committee gathered to set in motion some major proposals.

VHF FIELD DAY

LAST MONTH I prompted you into thinking about registering for HF CW Field Day. This month it is the VHF contest's turn. This is an event where you must register your intention to enter and what site you are going to use - see *Contest Classified* for May 1995. Remember that registrations must be with David Johnson, G4DHF, by 10 June, with the contest running on the weekend of 1/2 July. This VHF contest is another great event for clubs, and although it covers 4m, 2m, 70cm and 23cm, it isn't necessary to be active on more than one band to put in an entry. Almost all clubs will be able to put together a 2m SSB station and most will also be able to dig out something for 70cm. 4m and 23cm can be a little more problematic but are usually quite manageable as well. The Open Section, in which anything legal goes, can be tough but there is also a popular restricted section where you are limited to one antenna per band less than 10m high, and a low power section where there is the same antenna restriction and a 25W power limit. There should be something here for every club, and it's often a very pleasant sunny weekend too. Let's hope conditions are as good as last year! ♦

TURN TO PAGE 81 FOR CONTEST CLASSIFIED

Novice Note Book

IAN KEYSER, G3ROO
Rosemount, Church Whitfield, Dover,
Kent CT16 3HZ

WE HAVE NOT TALKED about HF antennas for some time. Now the warmer weather is with us it is the time when we should be thinking of getting the antennas overhauled for the coming winter. Because these jobs always take longer than anticipated it is a good idea to start planning HF antennas now. Your HF antenna system should then be ready for operation during those long winter evenings.

The higher frequency HF bands are not at their best because we are now in the depths of the sunspot minimum. This means that most of the HF amateur radio operation is on the lower frequency bands. However openings do occur on the higher bands so we need an appropriate antenna. The best solution is to erect an antenna whose efficiency and effectiveness is greater on the lower frequency bands, such as the 160 and 80 metres, but will also work on the higher frequency HF bands.

Centre insulator for multiband dipole.

THE MULTI-BAND DIPOLE

ONE SOLUTION is to use a multiband dipole. Any sort of multiband dipole requires an antenna System Tuning Unit (ASTU, often known as an ATU). The best arrangement is to feed the antenna with twin feeder, this can either be 300Ω or 72Ω. It is important that you acquire or build an ASTU that has provision for feeding twin feeder.

The antenna invented by Louis Varney, G5RV is probably the best known of the multi-band centre fed antennas. It comprises a 31metre long horizontal wire antenna fed at the centre using open wire feeders. If the length of the feeders is a multiple of a quarter of a wavelength at 14MHz then the impedance at the feeders, at the opposite end from the antenna, can be matched using a relatively simple ASTU.

A horizontal centre fed antenna to cover the 160 metre band would have to be long; in fact around 80 metres long. A more practical solution for a multi-band antenna to cover 160 is to use a multiband antenna whose lowest frequency is 80 metres. To use this antenna on 160 metres the feeders are connected together at the shack end and the whole antenna end-fed against earth using an ASTU.

USING TWIN FEEDER

COAXIAL CABLE CONNECTIONS between antenna and shack can be routed with very little regard for the path that it takes. Coax can be taped directly to the antenna mast or other metal supports. A little more care is required with twin feeder. Ideally support points must be kept as short as possible and changes in direction must not be too sharp, and not greater than 90°. For slotted feeder there is an advantage in weaving a foot of garden 'strimmer line' through the slots to give greater support and to reduce flexing at the bend.

Where it is necessary to pass close to a metal structure, or to bypass a rotator on a tower for instance, a short length of garden hose can be taped to the structure and the feeder passed down the centre. Seal the top with PVC tape to reduce water ingress but leave the bottom open to allow easy drainage. Where the cable is to travel along a garden fence use nylon cable ties to fix six inch long plastic spacers to the fence and to hold the twin feeder in place on the spacers.

LIMITED SPACE

WHILE ON THE SUBJECT of folding long antennas to fit a smaller spaces; the general rule is to keep the centre section of the antenna as high and as straight as possible and try and keep any folds less than 90 degrees. This way it is possible to fit a G5RV into a twenty by ten metre plot of land.

VERTICAL ANTENNAS

THE OTHER ANTENNA for the smaller back garden is the vertical. It is easy to dismiss the vertical on the low frequency bands due to inefficiencies but if we load the antenna with an inductor to make it look like a quarter wave on the band in use it can be very good indeed.

I often use 80 metre QRP from my car using an 8-foot centre loaded whip and at night work Europe with no difficulty. Ask your local 80m HF Novice and I am sure that he will have worked my mobile station.

There is a major disadvantage with the loaded whip as it is very narrow band, but we only have a little band on 80 metres and, providing the antenna is tuned to the band, the results will be much greater than expected. For 80m I would suggest a 7 metre length of 50mm TV mast and a 12ft tank whip on top, between these two sections we insert a coil of wire to bring the system to resonance on the frequency in use.

Verticals do require a good earth system and several earth rods should be drifted into the soil around the base of the antenna and the braid of the coax feeder bonded to them. In addition to this it is a great advantage to add some radials, these should be 22 metres in length and fixed to the earth rods and supported a few inches above the ground on fences etc. When I lived in London I had a 50 foot vertical for 160 metres and my six radials ran down the neighbours back fences [but ask permission first - *Ed*].

I hope that this will help formulate some ideas and increase the activity on 160 and 80m.

HINT OF THE MONTH

WHEN USING TWIN wire feeders it is not necessary to waterproof the junction and feeder end. I make my dipole centre insulators out of 5 mm perspex scrap. Cut the insulator to a rough T shape as shown in the photograph.

The insulator tapers to where the antenna wire leaves the insulator. PVC tape is used to bind the wire to the insulator and continue down the wire some distance. This provides support for the wire at the point of maximum flexing in the wind and reduces the chance of the wire breaking at that point. ♦

RADCOM TECHNICAL FEATURE

JS 'SNAP ON' RF Current Probe

By J.B. Smith, VK9NS*

THIS DEVICE IS DEDICATED to those addicts of the vertical antenna. To make a Low Band vertical really work takes lots of time and effort. Upwards, real estate is free but few can erect the 40m-high quarter wave vertical for 160m. Even the 20 metre height needed for an 80m λ/4 wave vertical is a major outlay. So the majority of us are stuck with shortened versions, loaded somewhere or another. Regardless of what vertical antenna you use the image plane is of major importance. As the vertical antenna is shortened the base impedance falls dramatically, often to a few ohms. So the ground losses have to kept lower than this figure if possible; efficiency is the name of the game.

The radial system becomes the key to success. For a given situation it is the only part of the efficiency equation that we can strive to improve. The classic 120 radials at three degree intervals is impractical so we compromise by using a short radial here and a longer one there, and so on.

THE AIM

I WANTED A CHEAP, quick and easy 'Pocket sized Device' that would check the RF current in a radial, in fact in each of my radials.

Photo 1: Side view large plastic clothes peg version.

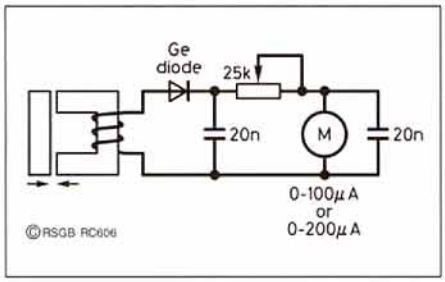


Fig 1: Circuit diagram of current probe

The idea used is not new [1], [2] but this article describes a design that has been taken a step further, avoiding the use of an external meter. It then becomes a very versatile device and in all honesty I now wonder how I ever managed without it.

BASICS

RF CURRENT CAN be measured by means of an RF Ammeter in series with the wire. They are usually of the 'hot wire' principle, very accurate but expensive. AC Current is also measured by electricians using a current clamp. The principle of this is that AC current flowing in a wire through the centre of a toroidal core acts as a one turn primary. Turns wound on the core become the secondary of the transformer. The voltage across the primary is proportional to the current and turns ratio. The arrangement can be calibrated quite accurately since by using the correct core the toroid is not frequency dependent over the frequency range of the ferrite material.

To achieve this clamping action the core has to be split in two halves. The two halves can then be clamped over the wire in the course of measurement. In other words the toroid is once again complete; move the jaws apart and the device may be removed from around the wire.

SPLIT TOROID

TRYING TO SPLIT a toroid accurately can be a hit or miss affair. I tried splitting the ferrite material by scoring a line on it, placing it in a vice and hitting it with a hammer but it did not result in a clean break. I then turned to that old amateur radio standby, the junk TV set and found a small ferrite cored transformer with a split U type core. This was ideal; it had perfectly square mating surfaces and the clamping action was easy to visualise.

*PO Box 90, Norfolk Island, Australia, 2899

LUCK

IN MY TRAVELS ROUND the shopping metropolis of Norfolk Island I remembered seeing a large plastic clothes peg, a novelty item for use on the office desk, it had a pen holder and a strong spring. It was said it also made a great paper holder. A few weeks later this brainwave had me rushing back to see if it was still there. It was and it turned out to be ideal for what I had in mind. It had a strong clamping action and a wide jaw movement of an inch (2.5cm).

THE DEVICE

THE PROTOTYPE (Version 1) is shown in **Photo 1.** The JS SNAP ON, based on the large plastic clothes peg, is very easy to build and even easier to use. One of the handiest things you will ever make if you are into checking RF currents in radials, feed lines, wire antennas etc.

There are some limitations, easily fixed in your model if you have a mind to.

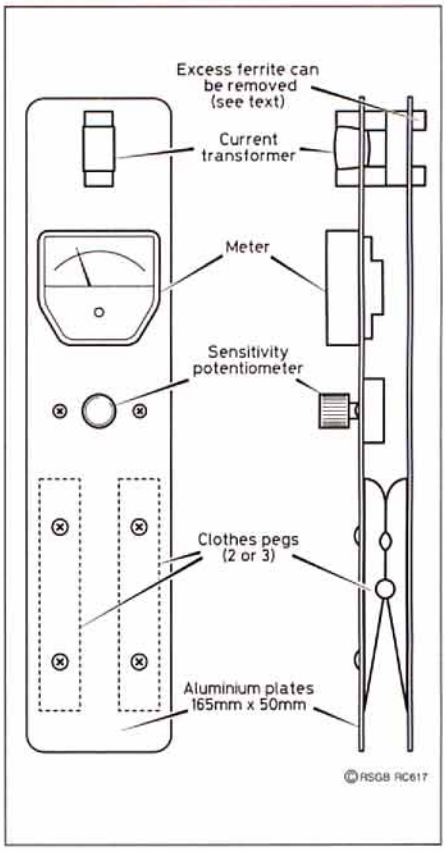


Fig 2: General construction of the version 2 current probe.

- The meter used is a typical cheap VU type, chosen because they are small. Edge types are also very good; they usually have a very sensitive movement, typically about 100-250 micro amps FSD.
- As a result everything is done at low power. I energise the antenna with a maximum of 8-10 watts but get adequate current readings. Be careful on higher power levels.
- No attempt has been made to calibrate the meter scale, (this is planned for Version 3). The 25k sensitivity potentiometer gives plenty of control. In its present form the JS SNAP ON is an arbitrary device which asks the following questions:

  a) Is there any current in the radial or wire?

  b) Roughly how much? A lot, quite a lot or not much?

  c) Is it more or less than the chosen reference radial or wire?

HOW ARE THE BURIED RADIALS PERFORMING?

OVER THE YEARS I have squirreled away lots of wire under-ground. I don't remember where all the wires are but I have a general impression of course. So when I tidied up the base of my new vertical I had the ends of the radial wires to deal with. I brought each through a wire staple with a one turn lock. The tail of the radial was terminated by a solder tag and then bolted to the new earth (ground) plate. The earth (ground) plate at the base of the vertical is square accommodating as many radials as I like on each side of the square. This tail was long enough to be able to get at the end of each radial with the JS SNAP ON.

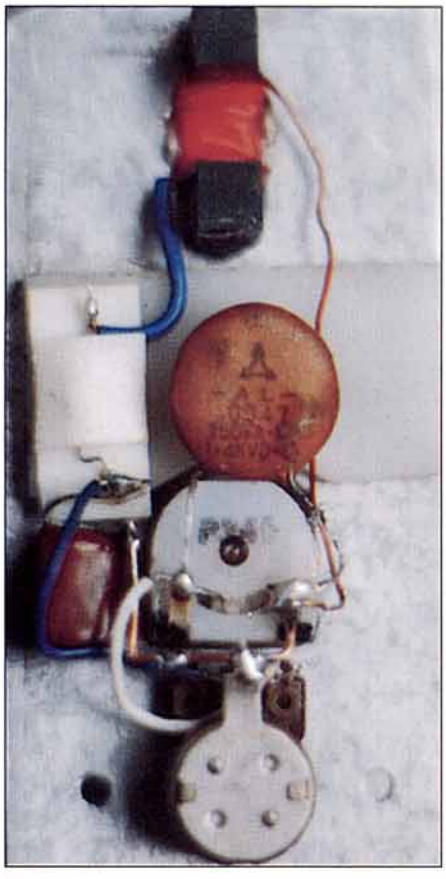


Photo 2: Top 'U' core in place, components wired up.

SUCCESS

A FEW WATTS OF power, at 1830kHz, was applied to the coax of my newly matched 160 metre vertical and the JS SNAP ON was put over a Reference radial. This comprised a known test length of wire on the surface of the ground. The meter gave a good reading, which I adjusted to full scale deflection with the sensitivity control. This became my reference for the readings of all the other 20 or so radials on one side of the square.

Photo 3: JS snap on probe in action. (V2.0 aluminium version)

The differences were amazing, six of my buried 'radials' had little or no current. Taking a chance one was pulled back out of the ground and it quickly became the reality of a very short piece of wire; sometime that radial had been accidentally broken. Incidentally, several radials shone like beacons and these were a few of my very first radials buried in 1981 using heavy gauge hard drawn copper wire. Not so good were the rusted out remains of a few galvanised wire radials buried some years ago.

This device was a revelation and several days later every radial was working, the others were scrapped.

IMPROVEMENTS?

FRANKLY I CAN'T think of any improvements as the JS SNAP ON has proved to be so informative that it is magic. There is no external RF pickup unless one really tries.

All available radials can be checked very quickly and a general performance picture formed; pick any known one as a reference and go from there. After a short period of use you will almost be able to tell the length of the radial. How the new radial just installed is shaping up. Incidentally I have also found a fault in my 40m array radial system under one of the verticals (yet to be fixed).

CONSTRUCTION

IN ORDER TO write up the JS SNAP ON device as an article it is necessary for the construction to be repeatable. I could not find a source of that large plastic peg. [*There doesn't seem to be any in the North London area either, Ed*].

Also junk TVs were running a bit short and I needed a reliable source of suitable split cores.

Overcoming the first problem was easy; redesign the whole thing! Version 2 is constructed from two pieces of aluminium held together with a couple of smaller plastic clothes pegs. A snap on ferrite core choke package solved the core problem. The construction of Version 2 is illustrated in **Fig 2** and **photos 2, 3 and 4.**

The gauge of the aluminium used for the arms of the peg must be at least 0.125 inch (2mm). Cut out holes are required for the VU meter back, the ferrite cores and the sensitivity potentiometer.

The springs of the pegs should set the tension and should not be modified by any flexibility of the aluminium. Two plastic pegs give sufficient tension but I will try three in Version 3.

The hole in the split U core ferrite snap on choke assembly put together in the intended fashion is too large. My target was a maximum of around 0.4 inch (10mm) to take the centre of normal coax with dielectric.

A reduced hole size in the ferrite U core was achieved by fixing the lower half upside down as shown in Fig 2.

The inside clearance of the arms has to be larger than the depth of the meter used. This depth is dictated by the height of the small plastic pegs used which is about 0.6 inch (11 or 12 mm) and is more than sufficient.

Place the two arms together and make the rectangular cut-out for the top and bottom cores, the fit should be reasonably tight. On the top arm, file the long edges with a

COMPONENTS

Resistors	
RV1	25k potentiometer
Capacitors	
C1, C2	10nF
Inductors	
Snap on choke kit	Cirkit, UF4
Semiconductors	
D1	OC91 or similar

Additional Items

Two pieces of aluminium 6.5" (16.5mm) x 2.0" (50mm) x say 0.125" (2/3 mm) thick. (see text)
Couple of plastic clothes pegs.
Araldite (5 minute set stuff saves time)
Suitable knob to fit RV1 (sensitivity control)

half round file to make sure the coil winding has clearance and is not touching the metal.

When closed the jaw end of the arms should be parallel thus ensuring the accurate mating of the top and bottom ferrite surfaces. To achieve this the bottom ferrite has its top flat face about 0.125 inch (2/3 mm) above the inside surface of the bottom arm. Make sure it is square and level, Araldite in place and allow to set.

Set the two small pegs flat on the base and allow clearance for meter and the sensitivity potentiometer. Araldite and allow to set.

Attach top plate onto the pegs using 4 small self tappers. (It makes sense to be able to take the thing apart) Now open and set the 'jaw' to about 0.125 inch (2 to 3mm) more than the parallel position. (Put the shank of a suitable drill in the jaws of the small pegs to achieve this.)

Construct the current transformer by winding 12 to 14 turns of 22SWG enamelled copper wire on the top core. Wrap a layer of tape over the core before winding the coil. The edges of the ferrite are very sharp. Wrap tape over the finished coil, make sure the tails are clear and so on.

Place the top U section of ferrite (with coil) through its cut out and let it 'sit' on the top of the ferrite core below. I used a couple of elastic bands to keep everything in place and yet be able to move the top core slightly. Make sure the coil and wire tails underneath are clear of the metal arm and make sure there are no spaces for the Araldite to drip though (a thin piece of paper between the faces will avoid disaster). Araldite the top core in place and let it set. Later, the coil can be given a thick protective coat of Araldite on top. When the Araldite has set do the same to the underside.

The situation is now that, on removing the drill shank and the elastic bands, the 0.125 inch (2 to 3 mm) which has been set will now ensure good facing of the ferrite faces under the pressure of the peg springs.

The device can be split again and the meter, potentiometer, diode and the two capacitors can all be assembled and wired. The type of diode is not critical but a germanium diode, such as a OC91, will give better linearity at low current levels. Reassembly should be easy by now.

The legs of the bottom upturned half core can be removed, although this is not essential. The job must be tackled *with care* (using a fine grindstone wheel).

This model is repeatable with the minimum of work. Not shown in the illustrations is a plastic wire guide at the jaws (fitted since the photos were taken). A couple of pieces of plastic either side with a 0.5 inch (12.5 mm) hole, (split of course) and held in place with Araldite.

REFERENCES

[1] 'G4FM's RF current probe', *Technical Topics*, *RadCom*, Nov 1984.

[2] 'Pliers type RF current probe', G3HZY and PA0SE, *Technical Topics*, *RadCom* Oct 1992. ♦

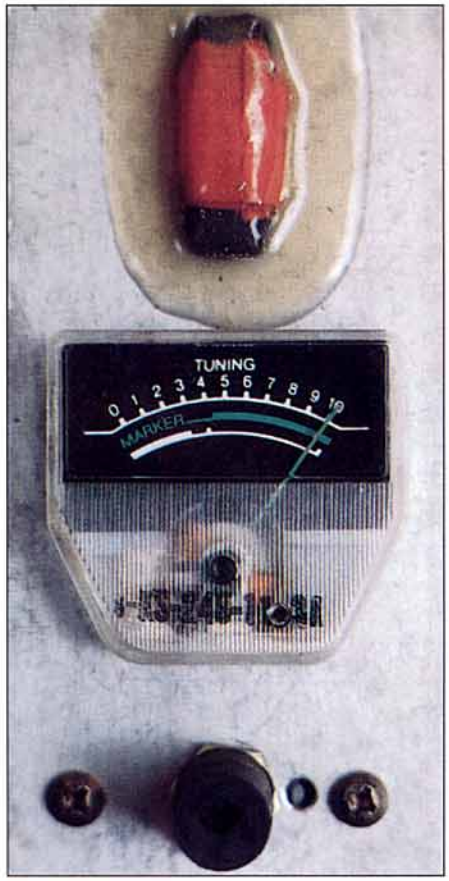


Photo 4: Top view of aluminium version, protective coat of araldite over coil, sensitivity control, visible are 2 of the 4 self tappers holding top panel to clothes pegs.

RADCOM EQUIPMENT REVIEW

The Howes ASL5 Audio Filter

Reviewed by Chris McWhinnie, G0MQW*

THE HOWES ASL5 audio filter is intended to give narrow filtering for CW and a fast roll-off response suitable for speech (SSB) signals. It is available as an assembled PCB module, or - as in this case - in kit form. As a kit it is supplied as a screen-printed PCB with parts only. The board measures just 117 x 51mm and so could probably be fitted in many an existing receiver. However, a separate HA50R hardware pack, containing matching chassis and fittings, was also supplied with this review kit.

PREPARATION

AS YOU MAY have read in last month's *Radio Communication* [1], the tools needed to build Howes' kits, and this board in particular, are minimal. A small soldering iron and side cutters would be the absolute minimum. The six-page A4 instructions contained a list of the components in groups, ie all the 8k2 resistors needed to be soldered one after the other. Clear identification of all the components was aided by the listing. It was noted that the instructions and board were both dated 1987, so this is not the latest digital filter, but a tried and tested design using discrete passive components and two integrated circuits containing active devices.

PCB CONSTRUCTION

THE 14 TERMINAL pins were fitted first. A 100W soldering gun proved best for these, as they require some force and heat to drive them home. There are 43 resistors, 35 capacitors, two ICs, one diode and one pre- set pot. It took just over two hours to fit all the components and another productive few minutes checking the board for solder bridges and incomplete joints. The hint in the text that a strong light helps identify such problems did indeed reveal one slip of the iron across two PCB tracks and four partial joints where light still shone through.

HA50R HARDWARE PACK

THE HA50R hardware kit includes a chassis with a black plasticised front bearing the Howes logo, the description 'dual-bandwidth filter' and three holes and switch positions marked CW, SPEECH and WIDE. A four-pole three-way switch, screws, M3 nuts and bolts, rubber feet and jack sockets were supplied as well as some copper wire.

New-style two-page instructions made it clear what needed to be marked, drilled and fitted. Holes were required for fitting the top of the case, for the audio input and output sockets and for the DC leads (not supplied). Four holes in the base are for the bolts to secure the board and one to secure three green LEDs which indicate the bandwidth selection. The sensible suggestion that pilot holes be drilled for most holes meant that every hardware part and the board were easily positioned.

Curiously, the corners at the back of the case needed rounding-off with a file, although the front had already been done as supplied. Apart from the tinned copper wire, connecting wire was not supplied. The text suggested using screened wire for some of the connections if protection from the unwanted effects of RF in close proximity is required.

CONNECTING THE BOARD

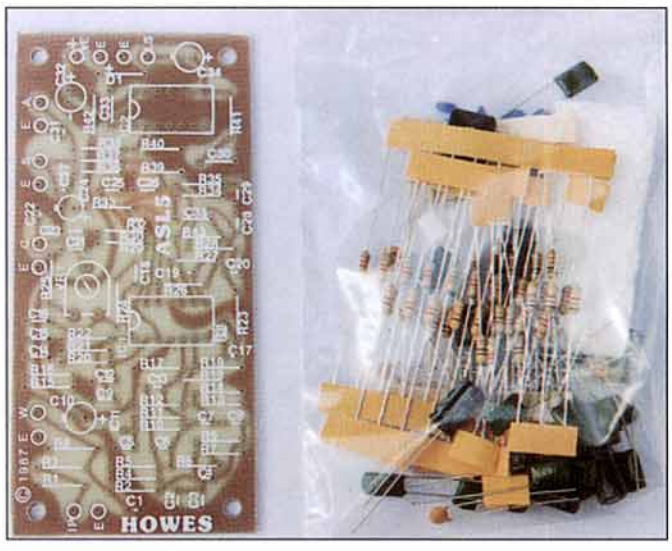
AS WITH THE Howes kit reviewed in [1], the spacing of the board off the aluminium chassis is intended to be only the width of an M3 nut. Despite careful soldering, more nuts had to be purchased to give greater spacing using two M3 nuts, as solder joints were too near to being grounded. The mounting of the three LEDs on one solder tag and a piece of22SWG copper wire looked flimsy inside the case but seemed to suffice. There was no DC lead or socket supplied, which leaves the choice to the constructor and is not a problem if a supplier of such components can be located. The soldering of the eight wires to the filter selection switch was fiddly, good lighting was needed to see the faint switch markings. The connections to the terminal pins were not easy either as the wires needed to be held still while the solder solidified.

CIRCUIT DESCRIPTION AND TESTING

THERE ARE TWO ICs in the design. IC1, a TL074CN, provides active three-section CW filtering and two-sections for speech. IC2, an LM380N, provides 1W RMS audio output. A small pre-set resistor varies the output level of the CW filter section to match that of the speech filter. The kit operates from below 12V to 14V and a smooth power supply is required in order to avoid hum problems.

Finding 3.5mm connecting leads to fit the supplied jack sockets caused some rummaging in the hi-fi junk box. A suitable lead was found to connect the record-out socket of a JRC NRD-535 receiver to the 3.5mm filter input and Sony MDR-24 stereo headphones were connected to the 3.5mm output socket. Approximately 40mA was being drawn by the board which seemed low given the recommendation for a 250mA capacity power supply. An LED had lit and the 80m QRP frequency could be heard clearly through one side of the stereo headphones.In common with other amateur equipment, mono headphones should be used!

CONTINUED ON PAGE 54



The ASL5 board and all components as supplied.

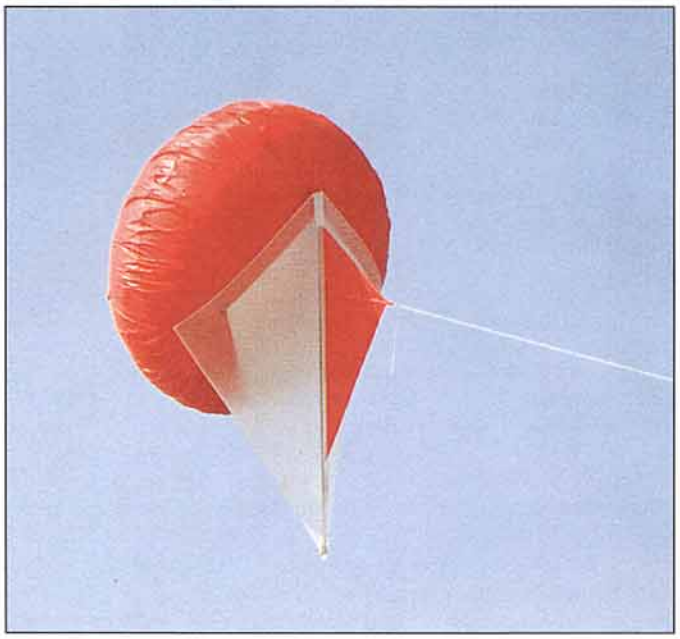
** Any correspondance via RSGB HQ.*

PRODUCT NEWS

Note: Product news is compiled from press releases sent in by the manufacturers and distributors concerned. Details are published in good faith but *Radio Communication* cannot be held responsible for false or exaggerated claims made in the source material.

IS IT A bird? Is it a plane? No, it's the **Allsopp Helikite**! If you fancy trying your hand at some lowband portable DX operation this summer, think about using a Helikite as a 'skyhook'. Neither a kite nor a balloon, but an ingenious combination of the two, Helikites are inflated with helium and will lift a flying line and light aerial wire to great heights. They are ideal for supporting lowband vertical antennas and, once launched, they'll fly themselves - allowing you to concentrate on working the Topband or 80m pile-up! A Helikite 'lifting kit' consisting of two kites, balloons, drogues and tails with sufficient line and four spare balloons costs £210.32 plus £5 postage and packing. Helium is widley available in 10 litre containers. *[Radio Communication's* Technical Editor had some excellent results using an 80m end-fed half-wave vertical supported by a pair of Allsopp Helikites. They will be reviewed in next month's *RadCom - Ed].*

Allsopp Helikites, Chestnut Lodge, Chalford, Stroud, Glos GL6 8NW, tel: 01453 886515.



THE LATEST version of Paul O'Kane's, EI5DI, contest logging program is **SDV - Super-Duper for VHF**. SDV is a comprehensive logging program written especially for RSGB VHF contests. The program provides instant 'duping' on any PC and will track any combination of county, country or locator square multipliers. SDV will calculate the distance, bearing and points for each QSO and prepare your log in the RSGB recommended format. The log can be printed out by band, with points totals for each page, and as it is 100% ASCII, it can be edited with any text editor. SDV even provides a built-in memory keyer for CW contests. SDV allows logging 'live' or off-line after the contest and, since no multiple keystrokes are required, it is very easy to use, making it equally suitable for novice or experienced contesters. SDV is available for £25. Also available for £25 is the original SD ('Super-Duper'), for RSGB and major international HF contests. The two programs can be ordered together for just £39.

Paul O'Kane, EI5DI, 36 Coolkill, Sandyford, Dublin 18, Ireland, tel: 00 353 1295 3668.

THE **BRITISH DX Club's *Radio Stations in the United Kingdom*** (ISBN 09514723-5-6), now in its 13th edition, aims to be the most accurate and comprehensive guide to British domestic broadcasting stations available. In A5-format, its 43 pages contain listings in frequency order of all LF, MF and VHF transmitters in the UK, with the station's name, location, power and parallel frequencies. Even stations using as little as 5W power are listed. A separate reference section includes an alphabetical list of station names, with the postal address, telephone and fax numbers and a cross-reference of frequencies used by each station, as well as RDS identifications and a host of other information. All stations in the UK are covered, including BBC and independent national, regional and local radio. *Radio Stations in the United Kingdom* is invaluable for any broadcast DXer or local radio enthusiast or simply for anyone taking their radio with them on a trip to other parts of the UK. It costs just £2.50 from:

British DX Club, 126 Bargery Road, Catford, London SE6 2LR.

ALINCO ARE replacing their DR-599E VHF / UHF transceiver with the new **DR-610E.** It is a dual band (2m / 70cm) FM mobile transceiver with detachable front panel, 'Advanced Channel Scope' allowing you to 'see' the activity on 11 channels, the capability of monitoring two frequencies on the same band, dual 'A' / 'B' VFOs, and CTCSS tone encode all fitted as standard. There are three power output levels: 50W (35W on 70cm), 10W and 5W, and extended receive coverage of 108 - 174, 430 - 510 and 800 - 999MHz on AM as well as FM. The DR-610E costs £659.

Waters and Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS, tel: 01702 206835, fax: 01702 205843.

MUTEK LTD, long famous for their pre-amplifiers, have recently reduced the size of the pre-amps designed to fit into the Yaesu FT-290R. The **muTek SLNA 290s** (for the FT-290R Mk I) and the **SLNA 290s2** (for the Mk II version) are now available at £35 plus £3 postage and packing. Also from muTek is the **SLNA 145sp**, which they describe as 'the world's smallest masthead amplifier' for 2m, and which measures 2 x 1 x 1in (excluding the N-type connectors). The amplifier has 12dB gain, a 1dB NF and can handle up to 30W on transmit. It costs £55 plus £3 P&P. Full details of these and other products can be obtained from:

MuTek Ltd, P O Box 24, Long Eaton, Nottingham NG10 4NQ, tel / fax: 0115 9729467.

SVETLANA Electron Devices, Inc is a US - Russian joint venture, manufacturing valves in St Petersburg, Russia, and marketing them from the USA. Svetlana valves (or 'tubes'!) include exact replacements for many valves suitable for amateur linear amplifiers, such as the **811A, 4CX250B** and **4CX1500A**. A full list of Svetlana valves, including many Russian valves new to the Western market, with their operating characteristics and maximum ratings, is available free of charge from:

Svetlana Electron Devices Inc, 3000 Alpine Rd, Portola Valley, CA 94028-7582, USA, tel: 001 415 233 0429, fax: 001 415 233 0439.

48

HAVE YOU EVER thought about trying slow-scan TV, but believe the equipment to be too expensive? Think again. **Absolute Value Systems** of Chelmsford, MA, USA have introduced the **SSTV Explorer** so anyone with a PC (286 or higher) with 640k RAM, VGA adapter and colour monitor can now *receive* colour SSTV pictures. Slow scan audio is simply input from the transceiver's headphone jack. For sending and receiving 32,768-colour SSTV on HF, VHF or UHF the **Pasokon TV** scan converter and software is the answer. An 80386 or higher CPU is required. The SSTV Explorer is $59.95 and Pasokon TV $239.95 in the USA. Write to the address below for further details and for information on availability and price in the UK.

Absolute Value Systems, 115 Stedman Street, Chelmsford, MA 01824-1823, USA, tel: 00 1 508 256 6907.

THE SERIES OF **Watson Morse keys** is now available. All Watson keys are hand-made from brass and are mounted on a light oak finish solid wooden base. They are finely crafted and carefully balanced to provide just the right 'feel' for the discerning CW operator. There are three straight keys in the series, starting at £29.95 for the basic GME and going up to £44.95 for the heavy-duty GMV model. The GMI is a stylish fully-adjustable dual paddle key which weighs 425g and costs £49.95.

Waters and Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS, tel: 01702 206835, fax: 01702 205843.

MFJ HAVE introduced a new QRP (12W) **20m SSB 'TravelRadio' transceiver, the MFJ-9420.** The 'TravelRadio' is a simple to operate, truly portable, lightweight transceiver which can be powered from NiCads, D cells or other 12V source (such as the MFJ-4114 'portable power pack'). The single-conversion receiver features a quiet, double balanced mixer front-end, powerful audio amplifier and a calibrated S-meter. On transmit, the meter monitors the speech processing level. The Motorola PA transistor will tolerate antenna mismatches or even accidental shorts or open circuits. The MFJ-9420 costs £249.95.

Also new from MFJ is the **MFJ-462 Multi Reader.** It is a data reader which simply plugs into the headphone socket of any shortwave receiver and translates RTTY, ASCII, AMTOR or CW into text which scrolls across an easily-readable LCD display. The unit is self-contained: no computer, software or interface is required. There is a printer port built in which allows 24-hour monitoring and printing if required. The MFJ-462 costs £169.95.

Waters and Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS, tel: 01702 206835, fax: 01702 205843.

THE **BRING AND Buy Database** is a new service in which anyone may advertise up to 12 items of equipment for sale for three months, or receive a print-out of all those selling up to four pieces of equipment. All 'for sale' or 'exchange' advertisements are automatically erased after three months. In addition to individual amateurs, 24 shops are supplying the Bring and Buy Database with lists of used equipment. The cost is between £1 and £5 depending on your requirements. For an order form, or for further information, contact:

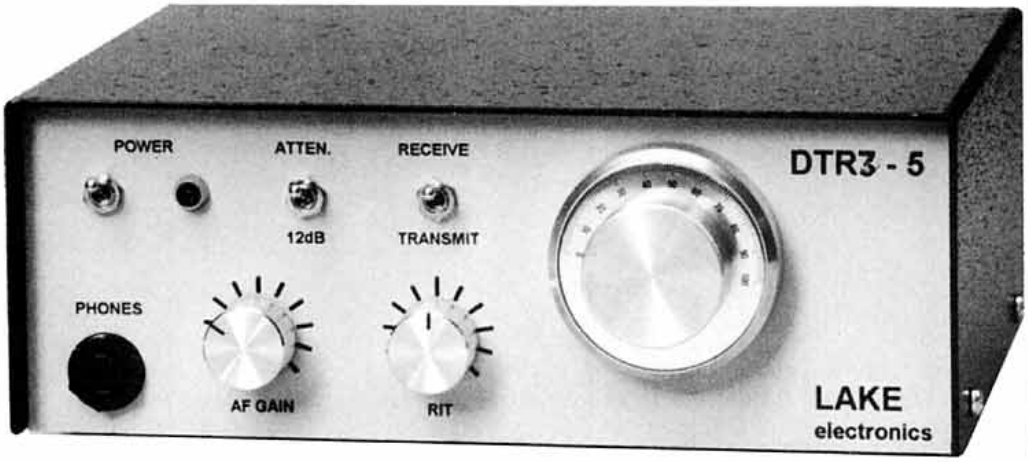
The Bring and Buy Database, 23 North End, Meldreth, Royston, Herts SG8 6NR, tel / fax: 01763 262443.

THE 1995 **International Short Wave League** ***Guide to English Language Short Wave Broadcasts to Europe (Summer Schedules)*** is now available. This A4 booklet provides details of the times, frequencies and programme type of all English-language broadcasts from around the world which are beamed to Europe. It costsjust £1.50.

ISWL, 10 Clyde Crescent, Wharton, Winsford, Cheshire CW7 3LA.

LAKE ELECTRONICS have recently introduced the **DTR3-5 QRP CW transceiver.** Covering 3.5 - 3.6MHz and rated at 5W output, the rig features the new Jackson tuning control, a very stable VFO and a 7-pole filter at the PA output. The DTR3-5 kit includes everything, down to the last nut, needed to make a professionally finished job, and costs £101.80. It is also available fully built and tested at £162.00. The popular DTR3 transceiver will continue in production. For further details send an SASE to:

Lake Electronics, 7 Middleton Close, Nuthall, Nottingham NG16 1BX, tel: 0115 9382509.



● **QSL, QUARTSLAB Marketing,** have recently introduced **crystal clock oscillators** in DIL14 (TTL or CMOS) or DIL8 (CMOS) formats in frequencies between 2.5 and 80MHz. For further details of these and the full range of quartz crystals contact **QuartSLab Marketing Ltd, P O Box 19, Erith, Kent DA8 1LH, tel: 01322 330830, fax: 01322 334904.**

● THE BRITISH Amateur Radio Teledata Group's **New Improved Multyterm** PACTOR, AMTOR, RTTY, SSTV, CW and FAX **terminal unit** has recently passed rigorous testing in compliance with the EN 50082 - 1:1993 EEC EMC standard. Further details can be obtained from **Ken Godwin, 11 St Lukes Way, Allhallows, Kent ME3 9PR, tel: 01634 271548.**

● A YEAR AGO, Ben Spencer Consultants launched a range of amateur radio kits [see also *Product News* in February 1995 *RadCom - Ed*]. These are now available under the brand name of **Alpha Electronics**. For a free kit catalogue, send an A5 SASE to **Alpha Electronics, Enterprise House, 33 New King Street, Bath BA1 2BL, tel / fax: 01225 482604.**

● THE **KANGA Products** Summer 1995 **catalogue** is now available. Write to **Kanga Products, Seaview House, Crete Road East, Folkestone, Kent CT18 7EG, tel / fax: 01303 891106.**

RADCOM NEWS FEATURE

Radio History at Bletchley Park

A chance to visit a secret wartime decoding station.

ON THE EVE OF WW2, a closely knit group of Intelligence Officers began searching the countryside for a secure, out of town base for the Government Code and Cypher School (GC&CS). Their search ended at Bletchley Park. Located 47 miles NW of London, at a junction of major road and rail connections to all parts of the country. Bletchley Park was to become the most important communications centre in the history of modern warfare.

By 1944, over 12,000 people were employed by GC&CS in Bletchley Park, including some of the most prominent mathematicians and intellectuals of the era. Amongst the fascinating work carried out at Bletchley was the decoding of the German Enigma traffic and the building of the World's first electronic computer - Colossus.

After the War, the Park retained a role with the intelligence services and was used by other organisations such as the Civil Aviation Authority and Post Office Telecommunications (later to become British Telecom). Three years ago, Bletchley Park was about to be sold off and it was likely that many of its historic buildings would be destroyed. Thanks to the work of the Bletchley Park Trust the site has been saved for the public and is now open regularly as a museum.

Radio Exhibits

AMONGST THE ITEMS on display in a number of buildings are wartime radios, radar equipment, a working replica 'Y' station (used for intercepting messages from the enemy), Diplomatic Wireless Service equipment, and the history of computing. Much of the radio equipment is on show thanks to the efforts of the Milton Keynes and District Amateur Radio Society (MK&DARS) and the Communications and Electronics Museum (Curator G3KPO).

Other displays feature military uniforms, firearms, vintage vehicles, a Churchill exhibition, crashed aircraft, a cryptology trail featuring some original cypher machines, model boats and railways and even cinema projectors.

A Rally as Well

ON SATURDAY and Sunday the 17th and 18th of June, the Society, in conjunction with RadioSport Ltd and the MK&DARS will be holding an amateur radio and computer rally at Bletchley Park.

This is a chance to have a really good day out, taking in both the radio rally and the Park's wartime exhibits. The entrance fee covers both the rally and the exhibition and there will be something for all members of the family to see. ♦

TURN TO PAGES 52/53 FOR BLETCHLEY RALLY DETAILS

The familiar 19-Set in a wartime setting.

A naval Enigma coding machine.

The working replica 'Y' station.

A small part of the display of historic radio equipment.

MEET THE 1995 L

Entering the "Summer Season", the Lynch Mob will be at all the major weekend fact, we've hardly a break between now and the end of October! For those of you (you don't know what you're missing), then see this issue for a listing of the rally

Icom IC-706
HF all band 50MHZ 144MHZ

Whilst I'm still getting over the IC-775DSP, Icom have made history once again - a small compact HF transceiver with 100 watts from Top Band to Ten, SIX metres with 100 watts, plus TWO metres, with 10 watts. Then throw in a general coverage receiver that covers 30khZ to 200mhz, (are you still with me on this?), alpha tagging of up to nine characters for each of its 101 memories, built in auto keyer, wide band FM, (for your local radio), Detachable front panel, proper FSK for RTTY, feather weight at only 2.5 kilos and only slightly larger than a 2M multimode.

MARTIN LYNCH IS THE ONLY RETAILER WHO CAN OFFER THE IC-706 ON A FIVE YEAR WARRANTY

SO WHY SHOULD I BUY FROM MARTIN LYNCH?

1. He's a great guy.
2. His staff haven't had a decent meal for over a month.
3. Neither has he.
4. The shop has run out of coffee.
5. He's just got a new member of staff and his salary is due soon.

And

- MARTIN LYNCH will GUARANTEE to pay you the HIGHEST TRADE IN VALUE for your clean working part exchange gear!
- MARTIN LYNCH will give you FREE OF CHARGE a 20M VALOR PRO-AM mobile HF antenna!
- MARTIN LYNCH will offer you a SPECIAL PURCHASE PLAN GUARANTEED to put a new IC-706 with the minimum of pain to your hard earned cash!
- MARTIN LYNCH has ordered the LARGEST QUANTITY - to ensure faster delivery!
- **To order the new ICOM IC-706, call the sales desk on 0181 566 1120!**

BULK PURCHASE ON FT-900AT

YAESU UK GIVE YOU FREE FILTERS WORTH £179.00 + LYNCHY GIVES YOU A FREE PRO-AM 5-BAND MOBILE ANTENNA WORTH £89.95 + another £190 OFF LIST!! TOTAL SAVING £458.00!!!

You have just THIRTY DAYS to make the most important decision of your life! Buy a brand new, boxed FT-900AT from MARTIN LYNCH and not only will you get nearly £270 worth of FREE GOODIES, but we've slashed another £190 OFF the RRP of £1549 . Offer ends 30th June 1995, or when we run out of stock, whichever is the sooner. Get dialling!!

FT-900AT with FREE filters + AB5 Antenna. £1359.00 (List £1816.00)

ATTENTION FT-290R MK2 OWNERS!

Three years ago, muTek and LYNCH bought you an improved version of the Yaesu FT-736R. By installing the "RDX" boards the signal to noise and sensitivity on both two and seventy were greatly improved.

1995 brings another great muTek design - a newly developed "optimised" preamplifier for the Yaesu FT-290R mk2. The SLNA290S consists of a low loss relay for TX/RX switching, a low noise amplifier based on the BF998, a variable attenuator such that the gain can be varied without effecting the noise factor or dynamic performance of the L.N.A., and a matched filter to reject out of band signals.

Supplied with fitting instructions for the FT-290Rmk2 is £39.95 p&p £3.00 or fitted in our workshops for £79.00, + £7.50 return carriage.

"Honey I Shrunk The Pre-amp"

Once again muTek set the trend in announcing the world's smallest MAST HEAD PRE-AMP. Measuring a mere 2"x1"x1", this minute device offers 12dB of gain, 1dB Nf and can handle up to 50W maximum through-power. Ideal for the FT-736R, using the power feed through the centre of the coax. Can be used with any other 2m transceiver using the BT50x.

SLSNA 145sp Mast Head 2m Pre-amp £59.00 p&p £3.00
BT500x Switching Interface £25.00

ICOM IC-775DSP - WITH FIVE YEARS WARRANTY!

First, a little history lesson... The new top of the range IC-775DSP is advanced today as the IC-701 was, fourteen years ago. Whilst the rest of the worlds Amateur Radio manufacturers were still producing sets with "VFO's", Icom steamed in with a world first - an HF transceiver with a REAL synthesizer. It was literally YEARS before the rest caught up. How long will it be with Icom's latest IC-775DSP - the worlds first HF Transceiver with proper Digital Signal Processing?

Icom's new baby really deserves six pages to describe the advance in design the new IC-775DSP has to offer. It has been designed from the ground up using serious high quality components and offers features and performance you'll find nowhere else.

The new IC-775DSP is so good, MARTIN LYNCH is arranging appointments to fully explain the operating features offered by the worlds most advanced HF Radio. Compare with the very best YAESU and KENWOOD can offer, with all three sitting side by side. To arrange a "test drive" call the LYNCH Sales Desk today. 0181 566 1120.

For those of you who can't visit the London Showroom, we would be delighted to send you details. Just call or write.

YAESU FT-8500

Yaesu's latest "REMOTE HEAD" Dual Bander offers features unique to the FT-8500.

1. Full remote operation via the FS-10 Smart Controller
2. View channel occupancy above & below your operating frequency with the in-built "Spectra Analyser".
3. Rear panel jack for data input, including 9600 Baud Packet
4. Latest "Omni-Glow" Display for exceptional brightness & clarity.
5. Permissible "Alpha-Tagging" against the massive 110 channel memory.
6. Can receive UHF+UHF or VHF+VHF or VHF+UHF, simultaneously.
7. Three selectable settings for power output. 5/10/50W (35W on 70)
8. Extendable receive capability including AM on Airband.
9. Personal Computer Control via an external PC for automated multiple functions with a single mouse click or keystroke.
10. One of the smallest Dual Banders available, 140 x 40 x160mm

Now available from stock on LOW COST FINANCE. Your part exchange is welcome!

YAESU FT-990 SPECIAL PURCHASE!

Counting up the HF transceivers sold since 1990, the Yaesu FT-990 has to be the best seller. It's well built, very reliable, simple to use and offers excellent value for money. This month MARTIN LYNCH offers the FT-990DC at a very much reduced price. First come first served.

FT-990DC list £1999.00.
ML PRICE: £1699.00.
Deposit £399, 12 payments of £119.00 per month.
Total amount payable £1827.00

BARGAIN HUNTER PRICES BEAT THE YEN PRICE INCREASES - PHONE TODAY

HF EQUIPMENT

ICOM		
IC707	LIST £895	ML PRICE
IC738	LIST £1649	ML PRICE
IC736	LIST £1969	ML PRICE
FT840	LIST £899	ML PRICE
YAESU		
FT900	LIST £1349	ML PRICE
FT900AT	LIST £1549	ML PRICE
FT900DC	LIST £1999	ML PRICE
FT990AC	LIST £2299	ML PRICE
FT1000	LIST £3699	ML PRICE
FRG100	LIST £559	ML PRICE
KENWOOD		
TS50S	LIST £999	ML PRICE
TS450S	LIST £1399	ML PRICE
TS450SAT	LIST £1549	ML PRICE
TS850S	LIST £1699	ML PRICE
TS850SAT	LIST £1849	ML PRICE
TS950SDX	LIST £3799	ML PRICE

PHONE TODAY

VHF/UHF MOBILE, BASE & HANDIE

ICOM		
IC281H	LIST £449	ML PRICE
IC2340H	LIST £689	ML PRICE
IC820H	LIST £1795	ML PRICE
ICZ1	LIST £529	ML PRICE
YAESU		
FT11R	LIST £299	ML PRICE
FT41R	LIST £339	ML PRICE
FT23R	LIST £269	ML PRICE
FT530R	LIST £499	ML PRICE
FT51R	LIST £499	ML PRICE
FT290R	LIST £539	ML PRICE
FT690R	LIST £539	ML PRICE
FT790R	LIST £639	ML PRICE
FT736R	LIST £1789	ML PRICE
FT5200	LIST £679	ML PRICE
FT5100	LIST £629	ML PRICE
FT2500M	LIST £369	ML PRICE

PHONE TODAY

KENWOOD		
TS790E	LIST £1849	ML PRICE
TM255E	LIST £899	ML PRICE
TM455E	LIST £999	ML PRICE
TM742E	LIST £829	ML PRICE
TM733E	LIST £739	ML PRICE
TM251E	LIST £389	ML PRICE
TM455E	LIST £429	ML PRICE
TH79E	LIST £449	ML PRICE
TH22E	LIST £239	ML PRICE
TH42E	LIST £269	ML PRICE

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70CM		
9 ELE FIXED	13.0db	£39.95
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23CM		
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RRP **£139.95**

YNCH MOB

rallies, including Bletchley Park on 16th June. In that can't get to the shop in London, dates. WE'LL BE THERE!

Rather than having a photograph of someone looking like a USED CAR SALESMAN, I thought you would like to see our latest Lynch Mob shot. In fact since this photograph was taken, another member of staff has joined the team. We're expanding thanks to you - it seems the better service you get from us, the busier we become. Funny that!

Left to right:
Chris G1FMH, Graeme G4XOF, Steve, Martin Lynch, Chris G8VDQ, Jenny Lynch, Richard, Brian G3THQ, Graham, plus too late for the photo & not shown - Steve G6URJ.

140 - 142 NORTHFIELD AVENUE, EALING, LONDON W13 9SB

WORKSHOP FACILITIES

One of the biggest advantages of moving to the new showroom eighteen months ago was the increase in workshop space. Graham Tingey heads the service team and together with Brian Greenaway our Customer Services supervisor, we guarantee to get your sick radio or accessory back quicker than anyone in the U.K. Our servicing rates are competitive too. Linked directly to the main distributors for spares and the only company able to offer a whole year of extra warranty once your set has been repaired, (provided it's less than eight years old), try MARTIN LYNCH next time you need a repair service. You'll be pleasantly surprised. Contact Brian, G3THQ on 0181 566 1120.

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R7 VERTICAL	£369.00
R5 VERTICAL	£279.00
A4S 4ELE BEAM	£428.00
A3S 3ELE BEAM	£349.00
A3WS 18/24 BEAM	£275.00
D3WS 10/18/24	£179.00

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TSB-3315 2/70 BASE 8.5/11.9db	£119.95
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TSB-3303 2/70 BASE 3.0/6.0db	£42.95
TSB-3301 2/70 BASE 6.5/9.0db	£74.95
TSB-3302 2/70 BASE 4.5/7.2db	£59.95
TSB-3302 2M BASE 6.5db	£37.95

MOBILE

TSM-1005 2M 7/8TH 5.2db MOBILE	£39.95
TSM-1320 2/70 2.1/3.8db MOBILE	£19.95
TSM-1326 2/70 2.1/5.0db MOBILE	£27.95
TSM-1332 2/70 4.5/7.2db MOBILE	£42.95
TSM-1607 2/70/23 2.8-8.8db MOBILE	£49.95

PRO-AM ANTENNAS

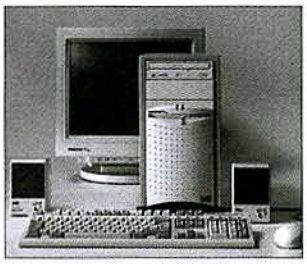
IF YOU WANT TO BE HEARD RUNNING MOBILE "HF", THEN CHOOSE THE FAMOUS "PRO-AM" RANGE FROM VALOR, USA.

PHF-160 Enormous 160M Centre Loaded Whip	£54.95
PHF-80 Almost as big 80m Centre Loaded Whip	£24.95
PHF-40 The muts nuts on 40m, at a mere	£22.95
PHF-20 The way to DX, (safely) on 20m	£19.95
PHF-15 You guessed it, the same but on 15m	£19.95
PHF-10 I'll give you one guess	£19.95
AB-5 5 bander 10-80 in one antenna. It works!	£89.95
BB-2 Massive Spring mount for L.F. Whips	£49.95
116-NP gutter mount with 3/8 thread	£6.95
142-ADP Body mount with 3/8 to SO239	£9.95

RADIO READY PCs

Specifications

Motherboard	VLB
Cache	256K
RAM	See each machine
HDD	See each machine
Controller	VL Bus
VGA card	SPEA VEGA PLUS
VGA Mem	1MB, VLB
FDD	3.5" 1.44MB
Keyboard	Yes - Cherry
Mouse	Yes - Logitech
Software	DOS V6.2, WFW V3.11
Monitor	14" SVGA .28 pixels Non-interlaced, Low Radiation with Power Management



All items are available on Low Cost Finance, call for details. Please note: The QUAD speed CD-Rom, 16 BIT sound card & speakers shown in the photograph are optional extras costing £295.

All machines are loaded with HAM software, including Log Program, Packet Controller, Word Processor, DOS V6.2, Windows for Work Groups V3.11, plus lots more.
***Pentium 90 and DX4/100 Machines are also available.**

Carriage extra at £20 per system, UK Mainland.

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PEACOCK DX2/66 BASIC PC
4Mb RAM, 420Mb Hard Disk.....**Price incl. VAT, £1099.00**

PEACOCK DX2/66 'PREMIUM' MULTIMEDIA QUAD PC
4Mb RAM, 540Mb Hard Disk, 2Mb VGA Mem,
Quad Speed CD-Rom, 16 Bit Sound Card, Speakers.....**Price incl. VAT, £1599.00**

PEACOCK PENTIUM 60 PC
8Mb RAM, 540 Mb Hard Disk.....**Price incl. VAT, £1499.00**

PEACOCK PENTIUM 60 'TAKE' MULTIMEDIA QUAD PC
8Mb RAM, 540Mb Hard Disk, Quad Speed CD-ROM,
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CONTACT STEVE JELLY - OUR DATA COMMS EXPERT FOR FULL INFORMATION

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IF YOU DON'T WANT TO TAKE ADVANTAGE OF MY FREE FINANCE AND WOULD RATHER PAY CASH, CHEQUE, CREDIT CARD OR TRADE-IN, THEN CALL 0181 - 566 1120 TODAY FOR EXPERT ADVICE. I promise you the best overall deal in the U.K. Get ringing, or you'll miss the bargains!
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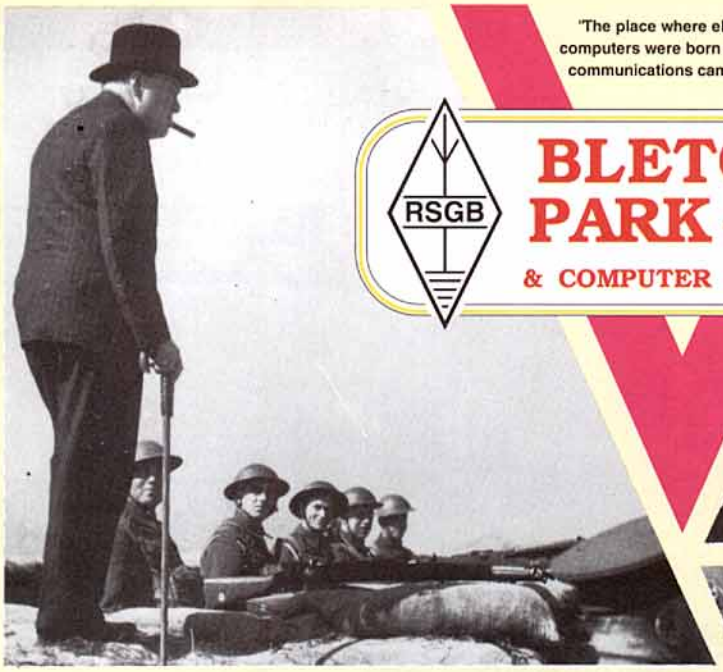
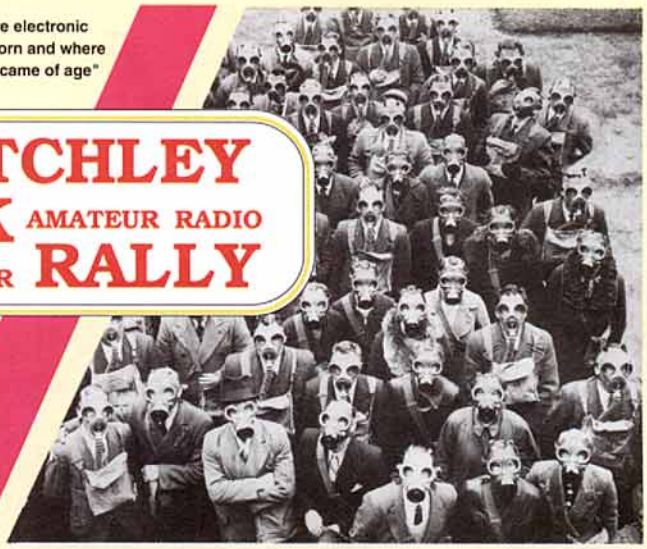
Yes I Would Rather Buy From Martin Lynch!

If it hadn't been for Bletchley Park, things could have been very different today

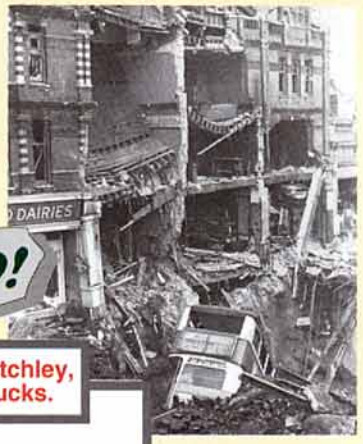
"The place where electronic computers were born and where communications came of age"





RSGB

BLETCHLEY PARK AMATEUR RADIO & COMPUTER RALLY



Trade Show
Special Interest Groups
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On-demand Morse Tests
2m & 70cm talk-in by GB2BP
Bring & Buy sale

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Displays of...
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Crashed Aircraft
Cypher Machines
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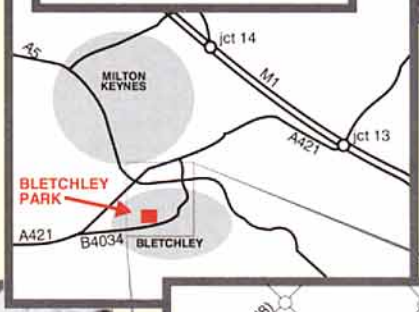
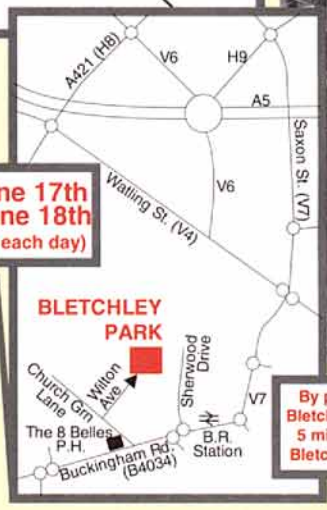
Bletchley Park, Bletchley, Milton Keynes, Bucks.





Admission price to The Grounds, Museum and House (which includes FREE admission to The Rally):
Adults, £3.00
Under 12's / Pensioners, £2.00

Saturday June 17th & Sunday June 18th
(10.30am-5.00pm each day)

Lectures:

Saturday, 2.00-4.00pm	**RSGB Datacomms Committee Packet Radio Open Forum.**
Sunday, 12.00-2.00pm	**Getting Started on ATV, by Dave McQue, G4NJU.**
Sunday 2.00-4.00pm	**G3NCL's "Key Clinic". Bring your Morse key for a tune-up!**

By public transport, Bletchley Park is about 5 minutes walk from Bletchley B.R. station.

With so much to see and do...

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Organised in co-operation with the Radio Society of Great Britain and Milton Keynes & District Amateur Radio Club

For details contact RadioSport Ltd., 126 Mount Pleasant Lane, Bricket Wood, Herts, AL2 3XD. Tel 01923-893929. Fax 01923-678770.

Have a Great Day Out at a New Event

BLETCHLEY PARK AMATEUR RADIO & COMPUTER RALLY

Combine a trip to the Radio and Computer Rally with a visit to the Bletchley Park Museum

There's something for all the family at Bletchley (see also page 49), the home of the Ultra decoding project and of the Colossus valve-operated computer. See how this operations centre, top secret until recent years, played a vital part in the War effort.

RSGB Information Stand and Bookstall

THE SOCIETY has its own room at the rally, where staff and volunteers will be on hand to answer questions, give advice, take subscriptions and sell books.

See you there Saturday 17 June and Sunday 18 June, 10.30am to 5.00pm daily.

Lecture Details

Saturday at 2pm - 'Packet Radio Open Forum'

THE RSGB DATACOMMS Committee will give a brief explanation of what they do, then they will try to answer questions anyone on any aspect of digital communications, including site clearances. The Committee Chairman, Tom Lilley, G1YAA, will give a brief reaction to the DSI2 Report (see this month's *RadCom*, page 30) which relates to the European proposals for possible loss of parts of the 70cm band currently used for packet links.

Sunday at 12 noon - 'Getting Started on ATV' by Dave McQue, G4NJU

COVERING fast-scan activity on the 1.3 and 10GHz bands, Dave's talk will tell you what equipment you need to get started and what to look for at rallies, etc. The talk will include demonstrations on both bands.

Sunday at 2pm - 'Key Clinic' by Ron and Shirley Ray, G3NCL and G4HES

STARTING WITH A brief history of Morse, the talk will cover the uses of the code. Shirley, G4HES, will give an introduction to learning Morse, followed by learning and practice techniques. You are welcome to bring your Morse keys (pump action, semi-automatic, iambic etc) for setting up.

This Month's Book Choice

Reviewed by Stephen Telenius-Lowe, G4JVG

QSL ROUTES 1995 - WORLD ANNUAL OF QSL MANAGERS

342 pages, A5, softcovers.
Compiled by Fritz-Ullrich Schneider, DL9WVM; Norbert Wenzel, DL5KZA; Lars E Bohm, SM5CAK; and Östen B Magnusson, SM5DQC.
Price DM 20, $15 or 20 IRCs from Theuberger Verlag GmbH, P O Box 73, 10122 Berlin, Germany (including P & P).
ISBN 3 - 910159 - 95 - 8

THE QUEST TO receive that rare QSL from a country that you worked just once, maybe fifteen years ago, in order to complete your DXCC has led to the production of a number of helpful publications. *QSL Routes* is one of the most comprehensive. In its 342 pages it lists more than 75,000 QSL managers and addresses in two sections. Part 1, the 'List of QSL Managers', is precisely that: an alphabetical listing of tens of thousands of callsigns of DXpeditions or resident DX stations who employ a QSL manager, along with the callsign of the manager. Part 2, 'QSL Addresses', is like a condensed international callbook, concentrating on QSL managers' addresses.

This book will only be of any great use to you if you really enjoy collecting QSL cards or if you are a keen DXer. If you are content to work a few stations, send out QSLs via the bureau and you are not too worried whether you receive a reply or not, this book is not for you. Rather, it is intended for those amateurs (and there is a growing number of them) for whom confirming that rare country - or IOTA island - is *important*.

Say you worked ZK3AW on Tokelau several years ago, but did not receive a QSL and your log does not record who the QSL manager was. Look up ZK3AW in part 1 of *QSL Routes* and you will be informed that the QSL manager is ZL1AMO. Sure enough, his address appears in part 2 of the book. No system is perfect, however, and one problem with this book is that it presupposes that you can find out addresses not given in the - much smaller - part 2 of the book. For example the QSL manager of OA4DO is listed as W7OAW, but W7OAW's address does not appear in the book. This means you also have to invest in the *International Callbook* in order to look up these addresses. However, there is a relatively small number of stations who tend to act as QSL managers for a large number of stations, and the addresses of most, if not all, of the most active QSL managers are given in *QSL Routes*.

There is also a lot more related information in there. For example, one-off special event callsigns - 'GV3RAF via G8FC'; former reciprocal callsigns - 'GW5AUU (=NOW=>) SM6DHU'; *non* QSL managers (presumably correcting information erroneously published elsewhere) 'GW8GT (*NOT*) GW4BLE'; and contest DXpeditions when the same callsign has been issued to different groups in different years, eg 'HC8A (WWDXCW86) via KQ1F', 'HC8A (WWDXSSB92) via N6KT', 'HC8A (WPXSSB94) via WV7Y'.

In a volume of this magnitude there are bound to be mistakes. While working in Papua New Guinea between 1991 and 1994 I operated from a number of Pacific countries and gave P29AA as my QSL information, since this call had been in the *International Callbook* for many years. However, in *QSL Routes* a QSL Manager in the Netherlands is given for P29AA which, as far as I am aware, is incorrect. I wonder how many QSLs intended for me have been misrouted to the Netherlands? This only goes to show that even with such a book by the side of the rig, you are never 100% certain of getting that needed QSL! What *is* certain, however, is that you are far more likely to get that wanted card by using this book than if you just used the Bureau.

The price of the book includes a copy of *QSL News 1996* magazine. The compilers say that the 1996 edition of *QSL Routes* will include at least 10,000 updates and will be available in January next year. ♦

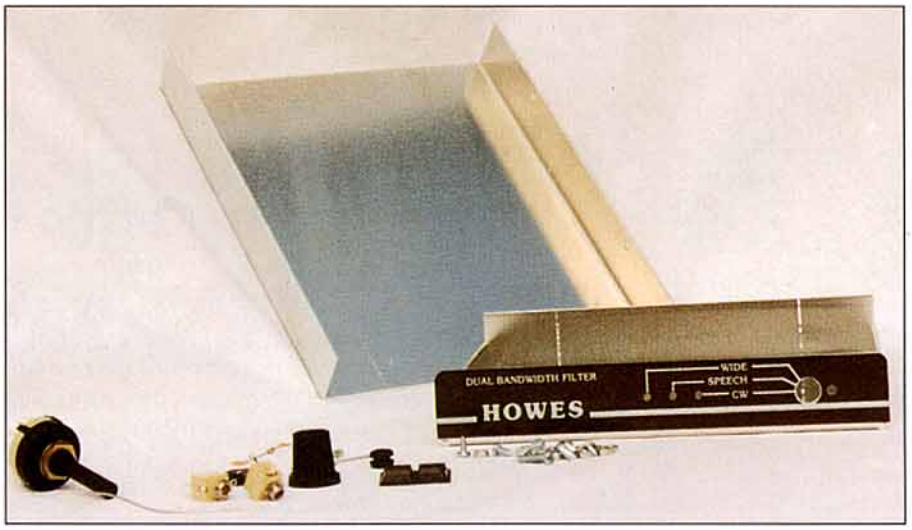
CONTINUED FROM P46

PERFORMANCE

ALTHOUGH FIGURES are quoted in the instructions, the performance was evaluated first without reference to them. The WIDE position was straight-through and had no effect on the received audio. The SPEECH position had a pronounced effect similar to using a narrower IF filter. Top frequencies including hiss and noise were reduced. Tuning away from a carrier in SSB to give a heterodyne produced a peak just below 1kHz, a rapid fall-off if not a trough at around 3.4kHz and then a gradual fall-off at low level. In CW a definite peak at around 900Hz was complemented by rapid roll-off below 700Hz and above 1.1kHz. The Howes figures quote -6dB points on CW as 300Hz centred on 850Hz and the SSB roll-off as 50dB down at 3.3kHz and over 60dB down at 4.3kHz. These figures were found to be realistic. The beneficial effect when the filter was used with a Sony ICF2001D and the Howes direct conversion DXR20 was more pronounced due to the wider bandwidth of those receivers.

CONCLUSIONS

THIS FILTER IS one of the cheapest add-on audio filters available. There is no variable notch filter, but this is reflected in the cost. A bandwidth filter is practically essential in today's crowded bands and, perhaps surprisingly, is lacking on some even quite sophisticated receivers and transceivers. Although the 300Hz section of the filter is too narrow for general broadcast listening, both sections of this filter will also be of use to the keen broadcast and medium-wave DXer. The four hours that this project took to complete, added to the minimal need for previous constructional experience and the low cost, puts this product within the reach of many SWLs or amateurs who have a receiver that is in need of additional filtering.



The HA50R audio filter hardware pack.

The Howes ASL5 dual bandwidth audio filter costs £15.90 in kit form or £24.90 as an assembled PCB module. The HA50R chassis and fittings cost £13.90. The kit and hardware are available together for £28.90 plus £4.00 post and packing. All Howes kits are available from C M Howes Communications, Eydon, Daventry, Northants NN11 3PT, tel: 01327 260178.

REFERENCES

[1] 'The Howes DXR20 Receiver Kit' reviewed by Chris McWhinnie, G0MQW, *Radio Communication*, May 1995. ♦

RADCOM EQUIPMENT REVIEW

Derek Stillwell Hand-Made Morse Key

Reviewed by Rev George Dobbs, G3RJV*

AS ANY PIPE smoker who happens to be a radio amateur will tell you, buying a Morse key is like buying a pipe. The more expensive ones are often the better ones, but even then there is no guarantee that it will be a good 'un. The only way is to use it and find out. I say this as an accomplished pipe smoker and a less accomplished Morse operator.

Great Britain has a good reputation for producing Morse keys, and recently a new name has appeared in our list of Morse key makers: Derek Stillwell, Instrument Maker of Shrewsbury.

DESCRIPTION

ALL PARTS OF the Derek Stillwell straight key are individually made, and the keys are hand-finished and assembled by Mr Stillwell himself in limited quantities. Being hand-produced in small numbers they could well become collectors' items. Each key is engraved with the maker's name, a serial number and, if desired, the owner's callsign.

The key is mounted on a heavy, polished, marble base with a non-slip ribbed rubber mat. The arm and bearing block are made of solid brass with fully adjustable ball and cone bearings. The knob is hand turned hard wood in a choice of three different woods. The large contacts are made from silver alloy. The spring tension is adjustable and lockable, as is the contact gap.

*St Aidan's Vicarage, 498 Manchester Rd, Rochdale, Lancs OL11 3HE.

IN USE

SOME TIME AGO, Derek Stillwell sent me an example of the key to try for myself. It certainly is a handsome thing! Before I used it, I could see that it had great potential as a presentation Morse key. It would make an excellent award or prize, or even a generous gift to a radio amateur. The finish is very good indeed. It would enhance anyone's operating desk or even, heaven forbid, a mantelpiece. But how does it handle?

The only way to answer this was to expose the world to my straight key CW sending. My preference for straight key usage is to set the gap small and the spring tension high: I am a 'thumper'. I enjoyed several sessions of straight key CW with the Stillwell key, finding it a pleasure to use. The balance did feel good, although for my use I had to set the spring tension at absolute maximum. With some Morse keys, I have had the feeling that I was fighting them, but this key was very smooth and natural to use.

My testing of the key coincided with several fellow QRP operators visiting me, and a few of them also had a turn with the key. These were operators the tensions of whose key springs I am unworthy to stoop down and adjust! Thankfully they all confirmed my view that it was a good key to use.

CONCLUSION

THE STILLWELL is a worthy Morse key to add to the annals of British key production. It is very well made and looks good and I have no complaints at all about the way it handles. Such quality and craftsmanship does not come cheap, however: the Stillwell key costs £75.50 plus £4.95 for postage, packing and insurance. If you wish to have your own callsign engraved on the key, it will cost £4.50 extra. Many real Morse enthusiasts will feel that this represents good value for money considering the sheer workmanship involved, although if you just dabble on CW this isn't really the key for you and much cheaper models are available elsewhere.

The Stillwell key is available from: Derek Stillwell, Instrument Maker, 27 Lesley Owen Way, Shrewsbury SY1 4RP. Full information and a colour photograph can be obtained by sending a 4 x 8.5in SASE (or 2 IRCs if overseas).

SPECIFICATION

- Base: Polished black Portuguese marble, 178 x 76 x 19mm with non-slip ribbed rubber mat.
- Arm: Solid brass 12.5mm square, 178mm long.
- Bearing: Block solid brass 25 x 25 x 25mm.
- Contacts: Large diameter silver alloy.
- Knob: Hand turned and polished hard wood.
- Wood choice: Box, zebrano or padauk.
- Weight: 1.19kg (2lb 10oz).
- All keys individually made, hand finished and assembled by Derek Stillwell.
- Each key engraved with maker's name and serial number.
- Owner's callsign engraved on request (additional cost).

WHAT'S A 4CX250R?

CAN I REPLACE the 4CX250Bs in my linear amplifier with 4CX250Rs? What does 'R' stand for? Will I need to make any other changes?

THE 4CX250R IS a 'ruggedized' version of the 4CX250B, with a better cathode and more gain. It is pin and heater compatible with the 4CX250B. The Eimac tube catalogue says:

"The 4CX250R/7580W will replace the 4CX250B in equipment where the range of bias adjustment will tolerate this higher perveance tube and where the tuning range can compensate for the small differences in input and output capacitances."

'Perveance' is a term favoured by Eimac but hardly anyone else; other people call it transconductance, and it's the sensitivity of anode current to changes in grid voltage. In practice, it means that you may need a bit more negative G1 bias to set the required standing current (100mA per tube) in the 4CX250R, but this is usually well within the range of any adjustable bias supply.

The differences in input and output capacitances between the 4CX250B and 4CX250R are fairly minor as shown in **Table 1**.

In other words, unless your amplifier is right at the edge of its tuning and bias ranges, the 250R is indeed a drop-in replacement for the 4CX250B. The Eimac catalogue continues: "The 4CX250R/7580W will deliver more output power in most linear amplifiers which presently employ the 4CX250B and it will operate with maximum rated anode and screen voltage applied in environments where shock and/or vibration is experienced." In The VHF/UHF DX Book (see RSGB Book List on page 90), GW4FRX gives the following comparison, based on maximum linear output (per tube) in two-tone tests, see **Table 2**.

Screen grid voltage should be 350V for the 4CX250s - maybe a touch higher for the 250R - and extremely well stabilised for optimum linearity. The bad news is that 250Rs cost more, but are well worth the extra - which may not be a lot for new tubes.

By the way, take note of those maximum linear output figures in Table 2. They emphasise the point that you cannot get 400W PEP SSB output from a single 4CX250B or R without driving it beyond the limits of linear operation. The same applies to the 4CX350; you still need a two-tube amplifier to transmit a clean signal at the legal limit, especially when you take feedline losses into account. Some manufacturers claim that you can get 400W PEP from their single-tube amplifiers. Well, maybe you can do it on CW, if you're prepared to push the tube a little, but it won't be a clean signal on SSB. A 4CX350A will nearly do it if all the operating conditions are exactly right, but unfortunately a low cost amplifier that claims to produce 400W PEP from a single tube is also the kind that may not be paying much attention to the dynamic regulation of anode and bias voltages that are essential for good linearity. Inflated performance claims and poor design tend to go together.

Another problem is that having bought the amplifier in good faith and perhaps invested a lot of money in it, some people then feel entitled to push for the claimed output power, even though the amplifier can't do it. When politely told that their signal is far wider than it should be, they tend to believe it's not their fault because they are only doing what the manufacturer says. Sorry folks, that won't wash! Overblown claims in the manufacturer's handbook are *not* a licence to transmit a bad-quality signal.

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	4CX250B	4CX250R
Input	15.7pF	17.5pF
Output	4.5pF	4.8pF

Table 1: Differences in input and output capacitances of 4CX250B and 4CX250R.

4CX250B	285W PEP at 2000V
4CX250R	310W PEP at 2000V
4CX350A	290W PEP at 2000V
	370W PEP at 2500V

Table 2: Linear power outputs of 4CX series of PA valves compared (GW4FRX).

BEST BOOKS

THE ART OF ELECTRONICS

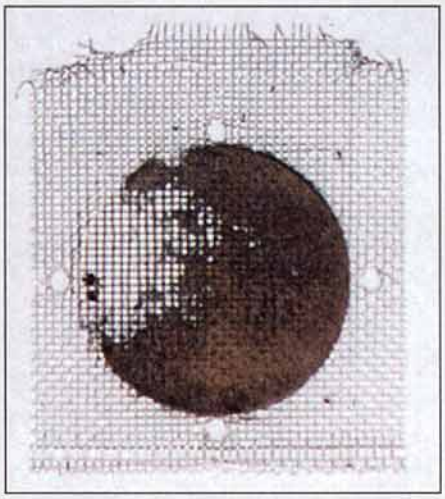
In amateur radio we tend to pick up scraps of knowledge here and there, unaware of much larger gaps until we fall into them.

FITTING THE FACTS

MY 4CX250 PA HAS started to suffer from tuning drift, and the screen current and anode currents are running away when I hold the key down. Has something gone wrong with the tubes?

THIS HAPPENED TO ME a few weeks ago. The amplifier wouldn't stay on tune, and even when I continuously 'rode' the tuning control to keep the RF output peaked, the anode and screen currents tended to increase uncontrollably until the screen-current safety cutout stopped their runaway rise. As you can imagine, the temperature of the outlet air and the whole amplifier was much higher than normal. The amplifier was becoming unusable. It seemed as if both tubes were going 'bad' together, and I even got as far as looking up the prices for new 4CX250Bs. Whatever could be wrong?

While verifying that none of the heater or bias voltages had changed significantly, I was starting to strip the amplifier down. And tucked away in a dark corner of the anode compartment was the answer. There was nothing wrong with the tubes to make them go into thermal runaway. It was the other way around; all the problems were the result of the tubes getting hot. The photograph below shows the state of the metal screening at the outlet of the blower. All that dust was on the blower side of the mesh, and you couldn't see it without stripping the amplifier down. Once the build-up of dust particles had begun, it must have accelerated quite rapidly over the space of a few months until the filter was almost 'blinded' and the amplifier was receiving very little cooling air. When the dust was all cleaned off and the amplifier reassembled, all the problems disappeared - including the tremors in the area of the wallet.



The cause of all the PA trouble - dust blocking the air inlet from the blower.

I had made the common fault-finding mistakes of confusing cause with effect. When you notice symptoms A and B together, it's all too easy to jump to the 'obvious' conclusion that A is causing B. But often it could be B causing A. Or both A and B could be caused by something else that you haven't found yet. If you make up your mind too soon, you may never find the real answer because you've stopped looking for it. Whenever you go fault-finding, try to remember that somewhere there is always a logical answer. It pays - and often saves you real money - to keep an open mind.

Sometimes we only know half the subject - but we're not quite sure which half. The value of good textbooks is that they approach the subject in a more systematic way than we did, and join together our isolated areas of knowledge.

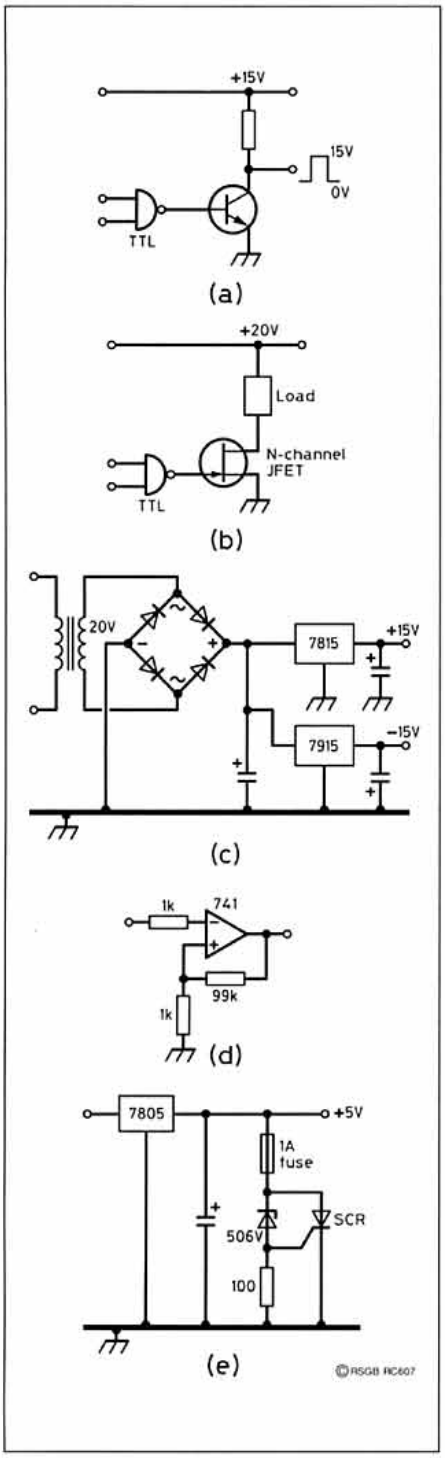


Fig 1: What's wrong with these five 'bad circuits' from *The Art of Electronics*? (a) and (b) TTL to high voltage interfaces, (c) plus and minus 15V DC supply, (d) x100 DC amplifier, (e) crowbar overvoltage protection. Answers next month.

The Art of Electronics [1] by Horowitz and Hill is the modern electronics textbook. Although a university-level text, it keeps its feet firmly on the ground - not surprisingly, because Paul Horowitz was a radio amateur long before he became a Harvard professor. The book covers every aspect of general and scientific electronics in an interesting, practical and largely non-mathematical way. RF circuits are covered, though not in great detail because RF is only one part of the broad sweep of this book. Unlike many textbooks you can skip over the maths and still make sense of the lucid explanations. For example, there are comparative datasheets on op-amps and logic families, and frank explanations why certain devices have become industry-standards, sometimes in spite of their deficiencies. Particularly valuable are the circuit ideas at the end of each chapter - not just recommended circuits but also many examples of bad circuits culled from the authors' teaching experience. Take a look at **Fig 1**. If you can't see what is wrong with each of these circuits, you need to read *The Art of Electronics*. If you can spot the mistakes, read the book anyway because those were the easiest ones! Answers next month.

THE CIRCUIT DESIGNER'S COMPANION

The Circuit Designer's Companion [2] is not an alternative to Horowitz & Hill, but is exactly what its title says; a companion volume. Tim Williams approaches the subject from an industrial perspective with an emphasis on designing circuits that will be reliable when mass-produced and used in different and unpredictable environments. That's why the first long chapter is on 'Grounding and Wiring' and there's much attention on EMC aspects throughout the book. How is this relevant to amateur radio? We only build one-offs, don't we? Yes, we do - but we need our projects to work first time because we haven't got a lab-full of testgear to sort out the problems. Even a basic understanding of the factors that make a reliable circuit will add immensely to the rewards of home construction.

More seriously, if you write-up your project for others to copy, they are entitled to expect that your circuit will work. Since you're taking on a responsibility for other people's time, money and enjoyment, you need to think about making your design reliable and reproducible. *The Circuit Designer's Companion* will help put you in the right frame of mind.

TEST LOAD FOR 20A PSU

WHERE CAN I FIND a 0.7Ω, 276W resistor to use as a 'dummy load' to test my new 13.8V 20A power supply?

THE USUAL ANSWER is to use car headlight bulbs, but there are two problems with this. First, it takes several bulbs in parallel to test a supply to its 20A limit. Second, the cold resistance of the filaments is very low, so you're actually testing the power supply's current-surge performance. In fact, a well-protected power supply may shut down as soon as you switch on. A better solution has come from Lloyd Butler, VK5BR, in the Australian journal *Amateur Radio*. He noticed that 16 SWG galvanized iron wire from the hardware store had a resistance of about 1Ω for a 17.5m length, so he simply wound that length of wire on a large wooden frame (**Fig 2**). By starting at 1Ω, the power supply can be tested at 13.8A, and gradually pushed up to 20A by tapping further down the spiral. In practice you'd have to buy a coil of suitable-looking wire and test it yourself. Use heavy copper-wire leads, and screw-on connectors to join them to the load.

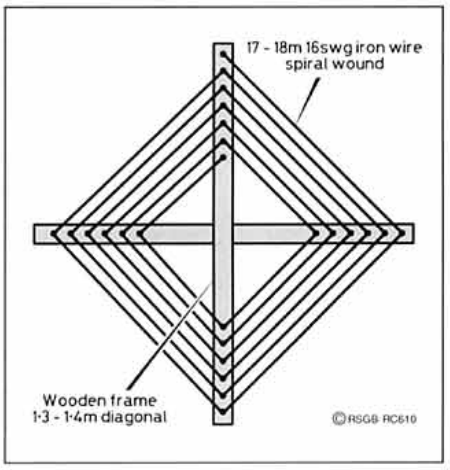


Fig 2: VK5BR's dummy load for a 13.8V 20A PSU. Tap down the wire to draw the desired current.

At full power of 276W, the wire is just mildly warm, but you obviously need to take care not to allow either the wire or anything in contact with it to overheat. Owing to the temperature coefficient of the wire, its resistance may rise by about 12% so the tapping point may have to be moved if you intend a long-term test at the full 20A. Interestingly, VK5BR found an instability in his home-made power supply which wouldn't have been noticed without carrying out the test at full load.

REFERENCES

[1] *The Art of Electronics* by Paul Horowitz and Winfield Hill, Cambridge University Press, Second Edition, 1989. hardback only: ISBN 0-521-37095-7.

[2] *The Circuit Designer's Companion* by Tim Williams, Butterworth-Heinemann, 1993. Paperback: ISBN 0-7506-1756-X. ♦

IF YOU HAVE NEW QUESTIONS, or any comments to add to this month's column, I'd be very pleased to hear from you by mail, packet or E-mail (see head of column). But please remember that I can **only** answer questions through this column, so they need to be on topics of **general** interest.

RADCOM TECHNICAL FEATURE

Phased Vertical LF Band Antennas

The concluding part by Bob Whelan, G3PJT*

THE TWO TYPES of phasing network are the Lewallen L section and the Collins hybrid coupler. Both of these can be home-constructed quite easily (the method of connection is shown in **Table 4**) but hybrids are also available commercially [Note 6].

LEWALLEN L SECTION

This a simple variable L section (**Fig 8**). The component values depend on the impedance at the end of the feedlines. Lewallen provides values for L and C for various values of loss resistance [1]. These are tabulated in **Table 5** for 7.050MHz and earth loss of 10Ω.

Different values of earth loss necessitate different values of L and C, for this reason variable components are preferable. Lewallen calculated that a change in earth loss from 10 to 30W increases C by about 30% and reduces L by the same amount. This gives some idea of the extremes of adjustment range that might be needed. These are not large ranges for readily available components.

As the RF voltages and currents in the phasing network are low (300VAC and <5A) it can be constructed from readily available components. Inductors can be wound on iron powder toroids (T-120-2 or similar). I wound a winding with bare wire (approximately 1mm) with about 20 spaced turns and tapped it as necessary. Fixed capacitors can be air spaced variables or good quality mica or ceramic. Values can be measured by use of a bridge or by measuring the value of a capacitor needed to resonate the inductor at a known frequency. Both the inductor and the capacitors should be variable so that they can be set close to the calculated values prior to testing.

HYBRID COUPLER

The circuit for a 90° hybrid coupler is shown in **Fig 9**. The values are given by:

$$L(\mu H) = \frac{Z_0}{2 \times \pi \times F_0}$$

and

$$C(pF) = \frac{10^6}{2 \times \pi \times F_0 \times Z_0}$$

Where F_0 is the centre frequency in MHz and Z_0 is the characteristic impedance in Ω. As the impedance's at the end of the feedlines have reactive components it is difficult to ascribe a value to Z_0. It is normal to use the characteristic impedance of the feedlines as a starting point.

By way of an example, for Z_0=50Ω:

L = 1.2μH, C = 450pF

Using the data for say a T200-2 iron powder toroid this inductance equates to about 9 turns. The two windings are then wound together onto the core and the inductance measured and adjusted to give the calculated value. The capacity between the windings is measured and subtracted from the calculated capacity above. The result is the capacitance needed for C1 and C2 can be made up from fixed capacitors to suit.

Assemble the hybrid and terminate ports 2, 3 and 4 with 50Ω resistors. Apply RD at 7.050MHz from a 50Ω source to port 1. You should measure equal RF voltages on ports 2 and 4, and no RF on port 3. The voltage on ports 2 and 4 should be half that applied to port 1. If you have a fast 'scope you should see a 90° phase shift between port 2 and 4. The hybrid can be trimmed with small changes to C1 or C2 or by squeezing or spacing the windings on the toroid core.

The networks in the circuits shown are designed to produce the correct current and phase relationships between the elements. They are *not* for matching the array to the transmitter. Depending on the values of earth loss resistance you may find that the SWR on the feedline to the transmitter is unacceptably high. In which case a simple fixed tuned L or π section will need to be used at the array end of the feedline to reduce the SWR to a low figure. This won't make much difference to the efficiency but it will help you spot faults many of which cause a change of SWR on the feedline. For my arrays the SWR has been low.

INITIAL TESTING

AFTER CONNECTION OF the verticals to the feedlines and switch box there are a set of tests which can be made to check that the array system is at least functioning.

Measure the SWR on the main feedlines and check that it is approximately the same for all directions.

If it is *not* then suspect:

- One of the elements is not resonant correctly.
- One of the earths is not connected.
- One of the feedlines is O/C or S/C or otherwise damaged.
- There is a fault in the switch box.

The only way to find these faults is by systematically back tracking through the measurements you made as the various components were assembled and tested.

Human nature being what it is you will start by listening to a few signals. If the system is basically working you should be able to hear about 10dB F/B on signals in the main lobe as you reverse the beam direction. You may not notice much difference at all off the side. You may also observe that some near by signals show little change. This seems to be normal. If you are using a hybrid coupler the array should work with 15dB front to back ratio.

TUNING UP A 2-ELEMENT ARRAY

The procedure described here is a combination of measurement and common sense. it assumes that:

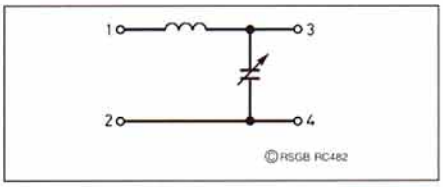


Fig 8: Lewallen simple variable L section. The component values depend on the impedance at the end of the feedlines.

	2 element and 4-square (see Fig 4 and Fig 5)
L-section (Fig 8)	1 to A, 3 to B, 2 and 3 to earth, Feed to 1
Hybrid coupler (Fig 9)	2 to A, 4 to B, Feed to 1

Table 4: Phase shift network connections.

2-Element	Feedline Z	L μH	C pF
2-Element	50	0.94	361
2-Element	75	2.11	161
2-Element	95	3.34	102
4-Square	50	0.53	1282
4-Square	75	1.17	564
4-Square	95	1.88	360

Table 5: Phasing network component values.

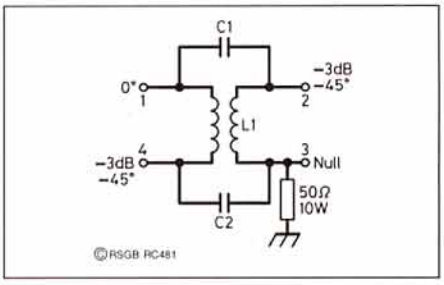


Fig 9: Circuit for a 90° hybrid coupler. The component values depend on the impedance at the end of the feedlines.

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The outstanding feature of the 4-Square its low visual impact thereby overcoming planning problems.

- You do not have access to RF test equipment.
- That even if you are building a 3 or 4 element array you will first build and understand how a 2-element works,
- You are using the Lewallen phase system (if you are using a hybrid coupler then the phase shift is preset but is also certainly not optimum).

Starting with a 2-element array fix up a vertically polarised test signal as far away as you can manage, say 4-5 wavelengths. Position the test antenna so that it is aligned with a null in the expected pattern, for a simple λ/4 spaced array this will be in line with the axis of the array.

Measure the values of the phasing circuit and set them to the expected values for your ground system.

Listen to the test signal on a receiver and switch the array so that it beams away from the test signal antenna. Adjust the phasing circuit L and C for the best null. I found that I was quite close, within 20%.

Re-measure the phasing L and C values. You can now back calculate the actual RF earth loss for your set up and hence calculate the phasing values needed for any array using similar grounds and elements.

If during this tuning procedure you suspect any poor or intermittent connections do spend time now to locate and eliminate them. It is next to impossible to tune up any array which has poor connections.

TUNING UP THE 4-SQUARE ARRAY

The radiation patterns of the 4-Square shows that the nulls in the pattern occur at 135° and 225°to the main lobe centred on 0°. The nulls are roughly 'in line' with a side of the square. Note that the nulls are not 'off the back' ie 180°. The null is the same alignment as the 2-element array and therefore the same test set up and procedure can be used.

There are two null positions 90° apart. The setting of the phasing network will be slightly different. If possible set the deepest nulls on Eastern Europe. Lewallen noted that such a procedure gave ambiguous results, this was not my experience except for the slight difference between the two null positions.

If you now listen to some on the air signals you should get nulls as deep as 20dB.

DIRECT ELEMENT CURRENT & PHASE MEASUREMENT

EARLIER I EXPLAINED that it is the current amplitude and phase relationships which determine the array performance. The measurement and tune up procedures of the previous section are approximate methods. It would be better to make direct measurements of current amplitude and phase. Then the array performance should be close to that expected through modelling and theory.

Whilst the measurement of current amplitude is easy using an RF current probe, rectifier and Hi Z voltmeter, the measurement of phase is difficult. Using a phase detector provides a way of setting up phase shift networks and checking the hybrid coupler used in the Collins approach. Unfortunately few amateurs have access to an RF Phasemeter or Vector Voltmeter.

For the Lewallen and Collins methods the voltages at the feed ends of the λ/4 feedlines are in phase with the current into the elements. Therefore all that is necessary is to measure voltages at the switch box with a phase detector and RF voltmeter. An oscilloscope can also be sued for phase measurements but again the estimation of the phase angle from the pattern is at best an approximate procedure (use alternative sweep).

CURRENT PROBE

Although the above approach works I have felt more confident measuring the element currents directly using a simple current transformer. About 10 turns on an ferrite toroid of about 15mm diameter gives enough pick up. A simple diode detector is connected across the winding. The lead carrying the RF current to be measured is passed once through the hole in the toroid. [A current probe is described on page 43 - *Ed*].

MEASUREMENT OF PHASE

THE SIMPLEST PRACTICAL approach to measuring phase relies on the well known product detector and is shown in **Fig 10**.

For arrays with 90°, ie zero [Note 7], and other phase shifts are difficult to estimate as the measurements are dependant on amplitude. The simplest way of realising this circuit is to use a double balanced mixer such as the SBL1.

The attenuators on the input ports provide the correct terminations. The circuit has a very wide bandwidth.

With voltages of approximately 0.3V RMS at V1 and V2, the output voltage, Vout will be around 0.2VDC at zero phase shift. I use a 500-0-500mA centre zero meter (Ri=500Ω) and this reads about 400ma for θ=0°.

If V1 and V2 are non zero then Vout = 0 for shifts of +/-90°. The output can be used to determine the sense of the phase difference, since if Vout is +ve then q lies between +/-90°. If Vout is -ve then θ is greater than +/-90° but less than +/-270°.

To make measurements a pair of current probes are required of the same sensitivity. A probe is threaded onto each of the elements it is wished to compare. Each probe is connected with coaxial cable to the detector input, V1 or V2. The two cables must be the same electrical length.

To compare amplitudes it is only necessary to use a high impedance voltmeter to measure the voltage between O1 or O2 of Fig 10 and ground. O1 representing the current in the element connected to V1 and O2 representing the element connected to V1 and O2 representing the element connected to V2. If you wish to check for equal amplitudes just measure the voltage between O1 and O2. It should be zero if the currents are equal.

To compare phase, measure Vout. This should be zero for 90° phase difference (subject to Note 7).

Adjustment of both arrays and hybrid couplers can be done using this handy circuit. When adjusting an L-section phase shift network you will find that changing the L to c ratio will change the current ratios for 90° shifts. The test switches on the switch box are very useful during these tests since the current phase and amplitudes can be checked for various directions. due to variations in the earth systems and proximity effects of other antennas it is often not possible to get the same measurements for all directions. set the system for the best compromise.

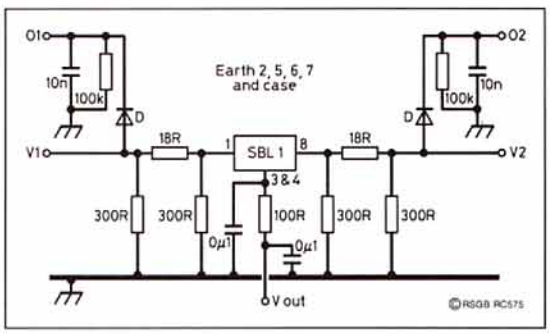


Fig 10: Phase detector circuit using a product detector.

RESULTS

BUT HOW DOES THIS ANTENNA sound from the other end? In February this year, John, G3HCT, operated as VK4CJB, and conducted a series of tests with Bob, G3PJT, on 40m. John reports that on both the long and short path the signal was "impressive". Under a wide range of propagation conditions contact was always made and often the signal peaked at S9. The array was 2-4 S units better than a sloper and on a par with a 2-element yagi at 70 feet. Signals on the G-VK4 path show rapid QSB but several times G3PJT was the only G signal audible. The phased array seemed to extend the time that the path was open.

So there you have, what more is there to be said.

NOTES

[6] Hybrid Couplers and switch boxes are available from Vine Antenna Products, see page 21.

[7] Zero output is also the result of two fault conditions, if either or both of the test signals are absent, or if there is gross amplitude imbalance between the two inputs. ♦

RADCOM TECHNICAL FEATURE

The Amazing 1-T-1 Receiver

The concluding part of an article by C F Fletcher, G3DXW*

FIRSTLY SOME GENERAL comments. All the components used in this receiver are readily available from most parts stockists. There is however an added element of pleasure to be had in homebrewing if old or second hand parts can be used to obtain the required results.

The only items which could be difficult are the two tuning capacitors because of the need for slow motion drives. I recommend that, if possible, you should lay hands on old tuner head capacitors which usually have a built in 3 to 1 reduction drive, either geared or ballbearing. I have included in the parts list the name of one supplier who has some reduction geared capacitors on stock and I am sure there are others. These components may have multiple sections most of which you may not want, but even if you use only one section they are usually a fraction of the price of new components.

So a scrounge around the surplus suppliers is a good start and good fun too. For the bandspread capacitor I used two sections of a VHF three gang tuning capacitor with 15pF per section. Having multiple sections available gives choice in the amount of spread, more sections in parallel increasing the spread. In the prototype, the 270pf main tuner worked well with a 30pF bandspread capacitor connected across the lower 30 percent of the coil. Tapping down the coil is simply a method of reducing the effect of the capacitor, due to stepdown transformer action, and allows one to use a larger capacitor for a given spread than if it were connected directly in parallel with the main tuner.

Tuning dials are always a problem. In my receiver, I used a pointer connected to the capacitor spindle and calibrated the panel. If a digital counter is available, the detector's low level oscillation can be tapped off the source of TR2, amplified by another 2N3819 FET and used to drive the counter. A very elegant result, but this sort of embellishment is well left until the receiver is otherwise in good order. Frequency counters can introduce unwanted switching noise.

For one-off construction, printed circuit boards are hard work; unless of course you like artwork for its own sake. Having started, as a boy, using breadboard construction, progressed through metal chassis bashing to PCBs, I can now report that I again construct in the breadboard fashion albeit on plain copper clad board. Provided you have some expertise with a soldering iron, using copper clad board as an earth plane to which components can easily be fixed (by either solder if they need be earthed or glue if they do not) can create circuits of near optimum performance.

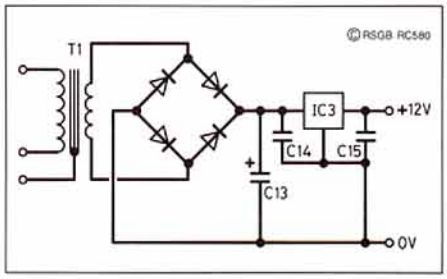


Fig 8: Power supply circuit diagram.

Once you get the hang of it they even look good and are very stable. Keep all component leads as short as can be reasonably handled and try, if possible, to form a mechanically sound structure by looping wire ends and crimping before soldering. Fixed capacitors of the radial lead type are ideal for this purpose, the decoupling capacitors making good support posts for other components. Integrated circuits should be turned on their backs, legs in the air, and secured by their earthed pins or glued down if you prefer. Its a good idea to mark pin 1 with a spot on the board using a fibre pen, especially if glue is used. As a guide, my piece of cu-clad board measured a little under 3in by 4in and had plenty of space to spare.

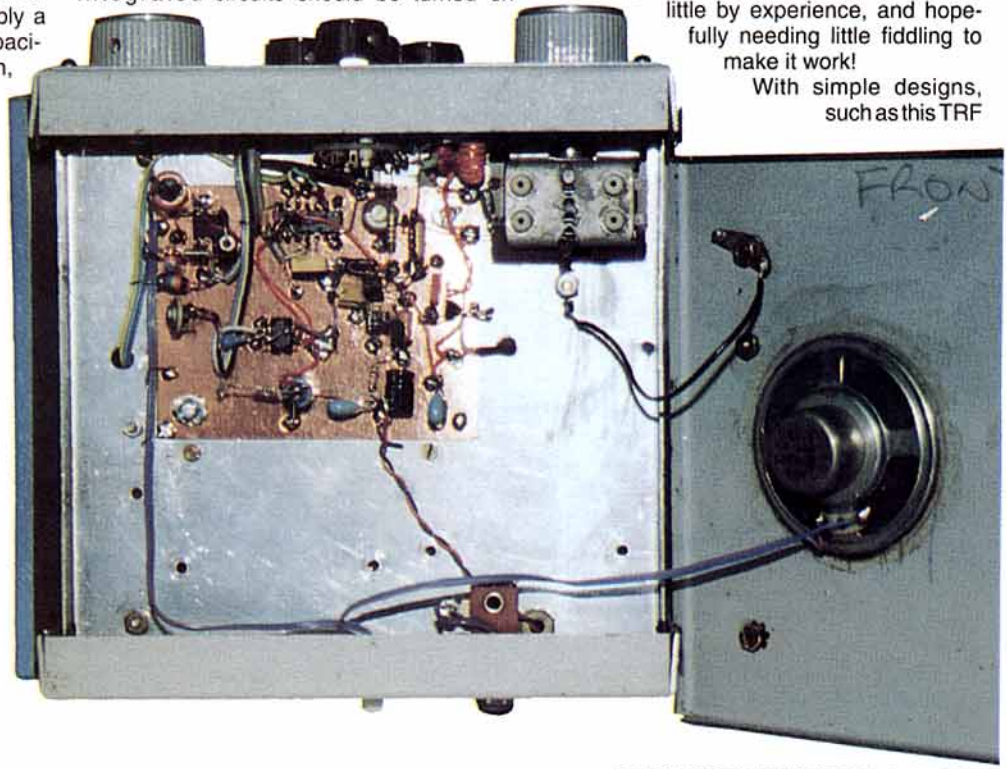
For anyone not used to home construction, first attempts are probably best made on an aluminium base with a front panel only. When the receiver works well, then enclose it in a box. It is so much easier to modify layouts when not hemmed in by the sides of a box. The front panel holes should only be drilled when the layout has been finalised.

The power supply **(Fig 8)** specifies a 6VA transformer (12V, 0.5A), which is the smallest commonly available. The 7812 regulator used provides the ripple free stable DC needed by the receiver, but it needs at least 15 volts input in order to function. Thus any transformer with a secondary voltage between 12 and 20 volts is suitable for the purpose, although if you have one giving more volts than strictly necessary, be careful that the electrolytic, C13, can withstand the DC voltage.

TESTING

RADIO DESIGN FOR the most part is done by theoretical calculation, modified a little by experience, and hopefully needing little fiddling to make it work!

With simple designs, such as this TRF



*12 Park Cresent, Retford, Notts DN22 6UF

receiver, the active components have more effect on performance than with say a superhet receiver where the passive components dominate the design, so a little careful measurement and adjustment can reap large rewards with this circuit.

Firstly, the manufacture tolerance of the gate pinch-off voltage (the negative voltage at the gate when conduction ceases) of the cheap FET specified is fairly loose. In operation the detector FET operates very close to this pinch-off point - the drain current being around 30 microamps.

Since we need to apply a voltage at point 'A', Fig 3, to control the state of regeneration, we need to know what the pinch-off voltage is. Usually, with the 2N3819, pinch-off is around 3 volts. I suggest that a simple potentiometer as shown Fig 4(a) be used initially to establish the working point which will be around twice pinch off. If this is done, it will be found that when using the potentiometer the onset of oscillation is quite sudden and not easily set, which is the reason for the circuit Fig 4(b). The range of control voltage needed for easy regeneration control is only around 1V, so having established the critical voltage at point 'A' using circuit (a), install circuit (b) and adjust RV5 to give this voltage at IC2 (pin 3 or 6) with RV4 mid range.

Building the two band version entails one other adjustment to regeneration. It will be found that the coil covering 1.8 to 4MHz is more prone to burst into oscillation than the higher frequency band. The two coils can be brought into line by shunting the lower frequency coil with a resistor and lowering its initial 'Q' slightly. I needed to use a 47k resistor (R12) for the purpose, but it must be selected on test.

This receiver was built to operate on a 50Ω feed from an antenna and ATU. The input attenuator, VR1, needs to form a 50Ω termination for the ATU, but 50Ω carbon potentiometers are not easily come by. An easier solution is to terminate the feeder in R11 (56Ω) and use a common 1k linear carbon potentiometer as the attenuator. This is quite effective because the gate of TR1 does not load RV1 at all.

CONCLUSION

THIS OLD DESIGN with one or two modern additions has a simply amazing performance. It works on 7MHz in the evening and hears all that my other station receivers can hear. The good selectivity without sharp cut-off gives the audio an easy sound, SSB sounding very clean. Shortcomings, well with an old style double sideband receiver you need to develop the art of ignoring unwanted signals within the passband rather than filtering them out. This is not really difficult and has the real advantage that you are continually 'aware' of what is happening on adjacent frequencies. The only real trouble comes when a very strong signal appears slap bang beside the weak signal you are trying to copy as the incoming RF energy tends to pull the detector frequency. The RF gain goes a long way to help under these conditions but sometimes there is no solution, c'est la vie!

On balance, this receiver has provided more fun per pound sterling than anything else I have built for years. It's worth a go. ♦

COMPONENTS

Resistors- All fixed resistors are 1/3W, carbon film.

R1	330
R2, R8	470
R3	100
R4	1k
R5, R6	2k2
R7, R12, R13, R19, R20	47k
R9	10
R10	33k
R11	56
R14, R17	100k
R15, R18	22k
R16	8k2
RV1	1K Lin Carbon
RV2	47K Log
RV3	47K Preset
RV4	4K7 Lin Carbon

Capacitors

C1, C5	22nF 63V Polyester
C2	100nF 63V Polyester
C3	100pF 63V Polycarbonate
C4, C12	47µF16V Electrolytic
C6	2µ2F16V Electrolytic
C7	330nF 63V Polyester
C8	4n7F 63V Polyester
C9	10µF16V Electrolytic
C10	47nF 63V Polyester
C11	220µF 16V Electrolytic
C13	1000µF 25V Electrolytic
C14, C15	100nF 50VDisc ceramic
C16	68nF 63V Polyester
VC1	270pF Airspaced tuning cap (see text)
VC2	15-50pF Ceramic trimmer
VC3	30pF Airspaced tuning cap (see text)

Inductors

Tuning coils	wound on Ferromagnetics
T50/2	iron dust toroidal cores.
L2a (1.7 - 4 MHz)	78 turns 30 SWG, tap at 30 turns
L2b (4 - 10.2 MHz)	34 turns 24 SWG, tap at 13 turns
L1a	10 turns, L1b 5 turns - wound over earthy ends of L2a and L2b
Thin multistrand plastic covered wire	
RFC	330µH min inductor

Semiconductors

D1, D6, D7	1N4148
D2, D3, D4, D5	1N4001
TR1, TR2	2N3819
TR3, TR4	BC558
IC1	LM386
IC2	741 op amp
IC3	7812 reg.
IC4	4066B

Additional Items

T1	12V, 0.5amp mains transformer.

Components are available from:
JAB Electronics Components, 1180 Aldridge Road, Great Barr, Birmingham B44 8PB.

Source of tuning capacitors:
J Birkett, The Strait, LINCOLN. Tel 01522 520767

RADCOM Helplines FOR MEMBERS

● John Welford is rebuilding a **Marconi TF1066B**/6 signal generator and requires advice on where to obtain the Mullard TD03/10E or English Electric DET22E (both must be the 'E' versions) or the **CV5458 valves**. John's address is 26 Templewood, Welwyn Garden City, Herts AL8 7HX, or tel: 01707 329508.

● Rod Craddock, GW4SLK, needs circuits and information for the **Storno TX615 and RX612** modules which he is trying to convert to 2m. He also needs information on the microphone voltage and jack plug wiring for the **Kenwood HMC-2** headset.

● Wayne Townsend, GW7PRT, wants a circuit diagram for the **Hung Chang 3502** 20MHz oscilloscope. If you can help, please write to Wayne QTHR.

● Tony Bull, G3ICB, needs a circuit diagram and preferably manual of R551N. If you are able to help write to him QTHR or tel: 01635 864345 evenings, fax: 01635 872762.

● John Wardle, G4CVA, needs the circuit diagram and / or manual for an **Eddystone EC10 Mk II**. All expenses paid. Please contact John if you can help on 01636 813767.

● If you can help in programming a **TDD1742T synthesizer chip**, as found in a **Marconi RC630** trunk radio and in designing loop filters, please contact Brian Morrall, G6EOX, on 01922 473492.

● Information is required on the **Channel Master Crown antenna rotator** (model number 9519D), especially on the power supply connections to the drive motor. It is thought that it requires 25V AC at 1.5A, but there are four connections into the coil system - what goes where? If you can help, please contact Ron Ray, G2TA, QTHR.

● Sam Baskeyfield, G3HVI, needs a few **6J4 valves** or their equivalent, and an **HC6U 43.888 (or near) xtal.** If anyone can help, please contact G3HVI, QTHR.

● An old **receiver** 'liberated' from an **Italian tank in 1942** by a member of the desert rats has come into the possession of Ray Hill, G0IMV. He would like to restore it to full working order, but needs help. He has no information on the set other than that it appears to be capable of working on 12 or 24V, and that all the valves are Philips, but stamped with an official Italian war department stamp. If you think you may be able to help, contact Ray on 01989 562906, or write QTHR.

● Wanted - **present whereabouts** / addresses of the following amateurs active in the **1980s**: VK0KH, FO8AK, T3LA, AH9AB, A35JL, VP8AHS, ZK1DR, ZK1AC, FW8SC, FO8HW, 3D2WR, W6ENK/KH4 and H44s WH, PT, CB, BH and JE, as part of a project. Postal expenses reimbursed. If you can help, please contact Mike, 35 Elliot Ave, Reydon, Suffolk IP18 6QX. ♦

IDEAS FROM ABROAD

TRANSLATED AND EDITED BY ERWIN DAVID, G4LQI

John Devoldere, ON4UN, is best known in the UK for his books on Low-Band DXing [1]. He also is the originator of some [2] and expert user of many **antenna programs**. Here is an extract from the Belgian 'National Society Magazine' *CQ-QSO* 2/95.

UNTIL RECENTLY, predicting antenna performance was more black magic than science or engineering, especially among amateurs. For yagis, there were only the *W6SAI Beam Handbook* and some magazine articles. More than 20 years ago I wanted to build a 5-element 14MHz Yagi and researched all relevant publications of the preceding 20 years. There was little correlation in that large body of data.

From this muddle I somehow picked a design and built it. For 20 years I had an excellent beam, or so I thought. Later, by computer modelling, I found that this beam had maximum gain and F/B ratio out-of-band, at 14.45MHz, even though the SWR was unity at 14.2MHz and reasonably flat over the whole band. Back then almost nobody knew that the electrical length of tapered elements, ie those with big-diameter tubing at the centre and thinner tubes toward the tips, differed from that of constant-diameter elements of the same physical length. Jim Lawson, W2PV, first pointed this out in his excellent series *Yagi Antenna Design* [3] in *QST* in 1980.

MODELLING PROGRAMS

COMPUTER MODELLING, ie the exact prediction of all electrical performance parameters of an antenna of known physical dimensions, based only on mathematical formulae, algorithms and systems, was first described in the 1960s. A practical program, NEC (Numerical Electromagnetics Code), was developed for the US Navy. It works by the *Method of Moments*, (explained by Ian White, G3SEK, in *RadCom* 8/93) and was intended for professional use on a mainframe computer.

The original NEC was a rather user-unfriendly engineering program which did not permit modelling of earth radials. The current NEC version 3 permits the modelling of elevated and even buried radials; it can be run on a PC 486DX2-50 or faster, with co-processor.

The availability of powerful home computers and the appearance of the NEC-descended program MININEC [4] opened the field to the general public, including amateurs.

Several enhanced and more user-friendly derivatives have appeared since. The most popular of these are *ELNEC* [5] and *MN* [6] and the more specialized *YAGIMAX* [7] which, uniquely, can plot the feed-point impedance vs frequency on a Smith-chart, and *YO* (Yagi Optimizer [8]), which is particularly fast and user friendly. *AO* (Antenna Optimizer [8]) can optimize all kind of antennas for a given parameter such as gain, F/B-ratio, or SWR bandwidth, but requires a fast PC. The latest versions, capabilities and prices of ELNEC, YO and AO are regularly advertised in *QST* [9].

The program *YA* (Yagi Analysis) comes with the 17th edition of the *ARRL Antenna Book* [10]. This powerful program is for Yagis only; unlike YO, however, YA does not include an optimization algorithm

GETTING STARTED

TO START A SIMULATION one must enter the proposed design parameters in an *input file*. The syntax is given in the program, in some versions by answering a series of questions. The parameters to be entered will include the design frequency, the number of conductors, the three-dimensional coordinates of the beginning and end of each conductor, the diameter of each conductor, the number of segments for each conductor, the conductivity and dielectric constant of the ground, and the feedpoint of the antenna.

The number of segments into which each conductor is to be divided, *pulses* in NEC-speak, is a matter of experience. Use too few and the results are inaccurate while too many require too much computing time. Some experimentation is recommended; if a small increase in the number of pulses makes for a considerable change in results, more and smaller segments are indicated. Ten segments give a good approximation of a dipole.

There are some basic rules. Each segment should be at last five conductor diameters long. Adjacent pulses should not differ too much in length. Where conductors are joined at a sharp corner, eg in a quad or delta loop, the adjoining segments must be kept short lest accuracy is impaired by *pulse overlap*, which has the effect of rounding the corner. ELNEC has a special provision, *tapered pulses*, which automatically takes care of this problem.

It is best to model an antenna *in free space* first, as that is the only way to compare antennas in a neutral environment. Where the earth is an essential part of the RF circuit, eg in ground-mounted verticals, this obviously does not apply. Where several antennas are within each other's near field, intended as in the case of stacking or unwanted as when unrelated antennas are in close proximity, all must eventually be modelled together. The computed dimensions of yagis in free space generally require no further adjustment if the antenna is mounted at least 1λ above earth.

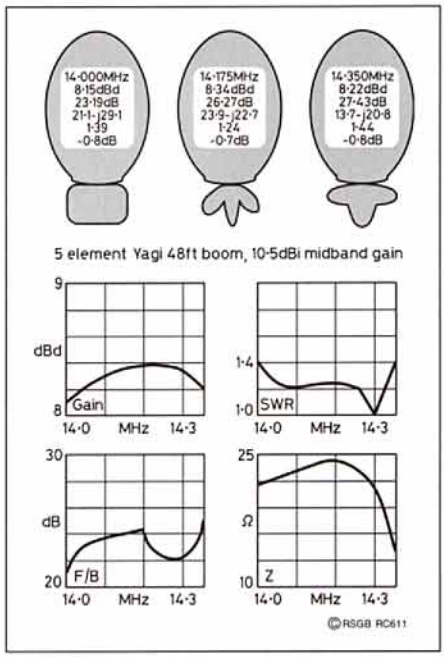


Fig 1: Top: radiation plots of a 5-element Yagi on three frequencies obtained with the program YO (Yagi Optimizer); inscribed in each are frequency, gain, F/B ratio, feed-point impedance, SWR and the gain sacrificed to optimize F/B ratio. Below: gain, SWR, F/B ratio and radiation resistance plotted against frequency.

LIMITATIONS

MININEC HAS SOME IMPORTANT shortcomings. It, and its derivatives, assume that in the near field the earth is a perfect reflector. Only in the far field can earth conductivity and dielectric constant be specified. This means that a monopole always has a *radiation* efficiency of 100% but the *reflection* efficiency depends on the specified earth properties. Take an earth-mounted λ/4 (ie resonant) thin radiator; according to MININEC it will always have the same impedance of 36Ω, whatever the quality of the earth below and regardless of the number of radials. Similarly, a Beverage antenna (which does not work well over perfect earth) cannot be adequately modelled, while the gain and impedance of a dipole, delta loop and inverted-V at less than 0.2λ above earth will come out wrong. The radiation patterns, however, will generally be correct.

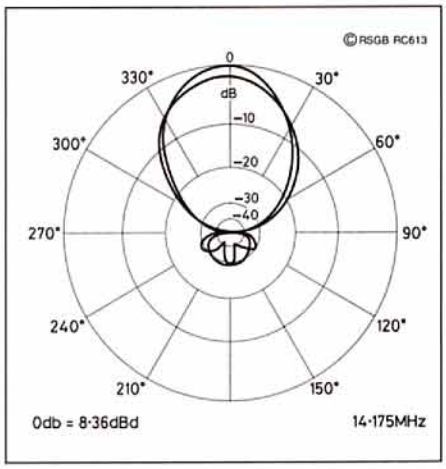


Fig 2: YO azimuth plots on a common scale of two five-element Yagis with boom lengths of 15.5 and 12.5m respectively.

The original MININEC required that the antenna feed be specified in terms of *voltage*, normalized to 1V with a phase angle of 0°. This was awkward when working on phased arrays, where the antenna *currents* must be specified. All the later programs, however, will permit voltage or current input.

The total number of pulses MININEC can handle is limited. Some of the enhanced derivatives can do better, especially ELNEC with the *MaxP* (Maximum Pulse) option. These are recommended for quad and delta loops.

TYPICAL EXAMPLES

THE PERFORMANCE DATA of a 14MHz 5-element Yagi, obtained with the program YO, are shown in **Fig 1**. The azimuth pattern and gain, F/B ratio, feed-point impedance and SWR have been simultaneously computed for three frequencies, here the mid-band design frequency and both band edges.

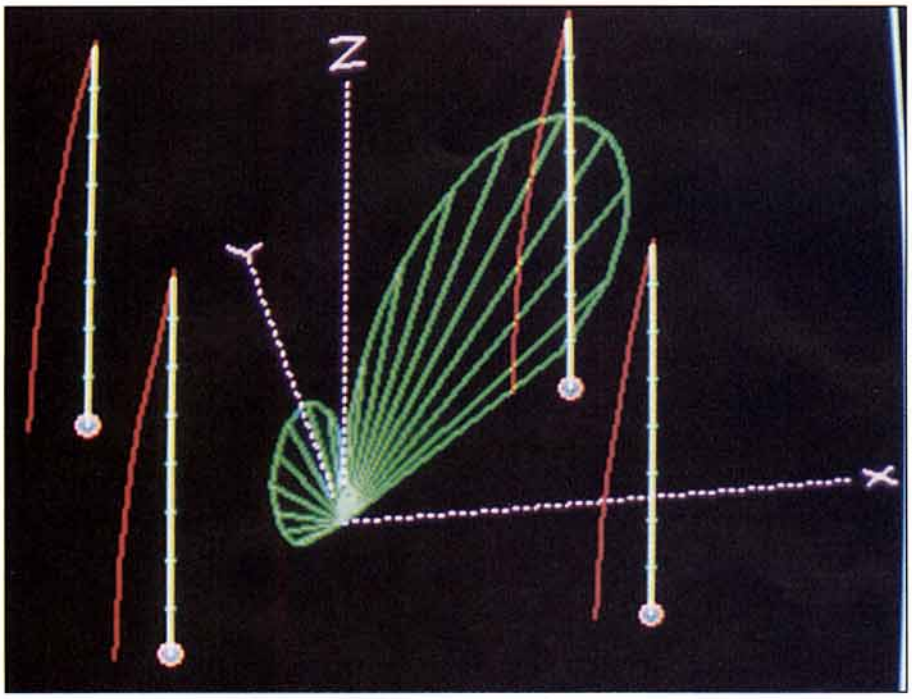


Photo 1: Three-dimensional representation of a four-square array, current distribution in each element and, superimposed, an elevation plot in the azimuth of maximum gain.

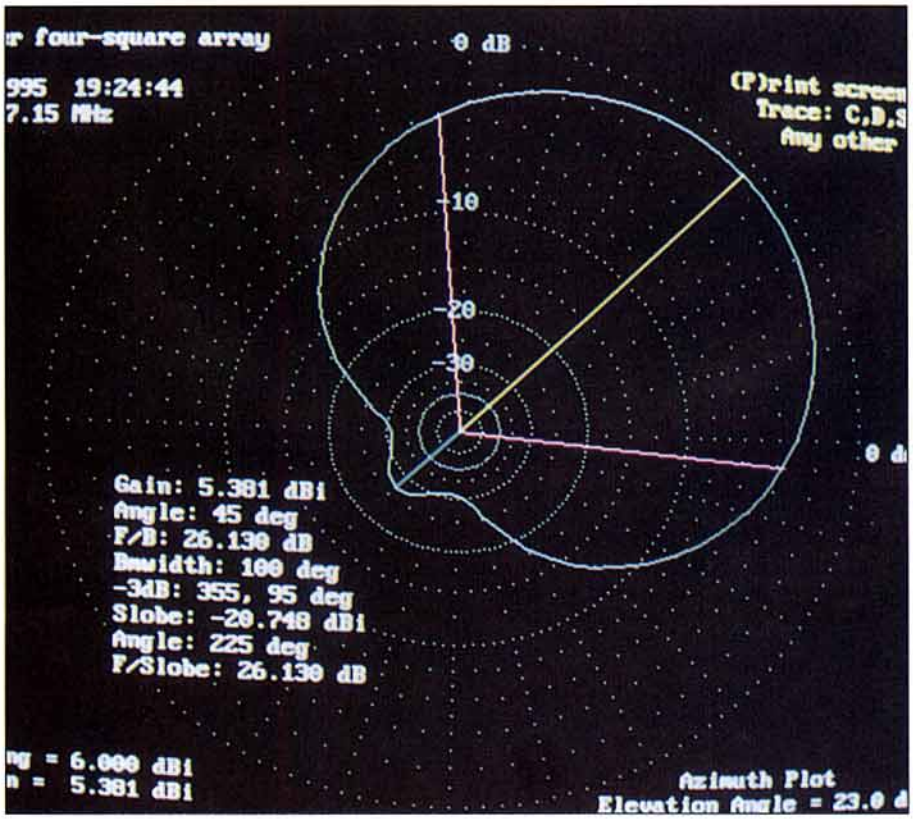


Photo 2: An azimuth plot at the elevation of maximum radiation and the most important performance data, all obtained with ELNEC.

Below that, gain, SWR, F/B and the real part of the feedpoint impedance have been plotted against frequency between the band edges. In **Fig 2**, YO displays, on one scale, the azimuth plots of two antennas similar to the one above to show the effect of boom length. The one with the greater gain has a 15.5m boom; the 12.5m boom yields somewhat less.

Photo 1 gives a three-dimensional picture of a *four-square* array, with a superimposed elevation plot in the azimuth of maximum radiation, obtained with ELNEC. The array consists of four λ/4 vertical radiators on the corners of a square. The four element currents are of equal magnitude and are phased to give maximum gain along one diagonal of the square. The azimuth plot, in **photo 2**, was computed at the elevation of maximum radiation, here 23° above the horizon.

A two-element cubical quad is shown modelled in **photo 3**. All segments were of equal length and too long for the corners of the loops. The aforementioned rounding-of-corners effect made the loops seem shorter than they were, resulting in an erroneously low F/B performance. In **photo 4**, the segments had been 'tapered' with ELNEC, which yielded the correct pattern.

NOTES

[1] *Antennas and Techniques for Low-Band DXing* by John Devoldere, ON4UN, 2nd ed 1994, is available from RSGB Sales.

[2] *ON4UN New Low-Band Software* ($55, £30 or BFr 1500). Includes programs for: gray-line propagation; mutual impedance and driving impedance for arrays with up to four elements; coax transformer/Smith chart for loss-free and real cable; two and four element vertical arrays; the L-network; shunt/series impedance networks; line stretcher (pi and T); stub matching; parallel impedances; SWR value and iteration; radiation angle of horizontal antennas; single-layer and toroidal coils; gamma/omega and hairpin matching; element taper.

Yagi Design Software ($70 or £40 or BFr1900). Includes a data base of 100 monoband Yagis with up to six elements and a module to analyze these as well as programs for: generic dimensions; element strength; element taper; mechanical balance; boom strength; weight balance; wind load; torque balancing; wind area; matching; optimizing gamma/omega; feed line analysis; rotating mast calculation; utilities to make input files for YO, MN and AO.

These design (not modelling) software packages are sold in MS-DOS format on 3.5" disk by J Devoldere, ON4UN, Poelstraat 215, 9820 Merelbeke, Belgium. Tel. +32 9 362 6455. Payment by international postal money order, US$ cheque payable at a US bank in the US, or bank notes by registered mail.

[3] *Yagi Antenna Design* by Jim Lawson, W2PV (SK), in book form (1986). Available from RSGB Sales.

[4] *MININEC* v.3 is in the public domain. That program and its documentation, order number ADA 1811681, and the technical reference NOSC TD 938, document

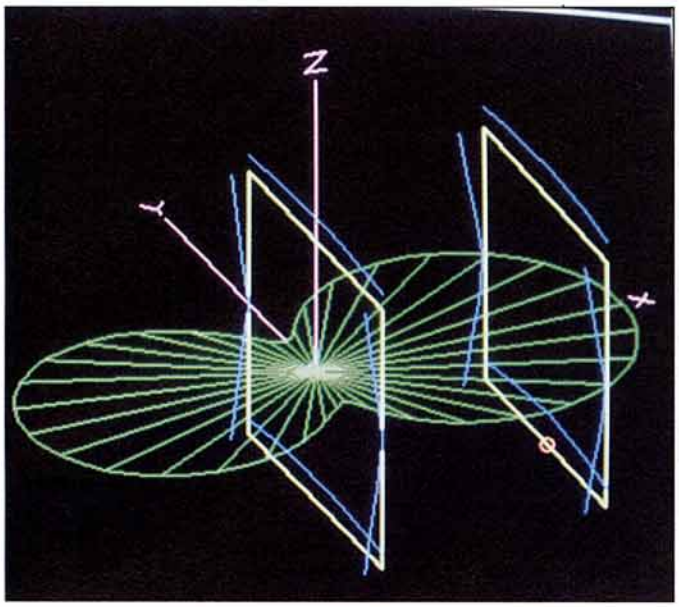


Photo 3: Three-dimensional representations of a cubical quad with current indications. This inaccurate azimuth plot was the result of too-long segments at the corners of the loop.

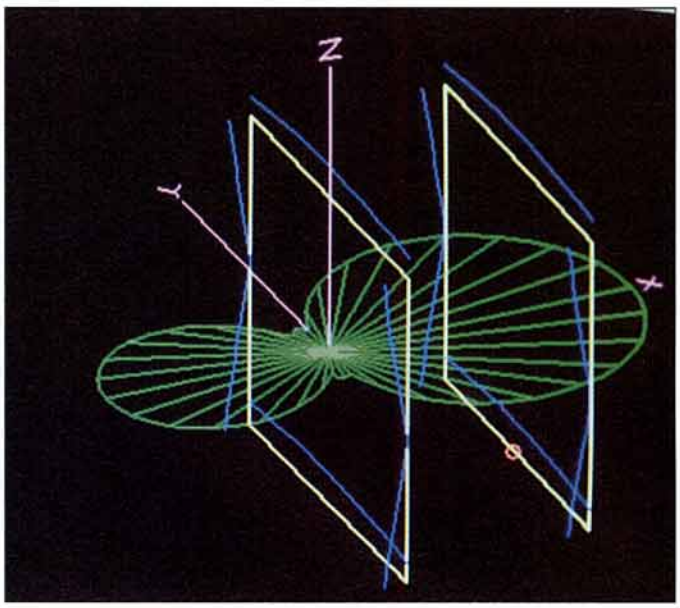


Photo 4: Three-dimensional representations of the quad in photo 3. This correct plot was obtained using the automatic segment tapering feature of ELNEC.

number ADA 181682 can be obtained (for a fee) from the NTIS, US Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161, USA.

[5] *ELNEC v.3*, an enhanced and user friendly copyright version of MININEC is sold by its author, R Lewallen, PO Box 6658, Beaverton, OR 97007, USA. State 3.5 or 5.25" disk and whether your PC has a maths co-processor. ELNEC 3 $49. MaxP $25, P&P $3. Visa and Mastercard are accepted. See a review by J Bazley, G3HCT, in *RadCom* 8/93.

[6] *MNC+MNH 4.5*, an enhanced and user friendly copyright version of MININEC, is sold by its author, B Beazley, K6STI, 507½ Taylor Street, Vista, CA 92084, USA. State 3.5 or 5.25" disk. $50. P&P $5. Visa and Mastercard accepted.

[7] *YAGIMAX* is a shareware program by L Gordon, K4VX, PO Box 105, Hannibal, MO 63401, USA.

[8] *AO 6.0* (Antenna Optimizer) $100, and *NEC/Wires 1.5* (which claims to accurately model true earth losses) $100, together $130, as well as *YO 6.0* (Yagi Optimizer) $100, are by K6STI. 386+387 and VGA required. See note [6] above.

[9] Subscriptions to *QST* are sold by RSGB.

[10] *The ARRL Antenna Book*, 17th edition, including the program *YA* (Yagi Analysis), is sold by RSGB. ♦

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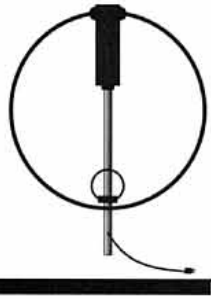

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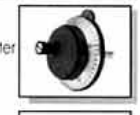

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MORSE KEYS - THEIR STORY AND THEIR USERS

AS MARK TWAIN might have put it "the death of Morse has been greatly exaggerated". Certainly interest in the design and use of Morse keys in the early years of telegraphy is being kept refreshingly alive by the publishers of *Morsum Magnificat*. Their latest venture is the publication of the first of a series of compact (A5 format) books based on 'The Best of MM'. Volume 1 is the 60-page *The Story of the Key* by the late Louise Ramsey Moreau, W3WRE, together with a listing of 'American Telegraph Instrument Makers 1837-1900'. [See review p57, May - *Ed*]

The Story of the Key led to me re-reading a very different hardback, 264 + viii page book, published some years ago entitled *The American Telegrapher: A Social History 1860-1900* by Edwin Gabler (Rutgers University Press, 1988). The book describes how, in the years following the American Civil War, an entirely 'new white-collar employee' and semi-middle-class profession of telegraphist (largely recruited from the working classes) came into being.

Members of this profession soon earned the reputation of being irresponsible, footloose and dissolute, largely at the mercy of the ruthless, near monopoly of Western Union and leading to the Great Telegraphists Nationwide Strike of 1883. Yet from their ranks emerged many notable figures - not least the great inventor Thomas Edison - many highly-skilled telegraphists and the first electrical communications network binding together the United States.

For amateurs more concerned with the perennial controversy over the Morse code requirement for amateur operation below 30MHz, it is worth pointing out that the February 1995 issue of *Morsum Magnificat* (No 38) contains a detailed account 'Morse Code and Amateur radio - The IARU Clarifies its Position' by Tony Smith, G4FAI, which provides a detailed summary of the 26-page document issued by the IARU on the work of the IARU CW Ad Hoc Committee. For those who believe that the Code has passed its sell-by-date this could prove an illuminating read.

CLOSELY-COUPLED RESONATORS FORM MULTIBAND ANTENNA

IN THE NOVEMBER 1994 issue of *RF Design*, editor Gary Breed, K9AY, provides design and construction information for an HF or VHF antenna that operates effectively on two, three, four or more different frequencies. The approach permits multi-band operation without the use of reactive decoupling networks or tuned stubs or traps etc. It also has the advantage of providing control over the feedpoint resistance and reactance at each frequency.

He has a patent pending (application July 1994) for "a method for constructing multiple-frequency dipole or monopole antenna elements using closely-coupled resonators" and

300 OHM TWIN-LEAD FEEDER

'BILL' MCLEOD, VK3MI, has noted recent references to 300 ohm ribbon feeder cables in *TT* and in several overseas journals, including WIA's *Amateur Radio*, both for antenna elements and for matching sections. He warns of a problem that was discovered the hard way some 50 years ago but seems often to be overlooked in recent discussions. With the standard form of exposed ribbon cable the impedance characteristics have proven far from stable in wet weather see **Fig 1(a), (b)**. In the UK a more stable form of tubular cable was marketed for a number of years, **Fig 1(c)** but is apparently no longer available.

VK3MI writes: "When a film of moisture covers the web between the two conductors the nominal impedance nose-dives as the capacitive reactances increases dramatically, with the 'K' factor of the water now forming a large part of the dielectric. This factor is about 80 (paragraph 3.3 in the ARRL Antenna Book) and compared to the 'K' factor for polythene (2.3) forming the web itself it does not require much water in the electrostatic field to cause vast changes!"

As a rough test it will be found that the 16pF or so of a 1-metre length rises to 60pF when only half immersed in a bucket of water! Enclosing the cable in a plastic pipe (as in the J-Pole antenna, *TT*, December 1994) will keep it dry although, as noted by VE2CV, this may itself change the characteristics of the matching section etc.

VK3MI adds that slotted web ('ladder') twinlead still has about half the web to give a large change when wet; the only current variety of twin lead for non-critical outdoor use appears to be the 'super low-loss foam enclosed TV twin lead Archer brand, Tandy Catalogue number 15-1174' which excludes water from the immediate field between the conductors, though fringing could still have some effect. However, measurements cannot be directly transposed when using published designs as the velocity constant of the foam filled cable is about 77% indicating that there are more solids in the foam dielectric than the 82% velocity factor of the common webbed variety.

"For similar reasons antenna loading cells and traps should always be enclosed to keep them dry; or, alternatively, be self-supporting with spaced turns separated from insulating supports to prevent moisture bridging between turns. Capacitors can be short open stubs of coaxial cable with sealed ends, eg RG58 has a capacitance of some 100pF per metre."

In the 1950s, the change of characteristics of 300 ohm feeder line when wet, led Telcom (The Telegraph Construction and Maintenance Co Ltd) to develop, patent and market a tubular form of 300 ohm feeder: See Fig 1(c). This had more stable characteristics under bad-weather conditions with an attenuation at 100MHz of about 1.4dB/100ft.

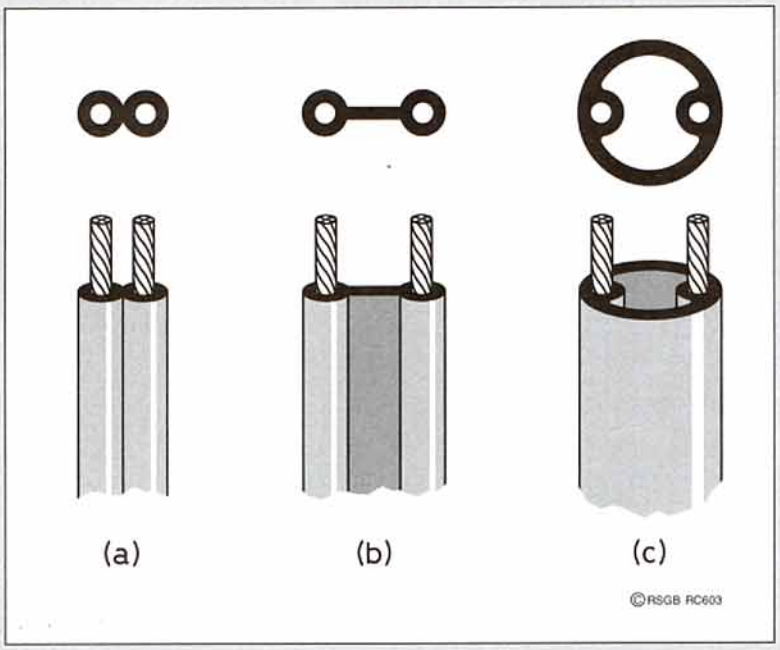


Fig 1: Low-loss twin feeder cables as marketed in the 1950s by Telcon. (a) 150 ohms nominal impedance with attenuation at 50MHz 2.1dB/100ft. (b) 300 ohm flat ribbon-type twin with attenuation at 50MHz 1.0dB/100ft. (c) 300 ohm twin tubular feeder with stable characteristics in varying weather conditions. Attenuation at 50MHz 0.92dB/100ft and power rating at 100MHz of 550 watts.

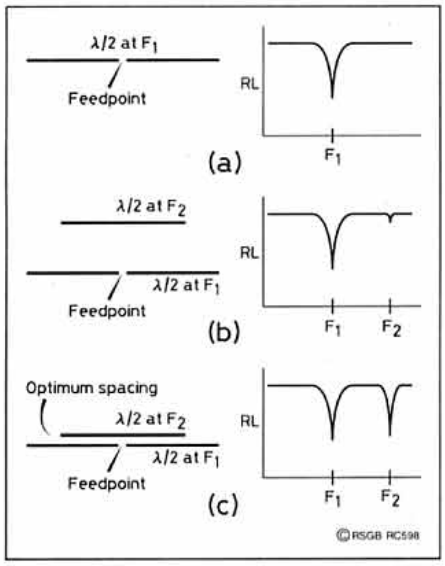


Fig 2: Principles of the close-coupled multiband antenna. (a) Shows a simple half-wave dipole element and its typical return-loss sweep; (b) shows the effect of an additional conductor, resonant at a higher frequency (F2), placed in the vicinity of the F1 driven dipole; and (c) shows how an effective antenna for both F1 and F2 emerges when the spacing of the second conductor is such that coupling is optimum. (Source *RF Design*)

is investigating applications including VHF/UHF cellular and mobile bands, HF broadcasting and amateur radio. However, it seems doubtful whether practical use of this technique is original. For instance, C B Sibley, G0LMC, reminded me that in the days of VHF television in the UK, one of the main antenna manufacturers patented and marketed a combined Band I and Band III antenna. This appeared to follow the same basic principle in which only the lowest frequency resonant dipole element is fed directly with the other dipole element being closely spaced from this element.

Similarly, Bill Orr, W6SAI, in reporting on K9AY's article (*CQ*, February, 1995) suggests that the principle was the subject of some six US patents issued between 1946 and 1950 and, as in the UK, was used for TV antennas and some log-periodic designs and is described as the 'Open Sleeve Dipole' in the 17th edition of *The ARRL Antenna Book*. But, without entering too deeply into any arguments about patents, we should all be grateful to K9AY for bringing this system more fully into the public domain and, especially, for providing computer analysis and practical details of an antenna for the 10, 18 and 24MHz bands.

K9AY introduces the Coupled-Resonator (C-R) principle as follows: "It is well known that conductors in close proximity exhibit strong mutual coupling. A design technique called the C-R principle has been developed which uses this coupling to great advantage. The C-R principle defines the conditions for optimum coupling, creating a system with multiple resonant frequencies, driven at a single feedpoint. Such a multiple-resonant structure consists of a driven dipole or monopole at the lowest frequency of operation, with additional resonant conductors surrounding it, placed at the appropriate distances.

"**Fig 2** demonstrates the C-R principle in its simplest form, a two-frequency system. A half-wave driven dipole is resonant at F1 and driven at the centre. A typical return loss sweep for such a dipole is depicted in (a). In (b) an additional conductor, half-wave resonant at an arbitrarily-chosen higher frequency, F2, is placed nearby. Some degree of coupling will exist between this conductor and the driven dipole, and the return loss sweep of the dipole shows a 'bump' at the resonant frequency of the second conductor.

"The main premise of the coupled-resonator principle is that there is an optimum spacing distance where the coupling results in a

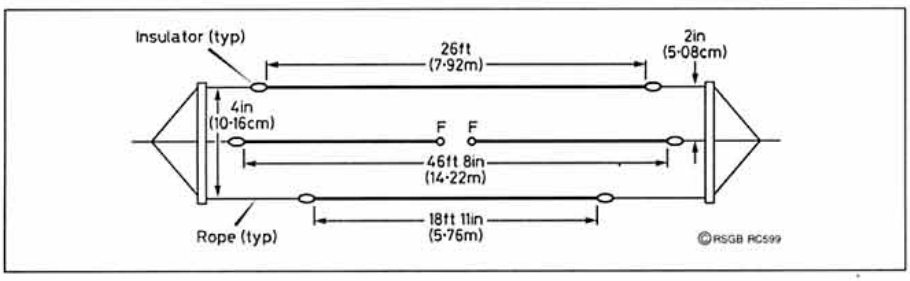


Fig 3. K9AY's experimental tri-band antenna for the 10, 18 and 24MHz band using the close-coupled (open-sleeve) approach. Dimensions are for an antenna made from No 12 AWG wire at a height of 45ft. Insulated spacers are required to keep the wires in alignment. Extra closely coupled wires could be added radially around the driven element for 14 and 21MHz but there will be a practical limit to the number of bands due to the growing complexity of interactions and structure.

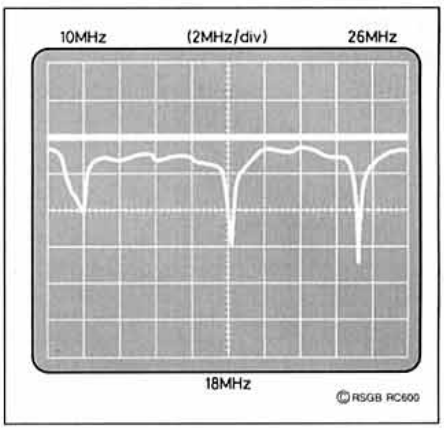


Fig 4: Return loss sweep of the triband antenna. The scales are 2MHz/division horizontal (centred on 18MHz) and 10dB/div vertical.

matched condition at F2 as in Fig 2 (c). The return loss remains good at F1 and, therefore, the system is matched at both frequencies."

K9AY shows that the same principle can be applied to monopole as well as dipole elements and can be expanded to three, four, five or more frequencies by adding additional resonators and placing them radially around the fed dipole or monopole. A practical upper limit is reached when the complexity of multiple interactions obscures the desired coupling, but systems up to seven frequencies have been successfully modelled.

He points out that the variables involved in the design of C-R antennas are: conductor diameter, conductor spacing, feedpoint impedance, and the ratio of frequencies. The feedpoint impedance at each additional frequency can be controlled by adjustment of resonator spacing and length.

The five-page *RF Design* article provides information on the design equations, radiation characteristics, advantages and limitations and also details of a practical C-R antenna. K9AY states: "Various antennas were constructed to verify the accuracy of the computer models, and to assure that the concept was valid. The first versions of these antennas were designed for HF amateur radio bands, where they could be evaluated 'on the air' and compared with other antennas of known performance . . . this arrangement allowed extensive experimentation in conjunction with enjoyment of the hobby.

"**Fig 3** shows the dimensions of a three-frequency dipole constructed from No 12 AWG wire. The driven dipole is resonant at 10.1MHz, with additional resonators for 18.1 and 24.9MHz . . . Choosing 50 ohms as the design impedance for F2 and F3, the required

DIGITAL VOICE COMING?

YOU MAY BE interested in the extract below taken from a section *Overview of Mobile & Personal Communication* by Andrew J Viterbi (QUALCOMM Inc.) in the book *Modern Radio Science 1993* (Oxford University Press for URSI, 1993):

"Based partly on Shannon's source coding rate-distortion theory, but equally on psychoacoustic and psychovisual principles, in the eighties and early nineties major improvements have occurred in speech and video digital source compression, with the result that digital bit rates for high quality speech and video are now lower than the sampling rate. This means not only that the transmission bandwidth of digital can now be lower than that of single-sideband analogue modulation, but also that the transmission quality is better and more robust because requirements for accurately transmitting a single bit per dimensions are obviously easier to meet than for transmitting an analogue value per dimension.

"These significant advances in source compression, particularly the so-called code-excited linear predictive (CELP) speech coder, have made digital mobile and personal telephony more accessible . . . "

spacing was determined to be approximately 1.75in (4.5cm) for each resonator. After modelling the design in ELNEC the spacing was increased to 2.0in (5cm), primarily to compensate for installation above real ground at a design height of 45ft (13.7m)... Return loss is greater than 20dB at the three design frequencies, exceeding 30dB at the highest two frequencies (those added by coupled-resonators): see **Fig 4**. 30dB corresponds to a VSWR of 1.06:1. Bandwidth tends to be reduced slightly at the higher frequency resonances.

"On-air performance of the three-band antenna proved to be indistinguishable from that of separate dipoles for each band. The radiated performance, the feedpoint impedance, and the variations in impedance with installation height above ground also served to confirm the validity of the MININEC-based ELNEC model."

200-WATT AC 50/60HZ INVERTER

OVER THE YEARS, several inverter designs, mostly stemming from *Electronics Australia*, have been noted in *TT*. Heralded as rugged and efficient, a single-IC square-wave inverter for use in automobiles and boats - designed by M S Nagaraj of the ISRO Satellite Centre, Bangalore, India - has been awarded a prize in the joint Wireless World/International Rectifier design competition and appears in the April, 1995 issue of *EW + WW*. (pp 346 and 348): **Fig 5**.

It is based around an IR2151 self-oscillating half-bridge driver which can supply complementary square waves with 50% duty cycle, at a frequency immune to supply voltage variations and with under-voltage lockout. Although the system works as a push-pull square wave amplifier with the output delivered from a centre-tapped double-wound transformer, the final output waveform is not shown and would presumably depend to some degree on the characteristics of the output transformer. Previous inverters described in *TT* have had stepped output waveforms possibly making them more suitable for the operation of transceivers etc primarily intended for use on AC mains with near sine-wave waveforms.

M S Nagaraj points out that lockout in the event of low battery voltage is a very important feature. "Without it, under low battery voltage conditions, the power mosfets would not conduct fully and would dissipate power. This in turn reduces inverter efficiency and could result in damage. In this unit, when battery voltage falls below 8V, both power mosfets are switched off."

He adds: "Although the dead time of about 1µsec generated by the IC is sufficient to prevent the cross conduction of the mosfets, it is not sufficient to allow the transformer ringing signals to be dissipated in the appropriate snubber circuits. Fortunately, dead time can be increased to the desired value by adding a few inexpensive components to the basic inverter circuit.

"Supply voltages Vcc and VB, and hence the outputs HO and LO are limited to 9.1V by components R1, C1 and D1. Oscillator frequency is set by R2 and C2. When HO goes high, TR1 holds the gate of power mosfet TR3 low for a dead period of about 300µsec, determined by R3 and C3. Diode D2 discharged the gate capacitance of TR3 instantaneously when the HO output goes low. Although the turn-on time of TR3 increases to about 30 µsec, it is a very small part of the period of the inverter output.

"TR2, C4, D5, R4, D4, and R8 provide an equal dead period to the low side output LO. R5, C5, D6 and R6, C6, D7 provide the snubber action for TR3, TR4."

It is noted that this circuit configuration is not limited to 50/60Hz inverters. High-frequency inverters with ferritecore transformers (with proper dead times) could form elements of electronic ignition systems and DC-to-DC converters, and by changing R1, the inverter could be powered by batteries of other voltages.

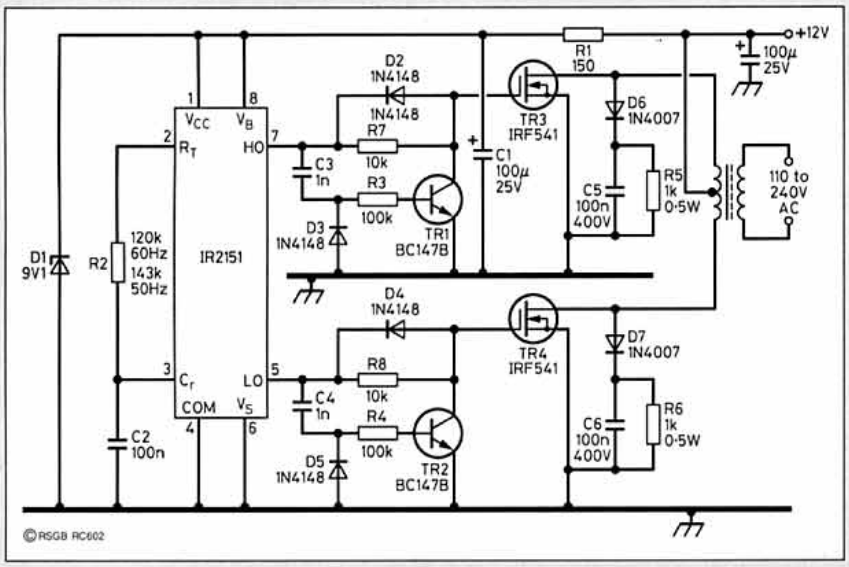


Fig 5: 12-volt DC to 240V 50Hz AC power converter based on a single IR2151 IC driving IRF541 mosfet switches. Most of the complexity represents the discrete transistor circuitry required to extend the IR2151's dead time. (Source *EW + WW*)

CABLES AND CONNECTORS

THE APRIL *TT* notes on coaxial cables and the choice of connectors and the necessity to seal them effectively against moisture ingress resulted in several pertinent comments.

Paul Gaskin, G8AYY, a long-standing microwave enthusiast, believes that the comments on selecting suitable cables and connectors for VHF/UHF, stemming from ZS6AXT, are rather confused and require some further elucidation. He lists the following points:

- RG58C/U is a small diameter cable best used for mobile whips or interconnection between equipment at VHF. It has a low power-handling capacity and a tinned copper braid which increases its losses.
- RG213/U is a MIL-C17D cable and has an adequate braid. Some RG8/U type cables made for the CB market do have a very poor braid. The plasticiser used in some older coaxial cables used to attack the copper braid.
- Andrew Heliax cable of the LDF 4-50 type is not very flexible and is expensive. It would be better to use RG213 with rotatable antennas and telescopic towers.
- RG213/U cable has a solid polyethylene dielectric and a non-contaminating PVC outer sheath. It is weather resistant and not easily damaged unless water is allowed to enter the ends in which case the copper braid could become corroded.
- I do not understand how the polyethylene dielectric of RG213 could be affected by UV light as it is enclosed in the braid and PVC sheath. It is more likely that deterioration occurs because of high temperatures. The standard black PVC sheath will give the maximum absorption of heat from the Sun!
- It is best to use silver-plated UHF or PL259 connectors with PTFE insulation. Coaxial cable braid cannot be soldered properly with the nickel-plated versions made for the CB market.
- BNC connectors normally have PTFE insulation and the cable entries have sealing gaskets. They have a *bayonet* fixing which may lead to misalignment of the contacts with wear. In critical applications it would be better to use TNC connectors which have a *threaded* fixing which ensures proper contact alignment.
- SMA *sub-miniature* connectors are not normally used on amateur equipment except at 10GHz. N-type or TNC connectors can be used on lower frequency bands!

In connection with G8AAY's comments on the braid used on such cables as the RG213/U, it is worth noting that this matter has been tackled in *TT* on various occasions. While cables manufactured to American MIL-SPEC standards do have virtually full coverage of the outer copper braid, the braiding on typical cables intended for civilian applications such as television downleads has been progressively reduced in order to neutralise the rising cost of copper (see *TT*, November 1988 and page 271 of *Technical Topics Scrapbook*

1985-1989). Robin Addie, G8LT, mentions that some years ago he obtained a large length of RG214-U cable which, unlike the RG-213, is *double-screened* and has proved excellent for HF/VHF/UHF even in 120ft runs to his tower.

After his wartime service as an Engineering Officer at SCU3, Hanslope Park, G8LT had a professional concern for many years with connectors of all types, including coaxial connectors. He contributed a fascinating paper, *Connectors Since the '20s,* for the Diamond Jubilee of the Institution of Electronic and Radio Engineers (published in *JIERE*, October/December 1986, pp317-324) and the following are some brief extracts from his Section 7 on 'Coaxial connectors':

"When C S Franklin developed his concentric line feeder system for the Marconi beam short-wave stations, he drew attention to the mechanical precision with which the branched and jointed feeders had to be made so that the phase at the feed point could be controlled accurately, thus ensuring that different sections of the antenna array were all driven in phase. Adjustment was achieved by minor changes in feeder lengths. The same principle applies where coaxial connectors are concerned . . .

"Cable impedances have varied over the years and a figure of around 75 ohms used to be the norm, whereas today 50 ohms is regarded as standard both for cable and coaxial connectors. The latter have now become one of the most highly developed components available to the radio engineer. The average family accepts the small coaxial plug (originally by Belling & Lee) as part of daily life, even if so many installers still 'forget' to tip solder the centre pin!

"The development of polythene as a dielectric for coaxial cables gave impetus to a part of radio engineering that had remained static since Franklin's day. Wartime radar with its high pulse powers and antenna arrays requiring careful phasing brought into being several forms of coaxial connector. Many were actually moulded onto the cables using small polythene moulding presses. Only later did PTFE form the internal insulation material within the connectors themselves. It has the advantage of being able to withstand the heat of soldering whilst being produced to precise dimensions.

"Anyone involved with signals and similar matters during the war will recall those magic type numbers PL259 and SO239, which designated a coaxial plug and socket pair made by Amphenol in the USA and which featured in so much equipment that came to the forces in Europe and the Far East . . . This UHF type has survived the passage of years and has been kept not only by the original makers but copied by the Japanese and others . . . being relatively inexpensive, there are versions for both commercial and professional uses. An assortment of adapters, from straight-through to right-angle are available but it must be remembered that two different screw threads are in use with are inter-matable.

"This UHF type is of non-constant impedance and, with advances in the uses of coaxial connectors, types having low VSWR and tailored to the cables of the day were more in demand . . . Two series of constant impedance connectors were introduced, namely types 'C' and 'N' for both 75 and 50 ohm cables, differing mainly in the type of securing mechanism, the difference being one of mechanics . . . more recently the 'N' type has tended to supersede the 'C' type.

"These are but two out of ten major series of RF connectors, and three of these are subdivided into families - standard, miniature and subminiature. Standard connectors are used with cables like RG8, RG213, RG214 etc. Cables appear as either flexible, semi-rigid, or rigid, and in diameters around 0.5-in for standard types, down to 0.250in and 0.14-in for semi-rigid cables . . . A theme common to all is that the use of a connector, of whichever design, shall not disturb the characteristic impedance of the line in which it is used.

ADVANCES IN LITHIUM RECHARGEABLE BATTERIES

WHILE THE SEARCH for improved large capacity batteries is being stimulated by the work on electric powered 'environmentally-friendly' vehicles, the growth of portable telephone systems, camcorders, laptop computers etc is fuelling the development of improved lightweight rechargeable batteries. It has long been evident that the limited capacity/weight ratio of nicad batteries is a practical disadvantage when using amateur-band handheld transceivers in the field, particularly when these are used at full power in the transmit mode.

Rechargeable lithium batteries began to appear on the market a few years ago and were noted in *TT,* but cost has remained high with the number of charge/discharge cycles usually rather low (about 200 maximum). Recently, the American firm Ultralife Batteries announced what it claimed to be "the World's first rechargeable lithium-based battery made entirely from lightweight solid materials". The battery, which was developed in the UK by Dowty Batteries of Abingdon (acquired by Ultralife last year), appears to overcome many of the previous problems encountered with such cells. **Fig 6** shows the new form of cell which is termed a 'shuttlecock' or 'rocking chair' battery because it relies on lithium ions passing to and fro as it is charged and discharged. Similar forms of battery are also under development by Japanese firm Yuasa and Danish firm Danionics. Ultralife is setting up a production plant in Newark, New York and later in Europe, with the first product designed for use in mobile phones due to be supplied to a communications company later this year.

The new battery, unveiled recently in London and described by staff-writer Andy Coghlan in the *New Scientist* (1 April 1995), can apparently be recharged more than 1000 times with only a tiny loss of capacity. Because it is based on lithium, it stores significantly more power weight-for-weight than nicad batteries at a cost, when in mass production, roughly the same per watt-hour (about one dollar watt-hour). The structure permits shaping to suit specific requirements; one prototype is a fraction of a millimetre thick, but has an area of about an A4 sheet of paper; another is the size of a credit card. Single cells can be stacked and sealed to form batteries shaped like small matchboxes.

Andy Coghlan reports: "When the battery is discharging, lithium ions migrate from where they are stored in a flat, carbon anode . . . The ions cross a layer of polymer electrolyte and combine with the cathode material on the other side to form lithiated manganese oxide. Sheets of metallic mesh on the top and bottom of the cell act as current collectors. When the battery is recharged, this process is reversed. The cell is sealed in laminated aluminium foil to keep moisture out . . . heart of the battery is the plastic electrolyte, made by blending a lithium salt, a polymer and plasticisers to make a rubber mixture. The electrolyte has to perform two conflicting functions. It has to be an electronic insulator to divide the electrodes and stop the cell shorting out and it has to conduct lithium ions."

Ultralife claims that its lithium-based batteries should be able to undercut other forms of lithium-based batteries, which contain relatively expensive cathode materials such as lithiated cobalt or nickel oxide much more costly than the lithiated manganese oxide material of the new battery. Production is expected to begin this year.

The US government is supporting a large billion-dollar programme to develop large capacity lithium batteries for possible use in electric cars.

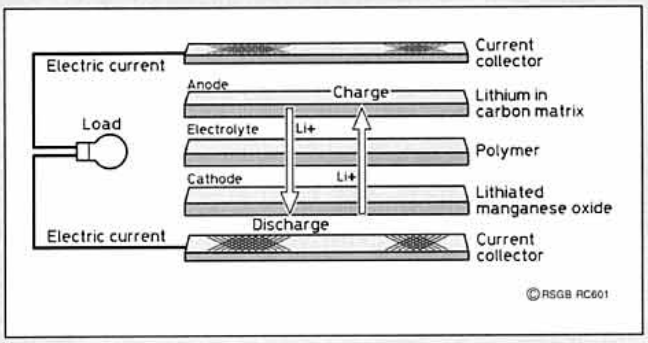


Fig 6: The solid-state lightweight rechargeable lithium-based cell as developed by Dowty Batteries, UK and due to be manufactured in the USA by Ultralife Batteries for use in handheld, portable equipment with an energy storage some three-times that of nicad batteries of equivalent weight. The battery contains lithium-based electrodes and a solid polymer electrolyte whose composition has not been disclosed. (Source *New Scientist*)

On this point alone hangs much of the complexity found in all modern coaxial connectors.

"Of course they have to do their fundamental job of good mechanical and electrical connection . . . Let us examine how this is achieved: Taking for example, 'C' and 'N' types and the stages of assembly that have to be followed in putting a plug or socket on to a cable end . . . Cable end preparation comes first. The protective sheath, the screening, the insulating dielectric and, finally, the centre conductor must each be exposed and cut accurately to fit the piece parts, both metal and insulating, that will be offered to them in the assembly process. The final work must give protection against the entry of moisture and/or dirt, and be able properly to mate with its counterpart.

"All makers supply detailed cutback dimensions for cables, and many offer reducers where there is a change in cable diameter, as well as adaptors to enable one type to intermate with another. Backend parts support the cable outer, while the screen is gripped and pressed into the metal shell, with the whole firmly anchored by an expanding grommet driven from the rear by a threaded locking ring. Before this is done, the internal PTFE insulation is put in place and the centre contact pin soldered or crimped, as appropriate. The resulting assembly should now be ready for use.

"Type C, which is of medium size, is weatherproof with a low VSWR up to 10GHz. It is characterised by a two stud bayonet locking ring, with a milled surface, which enables quick connect/disconnect . . . Type N is also a medium size weatherproof connector, where the bayonet locking ring is replaced by a threaded collar with a milled surface for finger tightening.

"The continued expansion of activity in the microwave region has brought new types of connectors. Amphenol's 'SMA' and 'SSMA' types are good examples. The former is a subminiature semi-precision (3mm) unit, with good performance up to 18GHz and, with semi-rigid cable, to 26.5GHz . . . Stainless steel gold plated bodies are used, catering for cables from 0.14-in to 0.25-in. At these frequencies, any connector range must include an ability to interface with stripline. A high performance Amphenol version gives a very low VSWR up to 40GHz. For many antenna applications, precise phasing is very important, and therefore features have been incorporated in the SMA type, for example, when used with semi-rigid cable, for phase adjustment in the connector itself by means of a nut which, when turned, brings about small changes in cable length and hence phase . . . Demands for an even smaller type have resulted in the SSMA, which is smaller than the SMA and designed for rigid and semi-rigid cables of 0.085-in diameter.

"We must also mention the workhorse of the instrument makers, namely the BNC. As the letters imply it is a 'C' type in miniature, having a two-stud bayonet lock and make to take small diameter flexible cables. It is used below 4GHz but special versions are available up to that limit. Its quick connect/disconnect feature renders it ideal for input/output in measuring and test equipment . . . "

On the topic of sealing coaxial cables (*TT*, April 1995) Dr R H Biddulph, G8DPS, comments: "I use RTV silicone rubber tube 744 made by General Electric of the USA. It cures liberating *alcohol* (Ethanol) which is non-corrosive and smells nicer than acetic acid! It is available from Industrial Silicones and Lubricants Ltd, International Centre, Spindle Way, Crawley, West Sussex RH10 1TZ. It costs about £8 for 310ml and would be a good buy for a club since it has a reasonable shelf life if sealed after use with aluminium foil."

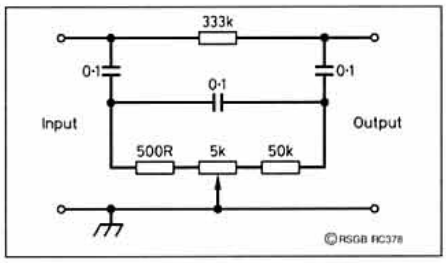


Fig 7: 60Hz notch filter (tuneable 40-120Hz) as noted by DA1PE.

A 40-120HZ TUNEABLE NOTCH FILTER

PETER COLE, DA1PE/G3JFS (Comms Branch (Tels Division) HQ UKSC (Ger), BFPO 140) while scanning some notes he made about 15-20 years ago, came across the filter circuit shown in **Fig 7**. He writes: I've no idea of its origins, but it certainly works. It is clearly some form of bridge network and I would very much like to know (a) how the circuit is derived; and (b) the design equations. Perhaps one of your mathematically-minded readers could help."

It appears to be an R-C (resistance-capacitance) form of the Bridged-T network but I willingly leave it to others to explain the mathematics to G3JFS!

HERE AND THERE

IT SEEMS HIGHLY likely that before long amateurs will begin to use digital speech systems based on the new techniques that permit communications quality speech to be transmitted at relatively low bit rates compared with the standard 64kbit/s of pulse code modulation. A recent book on this subject is *Digital Speech - Coding for low bit Rate Communications Systems* by Ahmet Kondoz of the University of Surrey (John Wiley and Sons, 1994). In his preface, the author writes: "Speech has remained the most desirable medium of communication between humans. Nevertheless, analogue telecommunication of speech is a cumbersome and inflexible process when transmission power and spectral utilisation, the foremost resources in any communication system, are considered. Digital transmission of speech is more versatile, providing the opportunity of achieving lower costs, consistent quality, security and spectral efficiency in the systems that exploit it . . . . The advent of faster and more reliable DSP chips has made possible the easy real-time implementation of highly complex algorithms. The sophistication is also exploited in the implementation of more effective echo control, equalisation and forward error control systems."

With DSP chips becoming available for speech bit rate compression to 16Kbit/s and less, intended for use in low-cost mobile and handheld telecommunication systems, it should also be possible to reduce the VHF spectrum needs for amateur VHF/UHF systems. It will, of course, be necessary for everyone to agree on which one or more standards should be used for amateur digital speech. Ahmet Kondoz explains it is also necessary to remember that "as bit rate falls, acceptable speech quality can only be maintained by (a) employing very complex algorithms which are difficult to implement in real time even with the new fast processors with their associated high cost and power consumption, or (b) incurring excessive delay which might induce echo control problems elsewhere in the system." However, a degree of time delay is entirely acceptable for simplex speech.

It has been noted several times in *TT*, that the inverted ground plane (vertical-T) antenna can readily be adapted to provide either horizontal or vertical polarization. 'Reflecties door PAOSE' (*Electron*, March 1995, p91) draws attention to an interesting way of providing alternative feed inputs for such an arrangement stemming from Ingo Huettie, DJ6YC: **Fig 8**. It would be feasible to provide remote switching by means of a coaxial relay or (for HF) a less expensive relay. With the dimensions shown, the system is intended for 7MHz.

Most of us tend to associate 'acid rain' with forestry problems in Norway and elsewhere, but as, Richard Genaille, W4UW, points out in 'Acid Rain and Your Antenna' (*CQ*, February 1995, p13-20) acid rain damages antenna systems. One of the solutions proposed by W4UW is to enclose insulators etc in empty, plastic soft-drink bottles to protect them from the acid rain.

Motorola have announced a second generation of chips specifically intended to form the heart of dual conversion narrowband FM receivers or as the lower IF of a triple-conversion system. Applications of the new MC13135 and MC13136 ICs include cordless telephones, short range data links, walkie-talkies, low-cost land mobile, amateur radio receivers, baby monitors and scanners. It is claimed that these chips offer significant advantages over the first genera-

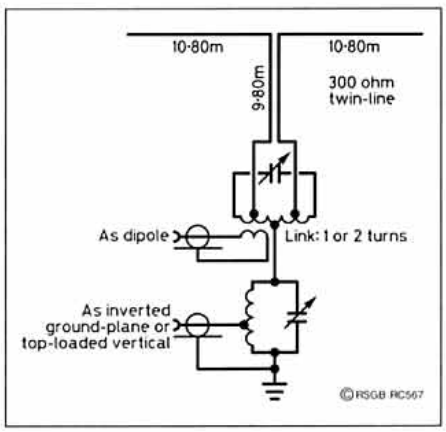


Fig 8: How an inverted Ground Plane (Vertical-T) antenna can be arranged to function alternatively as a horizontal dipole by using two matching networks which may be permanently connected. The coaxial feedline is then plugged into the appropriate socket. Dimensions shown are for 7MHz but could be scaled for other bands.

73

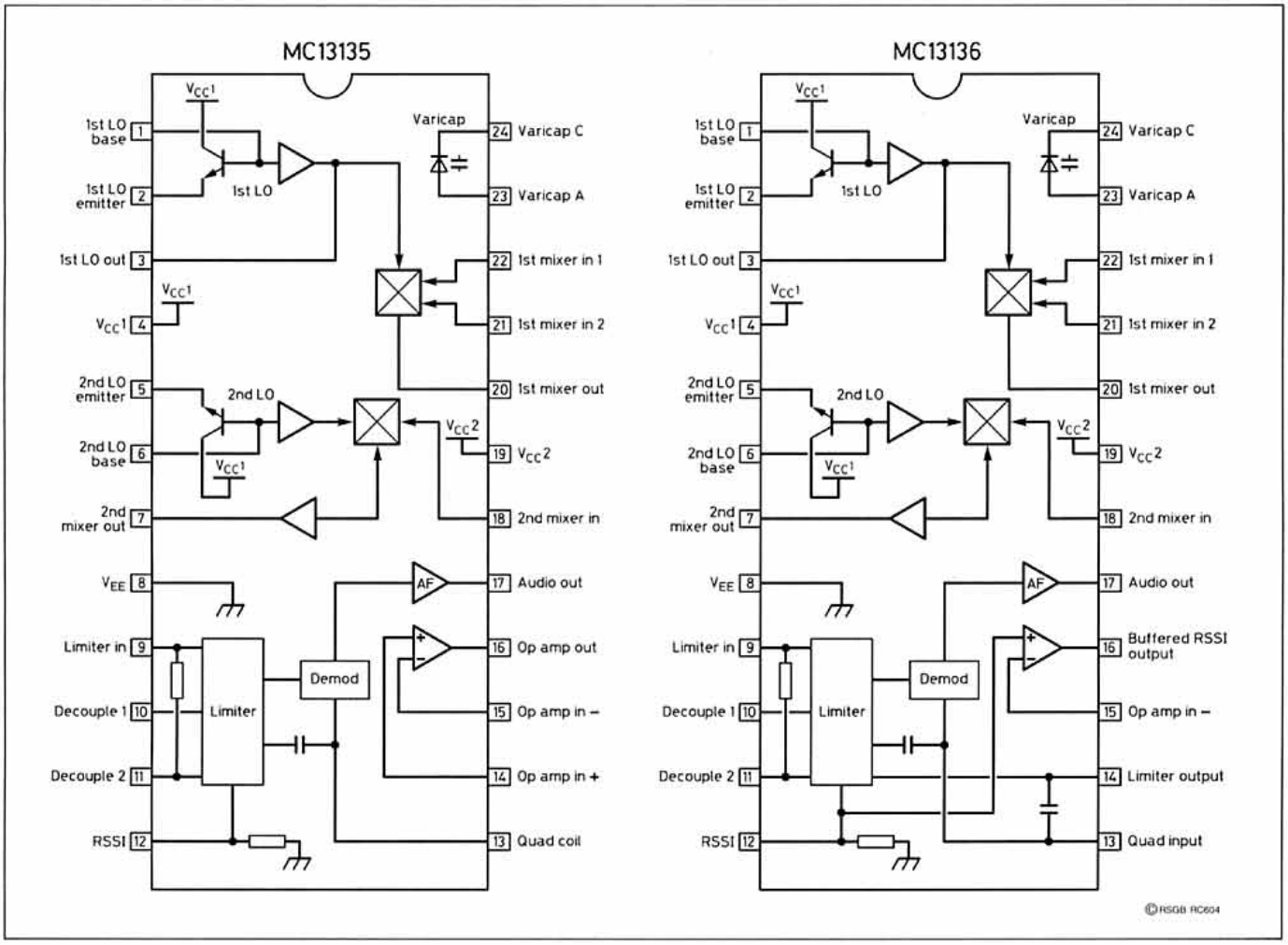


Fig 9: Pin connections for Motorola's 'second generation' MC13135 and MC13136 chips forming the heart of dual conversion, narrowband FM receivers.

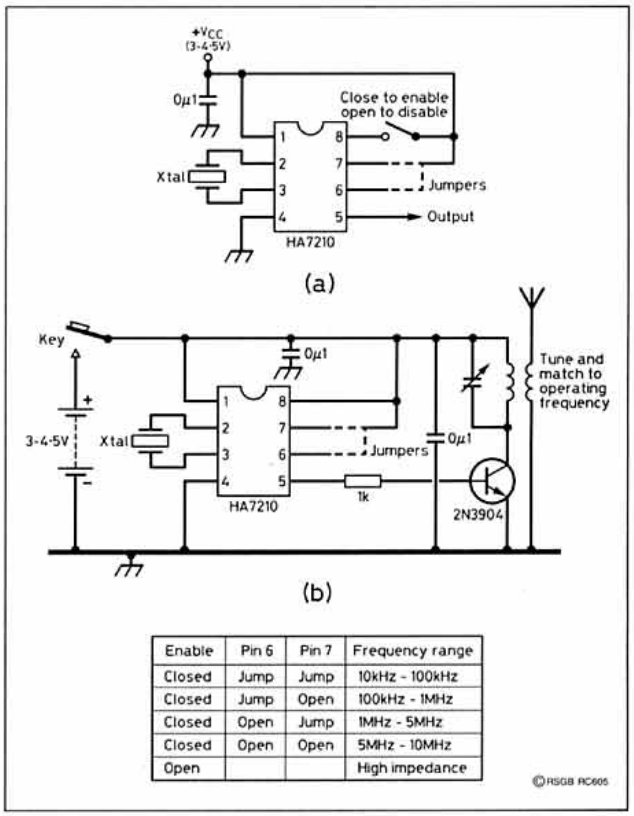
71 tion in signal handling and first oscillator operation, etc. Both devices include a Colpitts oscillator, VCO tuning diode, low-noise first and second mixer and LO, high-gain limiting IF and RSSI. The MC13135 is designed for use with an LC quadrature detector and has an uncommitted op-amp that can be used either for an RSSI buffer or a data comparator. The '36 can be used with either a ceramic discriminator or an LC quad coil and the op-amp is internally connected for a voltage-buffered RSSI output. **Fig 9** shows the pin connections.

Irwin Math, WA2NDM, (*CQ*, March 1995) shows how a Harris HA7210 chip can form "a minimum component, ultra-simple crystal oscillator" for use between 10kHz and 10MHz. Apart from the IC it requires only the crystal, an 0.1uF bypass capacitor and jumper wires for different frequency ranges: **Fig 10**.

Harry Leeming, G3LLL, of Holdings Amateur Electronics noted the item on RF switching diodes in April's *TT* which advocated the use of PIN-type Schottky diodes because of their improved dynamic range but remains unconvinced that such diodes can be relied upon not to deteriorate and become noisy in service. He writes: "Take the FT757 as an example. These have a reputation of being noisy on receive; indeed on some samples if you switch in the RF preamp the noise comes up more than the signal. Check the dozen diodes (ISS97 Schottky barrier types) around the input to the band-pass filters and the transmit/receive switch and up to half of them can sometimes be found to be leaky. Despite being 'yesterday's technology' I replace them with 1N4148 or similar and the receiver becomes as good as new and usually *stays* that way. I wonder if anyone can suggest modest priced diodes that are better than the 1N4148 in this application and will stand-up in service? I confess to being unable to detect any difference in the performance of a new FT757 and one that has had 1N4148s fitted."

CORRECTION, MAY *TT* P59

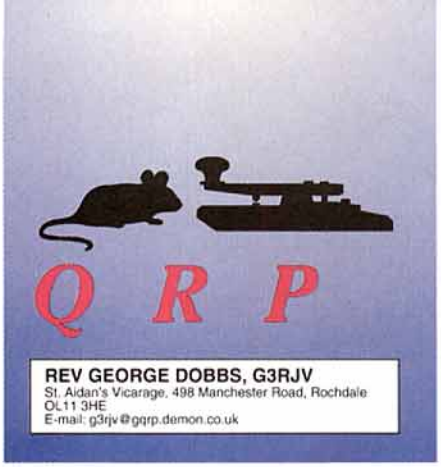
UNFORTUNATELY, the names of both 'Double - cross' amateurs ('Amateurs and the VE Day and VJ Day Anniversaries, *TT*, May) were printed incorrectly. They were Ronnie Reed, G2RX and Stan Reisen, G5SR. ♦



Enable	Pin 6	Pin 7	Frequency range
Closed	Jump	Jump	10kHz - 100kHz
Closed	Jump	Open	100kHz - 1MHz
Closed	Open	Jump	1MHz - 5MHz
Closed	Open	Open	5MHz - 10MHz
Open			High impedance

©RSGB RC605

Fig 10: (a) Minimum component, ultra-simple IC crystal oscillator based on the HA7210 chip. (b) Milliwatt QRP CW transmitter using the HA7210 chip with 2N3904 or similar transistor.



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THERE WAS AN error in the item on subscribing to the G QRP Club Internet list which appeared in the last *QRP* column (*Radcom*, April 1995). The subscription instruction should read 'GQRP-L'. To join the list send mail to 'majordomo@insite.parasoft.co.uk' with the following command in the body of the E-mail message: 'subscribe gqrp-l' (the last figure is L). Send mail to gqrp-l@insite.parasoft.co.uk and the mail will then be sent to everyone on the list. Anyone subscribing to the list will receive guidance on use of the list and how to unsubscribe.

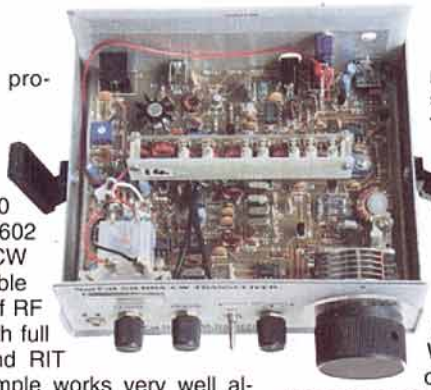
QRP CONSTRUCTION

FOR MANY RADIO amateurs the idea of QRP is synonymous with the construction of amateur radio equipment. Certainly low power operation on the HF bands lends itself very well to home made equipment and many of the QRP signals to be heard on the bands emanate from home built equipment. For many years *SPRAT*, the journal of the G QRP Club, has featured practical projects as at least two-thirds of its contents. Some join the G QRP Club solely for the construction articles and tips in *SPRAT*.

CLUB KITS IDEA TAKES OFF

A recent trend in QRP construction has been the introduction of club kits. These kits, usually of complete QRP transceivers, are sold at discounted prices only to members of a QRP Club. The doyen of the club kit concept is the NorCal QRP Club. The Northern California QRP Club was founded in 1993 by Doug Hendricks, KI6DS, and Jim Cates, WA6GER. From the outset it produced an ambitious and informative journal, *The QRPp*. Openly modelled on *SPRAT*, it contains many original and useful construction articles and information.

The big breakthrough for NorCal was the production of the NorCal-40, a 40 metre Super Transceiver Kit available to members only. A production run of 200 was arranged - though the club did not even have that many members - and all of them were quickly sold, setting the club on a steady ascent. Later a NorCal-40A was produced for the benefit of those who missed the original NorCal-40 offer. The NorCal-40 and 40A are NE602 based superhet CW transceivers capable of some 2 watts of RF output on 40m with full break-in, AGC and RIT facilities. My example works very well although the front end tends to suffer under European conditions in the evenings.



Left: NorCal Sierra, a multiband superhet CW transceiver.

The NorCal-40 was designed by Wayne Burdick, N6KR, who followed up with the Sierra, a multiband superhet CW transceiver, which became the second NorCal kit. The basic circuit of the Sierra is an improved version of the NorCal-40 with crystal mixing used to produce a multiband transceiver. To eliminate the need for complex, and expensive, band switching, the Sierra uses a system of band modules for each amateur band. This module contains the frequency determining and frequency conscious parts of the circuit for each band. Each module is built on to a small sub-board with gold plated edge connectors which plug in to the main transceiver board. The case has a flip top for ease of band changing.

The Sierra was an equal success and now the NorCal QRP Club is in the process of producing yet another kit, the Cascade. This is a QRP SSB Transceiver for 80 and 20 metres based upon a 9MHz IF filter. UK radio amateurs can join the NorCal QRP Club. The subscription for non-USA members is $20 a year and enrolment or information is available from Jim Cates, WA6CER, 3241 Eastwood Rd, Sacramento, CA 95821, USA. The club only accepts US funds and all cheques should be made out to Jim Cates.

US CLUB UNVEILS THE 40 - 40

One of the smaller QRP clubs in the USA is the New England QRP Club which produces an attractive little journal called *72*. The club has the distinct advantage of having Dave Benson, NN1G, as a member. NN1G has built up quite a reputation for designing QRP projects and it was no surprise to find the New England QRP Club producing a members-only kit based on a design by Dave. This kit is another version of a 40 metre NE602-based superhet CW transceiver called the 40 - 40. It was given this name because it covered 40 metres and sold for only $40. The kit contained a printed circuit board and all the board parts to build the transceiver.

This kit was such a success that it was recently published as an article in *QST* and NN1G has now made the kits available to non-members as well. For details of the New England club contact Jack Franke, NG1G, P O Box 1153, Barnard, Vermont 05031, USA. Information about the 40-40 kit is available from Dave Benson, NN1G, 80 E Robbins Ave, Newington, CT 06111, USA.

NEW KITS FROM G QRP CLUB

Having for many years produced a variety of home construction projects for members, often backed by Kanga Products kits, the G QRP Club is set to launch its own kit. The move was prompted by numerous requests from members who have seen the other club kit projects.

One of the problems of the kits produced in the US is that they are aimed at 40 metres. Though fine in the US and other parts of the World, the band proves a difficult one to use in Europe with the number of strong broadcast stations clustered at the high end of the band. The G QRP Club kits will be superhet CW transceivers for either 40 metres or 20 metres, called the GQ-40 and GQ-20 respectively, which will have the following features: A three pole, high Q, bandpass filter; a passive first mixer; a six pole 500Hz IF filter; QSK operation; RIT; a class AB Power Amplifier capable of at least 5 watts of RF output and a punched case with all the hardware.

The GQ Transceivers have now been bench and air tested and several prototype kits are being built by members to check the documentation. One hundred of the kits will be offered to members of the G QRP Club at a special member's price published in the summer issue of *SPRAT*. When this initial run of kits ends, the kits will be available to anyone at normal commercial rates from Hands Electronics. For information about the G QRP Club send a first class stamp to me at the address above.

MORE KITS ON THE WAY

A NEW NAME to appear in the UK kit manufacturers market is Ben Spencer Consultants of Bath who have begun to issue a small range of kits for the radio amateur. The kits include a range of CW and SSB active filters, Iambic keyers, and several items of test equipment. A repair service and a technical helpline is provided with the all the kits. More information from Ben Spencer Consultants, 33 New King Street, Bath BA1 2BL.

Hands Electronics have been working on a project developing multiband transceiver kits for use with their RF Power Amplifier. I have held off reviewing the kit until the latest revision appears on the market. This will be a 9-band CW and SSB transceiver kit with a DDS VFO with MPU controller driving a band mixer via phase locked oscillators plus all the options one might expect on a modern radio transceiver. This will be available in the summer when I hope to build and review this latest version. Advanced details are available from Hands Electronics, Tegryn, Llanfyrnach, Dyfed SA35 0BL, tel 01239 77427. ♦

NorCal-40, a 40 metre Super Transceiver kit .

GQ-40, a superhet CW transceiver for 40 metres, soon to be launched by the G QRP Club.

EMC

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115 Marshalswick Lane, St Albans,
Herts AL1 4UU

SOME 122 PAPERS on all aspects of EMC work were presented by leading authorities from industry and the academic sphere at the 11th International Symposium on EMC. More than 700 people gathered for the event which took place at the Federal Institute of Technology in Zurich, Switzerland on 7-9 March. It was reassuring to discover that a great deal is being done behind the scenes on this subject.

There were some interesting presentations regarding immunity. Mr van Doorn and Mr Worm, both from Philips Eindhoven, covered DAB (Digital Audio Broadcasting) versus FM as analysed with EMC in mind and also the simulation of the RF immunity property of analogue circuits. Mr Worm outlined the set-up for testing immunity to conducted radio frequency signals. On the subject of DAB versus FM, Mr van Doorn stated that the interference which the digital electronics in a DAB receiver emits in the DAB band would need to be 37dB below the EN55022 Class B limit so that the receiver does not interfere with itself. This calculation is also valid for situations where a DAB receiver is used in close proximity to any equipment which emits interference in the used frequency band.

The IARU Region 1 EMC Working Group also met during the Symposium week. Topics discussed included the latest position on standards for commercially available amateur radio equipment, mobile operation, uncooperative or unreasonable neighbours, and the relationship between the radio amateur and the electromagnetic environment. The latter subject was covered in a paper by the RSGB EMC Committee which was well received by the German National Society DARC who are using it as a working basis for EMC discussion in the DARC EMC Group. The RSGB paper compared the fields which can be generated by amateur transmitters with the immunity levels specified by current standards. It also compared the levels of RFI permitted by emission standards with received signal levels in the amateur service.

TELEPHONE EMC

THE EMC COMMITTEE has written to BABT (British Approvals Board for Telecommunications) complaining that it is approving telephones which have inadequate RF immunity. The committee pointed out that due to BABT approval, radio amateurs are not permitted to modify telephones or to construct filters which connect to the phone line. BABT confirmed that simple telephones are not tested for immunity in this country other than "impedance balance about earth" requirements in BS6305. BABT refused to accept that it was approving telephones with inadequate RF immunity.

Meanwhile, there is little doubt that carbon granule microphones, which telephone engineers call 'transmitters', have a high enough output to operate without an amplifier in the telephone. They were used from the earliest days of the telephone system right up until the 1970s and although they were prone to causing crackling noises, they rarely suffered from RF breakthrough. It would appear that when type 21A electronic microphone insets were first introduced to replace the type 16 carbon microphones in Post Office type 706 and 746 dial telephones, VHF AM air traffic control messages were heard on telephones at Manchester Airport! A more RF immune type 21B microphone was then introduced.

After telephone subscribers in the UK were permitted to buy their own telephone instruments instead of renting them from BT, a proliferation of telephones appeared on the market leading to a sharp increase in cases of amateur transmissions breaking through onto telephones. Many phones do not appear to have been designed with RF immunity in mind. A case in point was reported by Ron Bennett, G4DIY, who claimed the best DX he heard was on a telephone, his Comtel model 911. He said that it not only picked up another radio amateur 200 yards away but also a German language broadcast station after 8pm!

DEALING WITH TELEPHONE BREAKTHROUGH

It is worth making sure that you have at least one telephone which is immune to your own transmissions as this can be useful if a neighbour reports that you are breaking through on theirs. Lending the neighbour a telephone which doesn't suffer from RF breakthrough should convince them that the problem can be solved. If you operate on the lower HF bands, it is also worth having a BT 'Freelance' RFI Filter handy (see below).

If the telephone which suffers breakthrough is rented from BT, the subscriber should dial 151, the fault reporting number, and explain the problem to the operator. They should be well aware that this is a problem for BT to tackle but, in some cases, the subscriber needs to be persistent. Different telephone areas appear to handle RF breakthrough in different ways and in some areas they may call in the Radiocommunications Agency to check the amateur station. We have also had occasional reports of a 151 operator giving incorrect advice such as, "tell him to stop transmitting" or, "it's not BT's responsibility; contact the DTI".

There are several BT telephones with good RF immunity and fitting one of these in place of a rented phone which suffers breakthrough should solve most problems. BT may also fit a BT80A/RF2 RF filter where the line enters the building or near the affected telephone. This is a special version of the standard BT80A terminal block containing two series chokes which are designed to reject Medium Wave broadcast signals. They are also reasonably effective on the 1.8 and 3.5MHz amateur bands but become progressively less effective at higher frequencies. BT has a four pair copper braid screened cable called 'Cable, Distribution 3608A' which can be used where telephone wiring inside a building is acting as an MF or HF receiving antenna. The braid needs to be connected to a low impedance earth point. BT also has ferrite rings called 'Cores, ferrite No 103A' although we do not have details of the performance of these at different frequencies.

If the affected phone is not rented from BT, it is worth trying a plug-in filter, the 'Freelance' RFI filter which is also known as 'RF3' or 'Suppressor LJU 10/14A' (BT Item Code 87 7596). This incorporates four series chokes which are similar to those in the BT80A/RF2 so they have little effect on the higher HF bands and virtually none at VHF. Further details of the characteristics of both the filters mentioned above were published in *RadCom* (October 1993, p74). Some BT phone shops stock the 'Freelance' RFI filter at £7.95 but it can also be ordered directly from BT and charged to your phone bill. In April 1995, we dialled 150 and spoke to the Business Telephone Sales section of BT's London area It had them listed at £7.94 plus £2.54 postage and packing (both prices including VAT) but had none in stock and suggested that we try local BT phone shops. We couldn't get through to two BT shops and a third had none in stock but said it was expecting some soon.

Anyone wishing to construct or manufacture telephone RFI filters would have to submit them to BABT for approval. The filters would need to be manufactured by an approved company to appropriate quality standards. Fitting a suitable type of ferrite ring or split core to the phone cable does not affect BABT approval and may help on the higher HF bands where the 'Freelance' RFI filter is not effective. It is important to use a suitable grade of ferrite and to wind enough turns (see the EMC Section of 1994 and 1995 *RSGB Call Book*). The Maplin BZ34M computer data line noise filter is a clip-on split ferrite bead which looks neater than a ferrite ring and

Mr Worm from Philips Semiconductors, Eindhoven shows a slide of a typical set-up for conducted immunity tests at the EMC Symposium Zurich 95.

Band mode etc	Antenna noise temp K	Rx noise fig dB	Rx noise temp K	System noise temp K	Minimum discernible signal µV, dB(µV/m)		Antenna type	Antenna gain dBd	Antenna factor of a dipole dB	Antenna factor dB	Minimum discernible field strength dB(µV/M)
50MHz											
SSB (rural)	4000	5.0	627	4627	0.09	-21	4 ele yagi	8	2	-6	-27
FM (rural)	4000	5.0	627	4627	0.45	-7	dipole	0	2	+2	-5
SSB (urban)	300000	5.0	627	300627	0.7	-3	4 ele yagi	8	2	-6	-9
144MHz											
CW EME	200	0.5	35	250	0.004	-48	2x15 ele yagi	17	11	-6	-54
SSB (rural)	200	2.2	200	400	0.03	-30	15 ele yagi 14	11	-3	-33	
FM (rural)	200	2.2	200	400	0.15	-16	colinear	6	11	+5	-11
SSB (urban)	1000	2.2	200	1200	0.5	-6	15 ele yagi	14	11	-3	-9
432MHz											
CW (EME)	20	0.4	28	70	0.002	-54	4x15 ele yagi	20	21	+1	-53
SSB (rural)	150	1.8	150	300	0.02	-34	2x15 ele yagi	17	21	+4	-30
FM (rural)	150	1.8	150	300	0.1	-20	colinear	8	21	+13	-7

Table 1. Minimum discernible signal strengths on 50, 144 and 432MHz bands.

can normally accommodate six turns of telephone cable. Answering machines and some telephones have a mains supply via a separate mains adaptor unit. If such equipment suffers RF breakthrough, it may also be necessary to fit a ferrite ring or clip-on core to the cable from the mains adaptor to the phone or answering machine.

Radio amateurs are under no obligation to pay for filters for a neighbour's phone, TV or anything else but in many cases it is unlikely that the neighbour will pay and to insist on this could lead to a dispute. In practice, the radio amateur normally needs to obtain a suitable filter and lend it to the neighbour to find out whether it will solve the problem. If it works, the filter could be left with the neighbour, making it clear that it is on loan for as long as they need it. Offering it as as gift is not advisable as this gesture of goodwill could be taken as an admission of liability in the event of any future legal action.

Some telephone breakthrough problems cannot be cured by line filters or ferrite rings as they are caused by direct RF pickup in the telephone or pickup on the cable to the microphone or earphone. The latter problem can arise with two piece telephones where the handset is separate from the electronics and the two are connected together by an unscreened cable. Although the cable from the handset to the phone often has plugs at each end for ease of replacement, there do not seem to be any suitable plug-in filters for such cables.

In the USA, the FCC (Federal Communications Commission) has stated that, in general, its policy is to expect telephone receivers and similar devices to be designed and constructed in such a way as to make them immune to the levels of RF expected to be encountered in the environment in which they operate. The FCC receives 25,000 complaints per year of RF breakthrough to telephones due to CB, amateur and broadcast transmissions. In 1994, the FCC Field Operations Bureau published a Telephone Interference Survey, which covered a random sample of cases. In one third of cases, the breakthrough was caused by transmitters of 10 watts or less. The FCC also found that filters cured RF breakthrough in only one third of cases. They also tried substituting 'bulletproof' phones with carbon microphones and no semiconductors which eliminated RF breakthrough in 96% of cases.

Occasionally, RF breakthrough is heard with even the most RF immune telephone. This can occur if something else on the line is rectifying the RF and putting the resulting audio signal back on the line. Any other telephone, answering machine, modem, fax machine or alarm autodialler should be temporarily unplugged to eliminate this possibility. Corroded connections on the line can also rectify RF and according to 'Lab Notes' in October 1992 *QST*, transient suppressors can start to rectify RF after they have suppressed a few transients. In the UK, the transient suppressors are located inside the master socket.

TELEPHONE IMMUNITY

Ron Bennett, G4DIY, told how he did some tests of RF immunity with a BT engineer who had a selection of BT telephones in his van. Only the Vanguard 10E and the Duet 100 were sufficiently immune for use near Ron's HF amateur station.

Meanwhile, R Seabourne, G0UHN, revealed that he had a problem with RF breakthrough on a BT Vanguard TELE 4001AR and that BT exchanged this for a BT Relate 200 which solved the problem completely.

Eric Thirkell, GM4FQE, reported that his Slimtel and Venue 24E telephones both suffered RF breakthrough from 100 watts of 3.5MHz SSB. His new BT Response 500 is well named as it responds to SSB even when the handset is on the hook. With a 'Freelance' RFI filter and two ferrite rings on the handset leads, the breakthrough in the Response 500 was much reduced.

Dr Colin Sumner, G0POS, had RF breakthrough problems on the 1.8 to 28MHz bands with his Audioline 885 telephone/answering machine. Colin contacted Audioline for technical information and they advised him to use a 'Freelance' RFI filter and to check whether the telephone still suffered breakthrough when the power supply for the answering machine was unplugged. They also had information on modifications to reduce RF susceptibility of the handset but cautioned Colin that any do-it-yourself modifications would invalidate the BABT approval.

MERCURY COMPATIBLE PHONES

The majority of phones do not have good RF immunity and those which do are mostly made by BT, so they do not have a Mercury button! Unaware of any Mercury compatible phone with good RF immunity, we asked - in the *EMC* Column (*Radcom*, December 1994) - for information on telephone immunity, particularly Mercury compatible telephones. It emerged that an alternative approach is for subscribers to the Mercury 131 Residential Service to change to the Mercury 132 service if possible and to use an RF immune BT telephone. To make a call via Mercury using the 131 service, it is necessary to dial 131 followed by a PIN number then the phone number. A Mercury button is useful for storing the 131 and the PIN, although with some phones it is possible to use an ordinary memory for this purpose. Subscribers to the Mercury 132 Residential Service only dial 132 before the number. There is no PIN number so it's easier to use telephones which do not have memories or a Mercury button. The 132 service is only available to subscribers on BT digital exchanges which now serve 75% of BT customers. The charges for 131 and 132 are the same except that the 131 service charge is paid annually and with 132 it is paid quarterly.

Bob Wellbeloved, G3LMH, of Winchester has a neighbour who subscribed to the Mercury 131 service and bought a 'Connect 1 Plus' wired telephone from Mercury Communications. Bob's 100W PEP SSB transmissions on the 14 or 21MHz bands caused RF breakthrough on this phone. Mercury, who only sold one type of wired telephone, replaced the phone with another of the same model which suffered from the same problem. Bob lent his own BT Sceptre 100 telephone to his neighbour temporarily and proved that this did not suffer from any problem under exactly the same circumstances. The neighbour also has another phone which does not suffer from RF breakthrough but it does not have a Mercury button.

BT then fitted a filter at the point where the BT line enters the building but this made no improvement. Bob lent his neighbour a Freelance RFI filter which cured slight breakthrough at 14MHz but had no audible effect on the much more severe breakthrough on 21MHz. Mercury Communications offered Bob's neighbour a refund but she chose not to accept this. Mercury did not have any information on a telephone with a Mercury button and good RF immunity. The EMC Committee has been in contact with Mercury and with GPT, the telephone manufacturers. GPT viewed this customer's requirement as a spe-

cial need and said that it was unreasonable to expect it to provide a modified version of the telephone with increased RF immunity. The Connect 1 Plus was discontinued in 1994.

The Committee has received other reports on RF immunity or otherwise of Mercury compatible phones. Steve Slater, G0PQB, has three Mercury compatible phones, a Philips TD 9044 and two TD 9045 models, all of which suffer breakthrough from his transmissions on the 3.5 - 28MHz bands but not on the 1.8MHz band nor from the local 1548kHz Capital Gold AM broadcast transmitter.

Anthony Richards, GW4RYK, reports that at his office in Welshpool they have a Philips Mercury compatible telephone system labelled 'Sopho-set K260' which suffers from RF breakthrough from police car and motorcycle radios as they pass the office or wait at traffic lights.

Ross Cary, G3DYY, has a Betacom Duo combined answering machine and telephone. Ross said that his RF causes the telephone's Mercury button to lose its memory. He phoned the Betacom Help Line but they were unable to help. Ross then bought a Dialatron 'Designer M' Mercury compatible telephone system Model 01/4822W and said that it has good RF immunity even using 26dBW to his G5RV antenna.

RF EMISSION STANDARDS

A STANDARD OF particular importance to radio amateurs - EN 55022 (BS6527) - will be introduced in the UK next year. This applies to computers and is the basis for the Generic Emission standard EN 50081. Such steps have already been taken in the USA and Germany where RF emission standards for computers have been compulsory for many years. Although there should be some improvement from 1996, it should be noted that the standards were designed primarily to protect broadcast radio and TV reception with an outdoor antenna at a distance of 10 metres from the source of the emission. Consequently, they permit levels of RF emission which are large compared to the minimum detectable signal in the Amateur Service.

RF emissions from computers and microprocessors can be broad band, narrow band or a combination of the two. An example of a narrow band emission is a harmonic of a crystal oscillator which falls on one spot frequency in the amateur band. Although this can be a serious nuisance if it happens to coincide with a calling frequency, EME frequency or meteor scatter frequency, at least the rest of the band is clear. On the other hand, broad band emissions can cover all or part of a band with a blanket of QRM which may prevent the reception of weak signals. With true broad band RFI from EN 55022 compliant equipment, the level measured using an amateur SSB receiver with 2.4kHz bandwidth will be far below the EN 55022 limit because the EN 55022 standard uses a measuring receiver with 120kHz bandwidth.

For cable TV systems, the permitted levels of radiated emissions are currently much lower than EN 55022 and are defined in the Radiocommunications Agency standard MPT 1510. This prohibits the use of certain frequencies such as distress frequencies and sets limits of the field strength at a distance of 10 metres over the frequency range 30 - 1000MHz. These limits are up to +32dB(μV/m) at some frequencies but the limits are much stricter in the amateur bands. They are: -6dB(μV/m) at 50 - 52MHz, -18dB(μV/m) at 144 - 146MHz and -15dB(μV/m) at 432 - 440MHz. The level at 144 - 146MHz is 48dB lower than the EN 55022 Class B limit.

To put the various emission limits in the context of amateur reception, we need to know the noise levels and minimum detectable signal levels for amateur reception on various bands. Some noise is actually picked up by the receiving antenna from natural or man-made sources and some noise is added by the receiver. To find out what signal levels can be detected by VHF/UHF DX operators in practice, we asked Ian White, G3SEK, the *In Practice* columnist about the minimum detectable signals on the 50, 144 and 432MHz bands. Ian provided the noise temperatures and minimum detectable signals listed in **Table 1** and EMC Committee member Dave Lauder, G0SNO, added typical antennas and calculated the minimum detectable signal level in terms of field strength. These are expressed in dB(μV/m), that is, dB relative to 1 microvolt per metre.

Table 1 gives 'ball park' figures for the so-called "minimum discernible signal" (MDS) levels where the signal power is equal to the sum of the receiver noise power and antenna noise power. The figures in microvolts are pd (potential difference) across 50Ω for a receiver bandwidth of 2.5kHz for SSB and 100Hz for EME (moonbounce) CW. It is assumed that cable loss is insignificant or that a mast head pre-amplifier is used. Both natural and man-made noise levels decrease at higher frequencies while for 432MHz EME operation, the noise temperature is much lower when the antenna is pointing well above the horizon because the sky appears very cold at 432MHz compared to 144MHz. Some allowance has been made for antenna losses and ground noise pickup for 432 MHz EME. For FM, 8dB has been added to allow for the increased receiver bandwidth and another 6dB to achieve significant quieting. The 'urban' figures are for a fairly noisy urban location but are not the worst imaginable. At a typical suburban location, the man-made noise levels may be significantly lower.

To relate the signal at the output of the receiving antenna to the field strength of the received radio wave, we need to know the gain of the antenna relative to a dipole and also the antenna factor of a dipole. Space does not permit a full explanation of antenna factor but we have assumed that a lossless half wavelength dipole has a capture area of 0.13 square wavelengths. At 144MHz for example, a dipole has an antenna factor of 11dB which means that it delivers 1 microvolt into 50Ω in a field strength of 3.54 microvolts per metre or +11dB(μV/m).

Fig 1 compares the results in Table 1 with the EN 55022, US FCC Part 15J and MPT 1510 limits. Equipment for use in a residential environment will have to meet the Class B limits. Some limits have been adjusted to the equivalent field strength at a distance of 10m though the actual measurement distance specified by the standard may be different. The standards use a measuring receiver with 120kHz bandwidth and a special type of detector called 'quasi peak'.Fig 1 shows that allowable emissions from nearby equipment that complies with EN or FCC standards can produce very strong interference to VHF/UHF amateur operations - well over S9 on an SSB receiver.

We have rarely found anything which emits more than +20dB(μV/m) at a distance of 10 metres in the 144 - 146MHz band and even this level is likely to be found on only a few spot frequencies. Nevertheless, even something which emits signals 30dB below the EN 55022 limit across the whole band can make a pretty effective jammer if it is close enough! At 432MHz, few computers emit signals anywhere near the EN 55022 limit and when considering EME reception, a nearby computer would usually be well off the beam of the antenna system. Although the situation in practice is rarely as bad as shown in Fig 1 might suggest, that is little thanks to the 'protection' offered by the EN and FCC standards. It only means that most of us have been lucky up to now. The MPT 1510 standard pays much better attention to the needs of non-broadcast radio users and shows the EN and FCC standards to be sadly lacking in this respect.

Thus, it is disturbing that there has already been an attempt among the European standards making organisations to *relax* the EN 55022 B limits by 4dB. Surprisingly, this proposal came from a European country which is normally noted for setting high technical standards. It was claimed that the relaxation would save US $10 on every computer made in the World but no technical case was made for the relaxation.

It is not only radio amateurs who suffer from QRM from computers etc. Emergency services and PMR users suffer in commercial areas where there is a high concentration of computer equipment. Users of radio microphones in broadcasting or theatres have also had interference problems. ♦

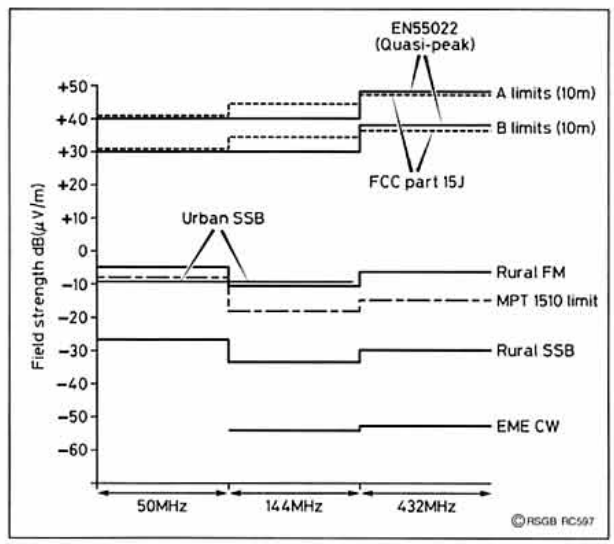


Fig 1: Minimum detectable field strengths and RFI emission limits.

HF/VHF VEE BEAM DESIGN AND PERFORMANCE, MAR 95

WE HAVE RECEIVED the following letter from P L Stride, G2BUY, regarding the article on HF/VHF Vee Beam Design and Performance by Richard A Formato, K1POO.

"The HF Link Geometry section of this article contains a number of obvious misconceptions.

"Fig 6 shows all the ionospheric layers at a common altitude rather than at the correct levels of about 60km for D, 120km for E, 250km for F1 and 300/500km for F2. It is also inferred that the D layer contributes to the returning signal whereas it only introduces attenuation. In practice, only the F2 layer is important in long distance paths above about 2000km.

"The text and Fig 7 refer to the use of the '4/3 radius earth'. This concept was introduced to account for the increased ground range resulting from *atmospheric* refraction of higher frequency HF, VHF and microwave signals. It is not applicable to paths above about 1km and has no relevance whatever to ionospheric propagation. Amended figures for Chicago and New York are:-

Layer Height 500km		
Distance, km	Hops	Take-off Angle
6146	2	10.4°
5381	2	13.6°

Layer Height 300 km		
Distance, km	Hops	Take-off Angle
6146	2	3.8°
	3	11.3°
5381	2	6.2°
	3	14.0°

"The errors are only significant at low take-off angles.

"It would also have been interesting to know something of the origins of the computer programme on which the article is based and of any experimental verification."

The author replied:

"The purpose of Fig 6 is to illustrate the concept of virtual height and its importance in determining the range of take-off angles needed to support a particular link. Fig 6 is not intended to imply that the usual ionospheric layer model places all the layers at one height. Quite to the contrary, the virtual reflection height typically varies between 100 and 500km, which is why Fig 7 plots curves for virtual heights in this range. A good discussion of this topic is available in [1], Section 17.04.

"The 4/3 earth correction applies only to groundwave propagation, not to ionospheric paths. The communicated range plot in Fig 7. should therefore be replaced with the enclosed plot [shown on the right - *Ed*] which is computed for an actual mean spherical earth radius of 6371km. Reference [1] Section 16.07 is a good source of information for readers interested in atmospheric refraction effects.

"The antenna patterns were computed on a PC using a program that implements Dr M T Ma's sloping vee model described in [2], Section 6.1. Impedance bandwidth was experimentally verified on several antennas, and the measured VSWR results in Fig 11 are typical. Detailed pattern measurements have not been made. Several antennas were built and operated very successfully on links in Greenland, between Greenland and the USA, and between Christchurch, NZ, and Antarctica.

"[1] *Electromagnetic Waves and Radiating Systems*, Second Edition, Edward C Jordan and Keith G Balmain, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1968.

"[2] *Theory and Application of Antenna Arrays*, M T Ma, Wiley-Interscience, John Wiley & Sons, New York, 1974."

LF MOBILE ANTENNA DESIGN, FEB 95

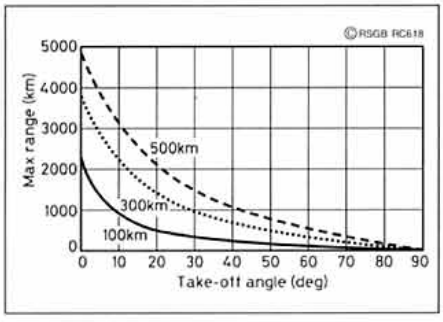
WE HAVE ALSO received a letter from P L Stride, G2BUY, regarding the article on LF mobile antenna design, R Bearne, G4DUA

"On the first page in discussing radiation resistance, the author first quotes a formula then continues with two examples which are incorrect. The correct figures are 0.0658 and 0.148 respectively. However, the correct values do subsequently appear in Table 3.

"In discussing antenna capacitance the author quotes a formula which is plainly incorrect as it fails to pass the simple test of Dimensional Analysis. It is clear that the numerator should contain the variable h representing the antenna length. Comparison with similar formulae in related fields indicates that the expression in square brackets should appear as a denominator not as a numerator. With these changes the expression comes close to the right answers but still does not reproduce the figures given in Table 3. A minor adjustment to the numerical constant does reproduce the Table 3 figures. The corrected formula then reads:

$$C_a = 2 \pi E_o h / (\ln(h/a)-1.7)$$

"This is in reasonable agreement with the formula given in Terman's *Radio Engineers Handbook* which I believe to be essentially correct.



"In the discussion on skin effect the variable omega is said to represent frequency in radians, this is incorrect it should read radians per second.

"In the discussion on maximising coil Q the author correctly quotes Butterworth's criterion of. Coil Diameter = 8/15 x coil length.

"The author then misinterprets this as '2:1 diameter to length ratio' whereas it should be interpreted as 2:1 length to diameter ratio! ie Butterworth is telling us that the coil should ideally be longer than it is wide - a fact which is generally recognised by those who have experience in this field. This is plainly not a simple slip as the subsequent coil design is based on this incorrect premise where the coil diameter is 75mm and the length is 40mm.

"There is a presentational error in Table 3 in that the first two columns have become conjoined and therefore read as nonsense. The correct presentation is as follows:

Antenna Length	Radiation Resistance
0.5	4.11E-03
1	1.64E-02
1.5	3.70E-02
2	6.58E-02
2.5	1.03E-01
3	1.48E-01

"In this table in order to calculate the antenna efficiency a figure has been assumed for earth loss resistance but its value to has not been declared. Investigation reveals this assumed figure to be 5 ohms - about half the figure which the author ascribes to his system later. The remaining figures in Table 3 appear to be correct with the exception of the relative gain figures which I am unable to reconcile with the associated efficiencies. For example taking the reference as 0.5m with a coil Q of 200 for which the efficiency is 0.01 compared with a 1m antenna of efficiency of 0.04 implies a power gain of 4 times corresponding to 6dB, yet the table gives a figure 8.07dB! Maybe there is a hidden rounding up error in the reference figure in the spreadsheet program which accounts for this discrepancy. This also impacts upon the graph shown in Fig 2.

"In the penultimate paragraph the author claims his coil measured 380mH (millihenries) but this should be 380 microhenries. This is significantly greater than the calculated value which appears in Table 3 as 318 microhenries. [This was not the author's fault, see note below-*Ed*]

"On a philosophical note, although the realisation of high Q is an important parameter in antenna efficiency which cannot be denied I believe another important parameter is low self capacitance associated with the loading coil since this acts to divert current from the whip radiator. This may account for why the very long coils favoured by the commercial manufacturers have proved to be so successful.

"The author makes a case for the use of Litz wire (or bunched conductors as it is now called) to obtain high Q and this reminds me

CONTINUED ON PAGE 80

CONTEST CLASSIFIED

All rules should be read in conjunction with the General Rules published in *Contest Classified*

DIRECTION FINDING RESULTS

SOUTHGATE VHF FOXHUNT

This year's 2m DF Hunt, held as ever on August Bank Holiday Monday, attracted teams from five clubs (Southgate, Verulam, Silverthorn, Cambridge and Swansea), which set a new record.

Two double DF Hunts were arranged (1400 - 1600 and 1700 - 1900), with G7HJA as the 'easy' fox, and G4KZD as the 'difficult' fox on each hunt.

In the first hunting period G7HJA was seated at the edge of a field in Whitewebbs Park and was found with relative ease by just about everyone. The opposite was true of G4KZD, who was extremely well buried somewhere between the water tower and Cockfosters Road in Trent Park. Only three teams managed to find him, and it took each of them a long time to do so.

After the break, the second hunt commenced. This time G7HJA was found sitting by one of the lakes in the grounds of Forty Hall, while G3KZD was once again in thick undergrowth, this time alongside the edge of Whitewebbs golf course.

As soon as the final hunt ended, everyone QSYed as quickly as possible to The Spinney for the announcement of the results and the post DF Hunt barbecue. Predictably our Welsh friends won again, but this time not by a very large margin. Unfortunately neither novice team had the confidence to hand in their entry form, so no winner can be declared for this section.

Post	Team member(s)	Transmitters				Total
1	GW1XBG/GW1DTA	14.26	15.32	17.34	18.20	248
2	G4DFB	14.26	-	17.33	18.14	227
3	G3UUT & Family	14.31	-	18.20	17.38	211
4	G3JKS, G0ODS, G0SNO, J Lauder	14.44	-	17.39	18.20	197
5	G3ZVW, G0NMC, B Neal	14.44	-15.55	18.35	18.20	146
6	2E1BFL, C Wood G0MEE, A Evans	14.19	15.58	18.54	18.30	139
7	G0ULI	14.28	-	18.15	18.59	138
8	G7COQ, G Raxworthy	16.00	-	-	18.59	1

ARDF RULES

FOREST OF DEAN VHF ARDF WEEKEND

An informal weekend of direction finding is once again being organised by the Swansea DF Group under the auspices of the RSGB. The aim is to promote interest in 2m 'foxhunting' and encourage inter-club and national competition. It will take place in the Forest of Dean. A local camp site is available: details from GW1BXG.

Dates: 8 and 9 July 1995.

Times: Saturday 1030 - 1400 and 1600 - 1930, Sunday 0930 - 1300BST - all double foxes.

Maps: Outdoor Leisure 14 - 1:25000 Wye Valley and Forest of Dean; or Landranger 162 - 1:50000, Gloucester and Forest of Dean.

Anyone requiring directions on Friday should give a call on 144.725MHz. On Saturday night it is intended to have a BBQ and a few drinks and maybe a portable hunt around the campsite.

Details from Phil Smith, GW1XBG, tel: 01792 642001.

WALSALL AMATEUR RADIO CLUB NATIONAL VHF EVENT (2 METRES)

Please note that the start location for this event (on 4 June 1995) as given in May 1995 *Contest Classified* should read: the Greyhound public house car park, on A50 in the village of Boundary.

SOUTH MANCHESTER QUALIFYING EVENT (TOPBAND)

Date: 11 June 1995

Map: 118 (Stoke on Trent)

Assembly: 1300 for start at 1320.

Location: Picnic area on B5082, 5 miles SE of Northwich, NGR 732709.

Competitors requiring tea should notify Chris Plummer, tel: 01782 514630 no later than 3 June.

HF RULES

RSGB SSB FIELD DAY 1995

1. The **General Rules** for RSGB HF Contests, published in the January 1995 issue of *Radio Communication* will apply. This is a 'Portable' contest.

2. **When:** 1500UTC 2 September to 1500UTC 3 September 1995.

3. Sections:

(1) Open: Maximum licensed power. Equipment: one transmitter and one receiver or one transceiver, PLUS an additional receiver if desired. No antenna restrictions.

(2) Restricted: Maximum of 200W pep **input power**. Equipment: one transmitter and one receiver, or one transceiver - no additional receiver. Antenna: Only one antenna may be used, which must be a single element (eg dipole, longwire, W3DZZ, trapped vertical) having not more than two elevated support points. No part of the antenna may be more than 15m above ground level.

Entrants in both sections may keep standby equipment on site, but it may not be connected to a power source or antenna at the same time as the main equipment.

4. Contacts: SSB only in the 3.5, 7, 14, 21 and 28MHz bands. Please note that the 10-minute QSY rule has been deleted.

5. Exchange: RS plus serial number starting from 001.

6. Scoring: For each complete QSO with:

(a) a fixed station in IARU Region 1 2 points

(b) a station outside IARU Region 1 3 points

(c) a /P or /M station in IARU Region 1 5 points.

IARU Region 1 countries include those in Europe, Africa, USSR, ITU Zone 39 and Mongolia. For a more precise definition refer to the RSGB Amateur Radio Operating Manual.

7. Multiplier: ONE for each DXCC Country worked on each band.

8. Final Score: The final score is given by the total number of QSO points earned on all bands added together, multiplied by the total number of multipliers worked on all bands added together.

9. Logs must be addressed as per General Rules, and postmarked not later than the Monday **22 days** after the end of the contest. Please don't forget (i) Separate logs for each band, (ii) the list of Multipliers worked for each band and (iii) Alphabetically sorted dupe sheet of callsigns worked.

10. Awards: The leading station in the open section will receive the Northumbria Trophy. The leading station in the restricted section and the second- and third-placed entrants in both sections will receive certificates of merit. A certificate will also the awarded to the station in each continent submitting the highest-scoring checklog.

21 / 28MHZ SSB CONTEST 1995

1. The General Rules for RSGB HF Contests *(RadCom* Jan 95) apply. ***Entrants are reminded that stations using packet or other spotting facilities must enter as multi-operator stations.***

2. Eligible entrants: Overseas (inc EI). UK.

3. When: 0700 - 1900UTC, Sunday 1 October 1995.

4 Sections: (a) UK **(b)** Overseas **(c)** UK Receiving **(d)** Overseas Receiving.

Single operator and Multi-operator entries accepted in transmitting sections.

5. Frequencies / Mode: 21150 - 21350kHz and 28450 - 29000kHz, SSB only.

6. Contest Exchange: RST and serial number, commencing with with 001. UK stations must also send their County Code.

7. Scoring:

(a) UK stations work only Overseas stations, 3 points per QSO. Multipliers as per General Rules.

(b) Overseas stations work only UK stations, 3 points per QSO. Multipliers: 1 for each UK County worked on each band. **NOTE:** *The same station may be contacted on both bands for QSO points and Multipliers.* **Total Score:** The number of QSO points on each band are added together. The total number of multipliers on each band are added together. The final score is the total QSO points multiplied by the total multipliers.

8. Logs: Separate logs are required for each band. Overseas entrants may use the stationery provided by their National Society. UK entrants see General Rules.

9. Address for logs: RSGB HF Contests Committee, c/o G3UFY, 77 Bensham Manor Road, Thornton Heath, Surrey CR7 7AF, England.

10. Closing date for logs: UK entrants, postmarked by 1 November 1995. Overseas entrants, delivered by 1 December 1995.

11. Awards:

Section a: The Whitworth Trophy to the UK single-op winner. The Powditch Transmitting Trophy to the leading single-op entry on 28MHz. Certificates of Merit to the 2nd and 3rd placed entrants overall and on each band.

Section b: Certificates of merit to the three leading entrants. Subject to the decision of the RSGB HF Contests Committee, additional certificates may be awarded to the leading entrants from each continent / country.

Multi-operator entries: Certificates of Merit to the leading groups in each section.

RECEIVING SECTION

Rules as for the transmitting sections except where specified below. Holders of transmitting licences for frequencies only above 30MHz may enter the receiving section.

7. Scoring: UK SWLs log only Overseas stations in contact with UK stations participating in the contest. Overseas SWLs log only UK stations in contact with Overseas stations participating in the contest. Scoring and multipliers as for the transmitting sections.

8. Logs: Columns to be headed: time UTC; callsign of station heard; report / serial number sent by that station; County Code sent by that station (if applicable); callsign of station being worked; multiplier (if new); points claimed.

NOTE. In the column headed 'station being worked' the same callsign may only appear once in every three contacts except when the logged station counts as a new multiplier.

11. Awards (At the discretion of HFCC, dependant upon the level of support.) The Metcalf Trophy to the leading UK entrant. The Powditch Receiving Trophy to the leading UK entrant on 28MHz. Certificates of Merit to the leading 3 entrants in each section, and the leader from each overseas country.

21 / 28MHZ CW CONTEST 1995

1. The **General Rules** for RSGB HF Contests (*RadCom* Jan 95) apply. **Entrants are reminded that stations using packet or other spotting facilities must enter as Multi-operator stations.**

2. Eligible entrants: (a) UK, (b) Overseas, (c) UK Receiving, (d) Overseas Receiving. Single or Multi-operator entries accepted in the transmitting sections.

3. When: 0700 - 1900UTC, Sunday 15 October 1995.

4. Sections: (a) UK **(b)** Overseas **(c)** UK QRP **(d)** Overseas QRP **(e)** UK Receiving

(f) Overseas Receiving. QRP stations may use 10W RF OUTPUT or less.

5. Frequency / Mode: 21 and 28MHz bands, CW only. Entrants are requested not to operate in the sub-band 21.075 - 21.125MHz.

CONTINUED FROM 79

of the time many years ago when I was required to investigate this technique as part of my commercial activities. I recall that after obtaining some very anomalous results I discovered that the Q could be doubled by prebaking the winding at 150°c. This drives out the moisture reducing dielectric loss associated with the insulation and confirms that the capacitive current plays an important part in the overall loss. It follows also that keeping the coil protected from moisture is also very important and may militate against the use of this type of wire for the mobile application."

The author replied:

"Paragraph 2. Agreed that the radiation resistance figures in the text are typos, the correct values are in Table 3.

"Paragraph 3. The antenna capacitance formula in the text is a typo as observed.

"Paragraph 4. Obviously omega is frequency in radians per second.

"Paragraph 5. Although there is a typo 'diameter to length ratio' best results were obtained with a short coil of large diameter, which I believe to be due to the reduced winding loss because less wire is necessary.

"Table 3. Agreed there is a typo on the first two columns of the table. The gain figures are different because of the truncation of some figures to simplify the table.

"Paragraph 12. The values of inductance used in Table 3 were just examples and were not related directly to the values used in the real antenna.

"In response to the philosophical comments, I believe that short coils are more effective because of the reduced winding length required to meet the required inductance. Self capacitance is covered in my article by explanation of proximity effect and the use of Litz wire obviously requires the coil to be kept dry because of the cotton covering used on this type of wire.

"In general there were a few useful comments in this letter but most of the content was over critical in extreme."

[Note: We have had some minor teething problems with Greek symbols and our new typesetting software. This has resulted in μ (micro) changing to m (milli) and Ω (ohm) changing to W (watts). We are aware of the problem and are taking steps to prevent these errors appearing in print - *Ed*]. ♦

HF RULES

6. Contest Exchange: RST and serial number, commencing with 001. UK stations must also send their County Code.

7. Scoring: (a) UK stations work only Overseas stations; 3 points per QSO. Multipliers: as per General Rules.

(b) Overseas stations work only UK stations; 3 points per QSO. Multipliers: 1 for each UK County worked. The final score is the total of QSO points times the number of Multipliers worked.

8. Logs: Overseas entrants may use the stationery provided by their National Society. UK entrants see General Rules.

9. Address for logs: RSGB HF Contests Committee, c/o G3UFY, 77 Bensham Manor Road, Thornton Heath, Surrey CR7 7AF, England.

10. Closing Date for logs: UK entrants, postmarked by 13 November 1995; Overseas entrants, delivered by 11 December 1995.

11 Awards: T E Wilson, G6VQ, Trophy to UK single-op overall winner. Certificates of merit to leaders and runners-up in each section, overall and on each band; also to the highest-placed multi-op entries from UK and Overseas. Additional certificates may be awarded (at the discretion of the HF Contests Committee) to the leading stations from each Overseas continent / country.

HF RESULTS ON PAGE 83 ➤

HF CONTESTS CALENDAR

26 / 27 May	CQ-WPX (CW)
3 / 4 Jun	National Field Day (CW) (Apr 95)
17 / 18 Jun	All Asia (CW)
24 / 25 Jun	Summer 1.8MHz CW(May 95)
8 / 9 Jul	IARU Radiosport(Mixed Mode)
8 / 9 Jul	RSGB SWL (Mixed Mode)
16 Jul	Low Power Field Day (CW) (May 95)
29 / 30 Jul	IOTA (Mixed Mode) (Mar 95)
6 Aug	RoPoCo 2 (CW) (Apr 95)
12 / 13 Aug	WAE DX (CW)
2/3 Sep	SSB Field Day (Jun 95)
1 Oct	21/28 SSB (Jun 95)
15 Oct	21/28 CW (Jun 95)
28/29 Oct	CQ WW DX SSB

VHF CONTESTS CALENDAR

3 Jun	50MHz Trophy (April 95)
3/4 Jun	IARU 50MHz (April 95)
3 Jun	1st 50MHz Backpackers (April 95)
10 Jun	UKSMG Summer (April 95 p24)
18 Jun	70MHz CW (Mar 95)
18 Jun	2nd 144MHz Backpackers (April 95)
25 Jun	432MHz FM Fixed/Open (April 95)
1/2 July	VHF Field Day
2 July	3rd 144MHz Backpackers (April 95)
9 July	2nd 50MHz Backpackers (April 95)
22 July	144MHz Low Power / SWL (May 95)
23 July	432MHz Low Power / SWL (May 95)
20 Aug	432MHz Fixed / SWL (May 95)
29 Aug	144MHz CW Cumulatives (May 95)
2/3 Sep	144MHz Trophy / SWL (Jun 95)
3 Sep	4th 144MHz Backpackers (Jun 95)
13 Sep	144MHz CW Cumulatives (May 95)
24 Sep	70MHz Trophy / SWL (Jun 95)
28 Sep	144MHz CW Cumulatives (May 95)

VHF RESULTS

144 MHZ FIXED / SWL AND AFS CONTEST (DECEMBER 1994)

Good activity, flat conditions, windy, deep QSB, grim! These are just some of the comments received from contestants about this contest. This contest continues to attract a large entry: the number of entrants has increased by 34% over the last three years. The number of logs arriving on disk also continues to increase (11%) - thank you to everyone who sent in disks. One concern expressed about supplying logs on disk is "will my log be subjected to a greater degree of checking?". The answer is "no". That was the good news. The bad news is that some clubs are still not reading the rules before entering. The rules were changed this year to be in line with the 432MHz AFS contest to try and minimise confusion (or so we hoped!) Perhaps next year all clubs will read the rules before entering? Congratulations to the Martlesham DX and Contest Group for winning the AFS section of this contest, to G4PIQ for winning the single operator section and to GD4IOM for winning the multi-operator section. PE1EWR collects first place in the overseas section. * denotes certificate winner.

Ian, G0FCT

SINGLE OPERATOR

Posn	Call	Pts	QSO	Loc	Power	Ant	Zone	Best DX	Km
1*	G4PIQ	4961	451	JO01MU	400	4x15Y	C	F5JRX	693
2*	G4WFR	4277	362	JO01OV	400	8x9Y	C	DL5ANI	695
3	G4UDE	1765	236	IO82KT	400	2x14Y		DF2VJ	801
4	G4RGK	1638	236	IO91ON	300	17Y		DJ0QZ	725
5	G3NNG	1434	241	IO91EP	300	17Y		DL0WAE	693
6	G3MEH	1364	241	IO91QS	400	2x9Y		DF1IAZ	737
7	G0EGX	1354	179	JO01IT	100	14Y	C	DF1IAZ	654
8	G8CUL	916	184	IO91JO	180	14Y		DL2OM	621
9	G4ZTR	873	118	JO01KW	25	15Y	C	DG9NEO	683
10	G4TZM	817	125	JO01NW	50	2x14Y	C	DL4OL	612
11	GM4JJJ	816	52	IO86GB	400	4x17Y		G7RAU	613
12	G0GCI	790	135	JO01ED	160	13Y	C	DJ1NY	596
13*	G8ZRE	778	121	IO83NE	100	8Y	A	GI4OWA	349
14	G3IGQ	759	164	IO91QF	100	14Y		GM0USI/P	578
15	G8MNY	739	183	IO91XI	200	8Q		GM0USI/P	581
16	G0GAG	738	147	IO93JD	75	2x17Y		DC9YX	
17	G0STW	734	96	JO01OW	100	10XY		DF1AFZ	629
18	G1OGY	711	163	JO01GR	200	13Y	C	EI3GE	473
19	G3PIA	707	127	IO91IN	400	2x17Y		DL0WAE	671
20*	PE1EWR	702	63	JO11SL	30	10Y		GD4IOM	623
21	G3NAS	667	140	IO92CR	250	9Y		ON4ZN	467
22	G0VAD	664	72	IO95FE	150	9Y		G4VPM	479
23	G0GLB	616	136	IO91IQ	80	17Y		GM4JJJ	506
24*	G8MYK	601	125	IO92BJ	90	17Y	B	ON4ZN	461
25	G0APZ	579	111	IO90WW	25	8Y		DJ2JA	624
26	G0RRC	561	101	JO02MB	100	14Y	C	DL8GP	517
27	G0ODQ	525	123	IO91NQ	180	9Y		GM0GMD	539
28	G0JDL	523	73	JO02UK	100	9Y	C	GD4IOM	462
29	G1WAC	488	112	IO92BJ	150	18Y	B	F1JGN	415
30	G4DWF	483	75	JO02PB	100	12Y	C	DF7VX	516
31	G3NLY	463	101	IO92BQ	60	10Y		GM7IKA/P	427
32	G4VPD	431	85	IO92BJ	100	18Y	B	DF7VX	735
33	G3WSC	426	112	IO91VC	10	13Y		GD4IOM	450
34	G0UWS	421	43	IO80FJ	25	5/5		G4ANT	425
35	G8JXV	416	108	IO91VE	100	9Y	C	GD4IOM	444
36	G3RHH	403	82	IO82UB	200	9Y		DL0WAE	734
36	G0DVJ	403	73	JO01MX	50	5Y		DL9YEY	514
38	G0PPO	383	117	IO91XL	170	10Y		GD4IOM	427
39	G0ADH	376	98	IO91KO	100	13Y		GM0KNX	457
40	G3JRM	366	45	JO02OL	10	17Y	C	DF2VJ	506
41	G7NCG	365	65	JO02CM	100	10/10		GI8AYZ	469
42	G7MHZ	362	58	JO01II	25	13Y	C	DJ2JA	545
43	G4TVR	358	80	IO92BJ	25		B	GD4IOM	267
44	G4CHL	356	66	IO81QQ	25	17Y		GD4IOM	304
45	G0DRM	351	75	IO83SB	80	9Y	A	GI4OWA	381
46	G0EYO	334	82	IO92BJ	100	12Y	B	GD4IOM	267
47	G3JJZ	330	92	JO01AJ	25	8/8		GD4IOM	438
48	G0PDZ	329	85	JO01AK	25	8Y		GD4IOM	435
49	G0MCN	311	73	IO91IO	85	2x5Y		G0VAD	393
50	G1TWS	298	76	JO01HO	25	11Y		GD4IOM	440
51	G0THY	288	76	IO91IT	25	9Y		GM0USI/P	511
52	G0HAX	281	75	JO01ED	200	17Y	C	DJ1NY	596
53	G0HKG	258	62	JO01IV		11Y	C	DL0WAE	530
54	G4ZJY	254	44	IO82SQ	100	10Y		GJ4ZUK/P	385
55	G0TCD	233	75	IO91SS	15	9Y	C	GD4IOM	384
56	G0IBZ	225	57	JO02KA	100	2x14P	C	GD4IOM	438
57	G3TWG	218	64	IO91PN	50	5Y		GD4IOM	390
57	G0JBA	218	42	JO01II	30	13Y	C	GD4IOM	474
59	G3RZF	215	79	IO91QM	40	12ZL		GD4IOM	397
60	G1BEK	191	42	JO02OB	10	8Y		GJ4ZUK/P	393
61	G1NRM	184	70	IO91UO	70	2x10Y		GD4IOM	405
61	G4XPE	184	36	IO92GU	10	10Y		GD4IOM	254
63	G8XLH	179	50	IO91OT	50	5Y		GM4JJJ	503
64	G4IRB	171	27	IO83TM	10	HB9CV	A	G3YVR	305
65	G6GSF	169	47	IO91XC	30	9Y	C	GD4IOM	459
66	G4TJE	165	61	JO01AK	50	5Y		GD4IOM	435
67	G8FMC	163	53	IO91PT	10	6Y		GD4IOM	368
67	G0MIC	163	51	IO91RH	100	7ZL		GD4IOM	418
69	G3FIJ	156	48	JO01KV	10	9Y	C	GJ4ZUK/P	364
70	G6ZDQ	152	44	IO92BJ	10	7Y	B	GD4IOM	267
71	G7HMF	142	38	JO02IB	25	8Y	C	GD4IOM	426
72	G4VUO	136	20	IO80OR	20	9Y		G4ANT	360
73	G0MHZ	135	44	IO91OT	60	8Q		GD3IOM	365
74	G0UZU	128	42	IO91OM	80	11XY		GD4IOM	389
75	G3YTU	119	35	IO90WX	25	5Y		G6YIN	332
76	G0TIW	118	52	IO91SR	50	V	C	GD4IOM	387
77	G0RWJ	117	31	IO91IQ	150	4x10Y		GM0USI/P	514
78	G0MWO	112	44	IO91UN	100	9XY		GD4IOM	409
79	G1LBM	108	24	JO01OW	10	5Y		DF2VJ	497
80	G0UPU	105	27	IO91AX	25	5ZL		GD4IOM	382
81	G0UYE	100	28	IO82TM	10Y	9Y		G4PIQ	244
82	G3WQG	91	37	IO91PO	8	8/8		GD4IOM	386
83	G0BRV	90	34	JO01AJ	25	8/8		GD4IOM	438
84	G7OJP	89	25	IO91IQ	25	2x9Y		GD4IOM	353
85	G1YJL	88	28	JO02KA	2.5	9Y	C	G4UDE	286
86	G0ICJ	86	32	IO92BJ	2.5	10Y	B	GD4IOM	267
87	G8CDW	84	16	JO02IP	10	4Y		G4UDE	258
88	G0OJP	83	25	JO02GT	45	LPY		G4GFX	207
89	G8LTY	82	28	JO02JA	10	6Q	C	GD4IOM	433
90	G3KDB	78	22	IO92CQ	15	6Y			
91	G1HQK	74	10	JO02BN	25	9Y		GD4IOM	361
92	G4GGC	72	18	JO02IA	25	HB9CV	C	GD4IOM	428
93	G7BIV	71	29	JO01IU	25	6Y	C	G3NNG	162
94	G4OIM	70	32	JO01AK	20	LOOP		GD4IOM	434
95	G0SHC	68	12	JO02CS	10	8Q		OS1ALJ	323
96	G7RRH	58	37	IO91XL	70	7Y		G0GAG	270
97	G7KFQ	47	23	IO91UT	25	V	C	G4HUP	114
98	G0OLM	40	20	JO01KX	30	8Y	C	G3NNG	175
99	G7PVZ	36	22	IO91QG	0.25	14Y		G4PIQ	132
100	G0TPK	30	16	IO91RS	30	9Y	C	G0GCI	94
101	G3SBV	29	17	IO91WK	10	9Y		G3NNG	106
102	G3GWD	29	11	JO01DD	25	9Y	C	G3NNG	144
103	G3IIS	25	15	JO01KV	2	3Y	C	G4UDZ	290
104	G7SQN	21	15	JO01LV	15	7ZL	C	G4RGK	126
104	G7NXO	21	11	IO91QS	25	V	C	G3YVR	77
106	G4NTY	20	12	IO83TM	10	GP	A	GD4IOM	163
107	G4WQY	18	2	IO91WA	50	8Y		G6YIN	327
108	G0OSR	15	15	JO01LV	2.5	GP	C	G1OGY	34
109	G0MEG	12	8	JO01BI	10	9Y		G3MEH	80
110	G0VBB	10	10	IO91SR	25	V	C	G3OLX	49

MULTI-OPERATOR

Posn	Call	Pts	QSO	Loc	Power	Ant	Zone	Best DX	Km
1*	GD4IOM	3884	295	IO74QD	400	8x9Y	A	DG7EAI/A	850
2*	G4ANT	3623	293	JO02QQ	400	2x17Y		DJ1HA	840
3*	G4HUP	2533	237	JO02PD	400	4x18Y	C	DG5SEX	666
4	G6YIN	1828	230	IO93ET	400	2x9Y		F1PKA	740
5	G3OLX	1563	263	IO91VH	150	17Y	C	GM0GMD	595
6	G6CW	1157	207	IO92KX	400	15+9Y		GI4OWA	460
7	G3WHK	1146	214	IO91VJ	160	16Y	C	GM0USI/P	573
8	G3YVR	1097	187	IO91WD	100	2x9Y		DL0WAE	601
9	G3NTS	951	183	IO91UM	250	17Y	C	DL2OM	559
10*	G0NYL	862	135	IO93QN	100	13Y	B	F1BBK	563
11*	G8KMI	781	137	IO90HW	150	4x17Y	D	DL4VAI	640
12	G4NOK	768	122	IO93FR	100	2x14Y		PA3FJY	552
13	G3GRO	704	142	IO91VC	150	13Y		GM4JJJ	592
14	G8GHN	669	155	JO01AK	300	18Y		GM0USI/P	576
15	G8SRC	661	125	IO91BO	120	16Y		GM0GMD	528
16	G7DNY	616	163	IO91VH	90	9Y	C	GM0USI/P	581
17	G0VFW	525	135	IO91RR	250	17Y		DL2OM	578
18	G4ZFR	524	74	JO02OA	150	17Y		DK3EG	525
19	G3GHN	468	130	JO01AL	80	19Y		PE1MCD	444
20	G7MWP	442	127	IO91RP	100	14Y		DL1KDA	552
21	G0HSA	396	72	IO93GI	180	8Y	A	G7RAU	
22	G0UJK	348	121	JO01AK	80	6Q		GD4IOM	
23	G0TLK	144	51	IO91XJ	15	5ZL		GD4IOM	433
24	G8PRC	49	17	IO70WK	25	15Y		G6YIN	

AFFILIATED SOCIETIES

Posn	Team	Zone	Total Pts	Call 1	Call 2	Call 3
1*	Martlesham DX & CG	C	11771	G4PIQ	G4WFR	G4HUP
2*	Sutton & Cheam RS	C	3325	G3OLX	G3WHK	G7DNY
3	Harwell ARS 'A'	-	3057	G3PIA	G3NNG	G8CUL
4	Colchester RA 'A'	C	3044	G0EGX	G4ZTR	G4TZM
5	Crawley ARC	-	2227	G3GRO	G3YVR	G3WSC
6	Maidenhead & D ARC	-	2071	G4RGK	G3TWG	G3RZF
7	Aylesbury Vale RS	-	2068	G8XLH	G0ODQ	G3MEH
8*	Wythall RC 'A'	B	1549	G8MYK	G1WAC	G4VPD
9	Clifton ARS 'A'	-	1520	G8GHN	G3GHN	G0PPO
10	Harwell ARS 'B'	-	1280	G0ADH	G0GLB	G0THY
11	Harwich RC	-	1245	G0STW	G0DVJ	G1LBM
12	Lichfield ARS	-	1218	G4NAS	G3NLY	G3KDB
13	Bromley & D ARS 'A'	-	1213	G8MNY	G3JJZ	G0TLK
14	ARC of Nottingham	-	1157	G6CW		
15	Chesham & D ARS	-	1130	G8FMC	G0VFW	G7MWP
16	West Kent ARS	C	1100	G0GCI	G0HAX	G3GWD
17	Guildford & D RS	-	963	G0MIC	G3IGQ	G7PVZ
18	Ariel Radio Group (London)	C	951	G3NTS		
19	Lowestoft ARC	C	908	G0JDL	G3JRM	
20	Scunthorpe ARC	B	862	G0NYL		
21*	Clifton ARS 'B'	-	842	G0UJK	G0PDZ	G4TJE
22*	University of Southampton RC	D	781	G8KMI		
23	North Wakefield RC	-	768	G4NOK		
24	Mid-Sussex ARS	-	720	G0APZ	G4WQY	G3YTU
25	Swindon & D ARC	-	661	G8SRC		
26	Reigate ATS	C	585	G8JXV	G6GSF	
27	Swale ARC	C	580	G7MHZ	G0JBA	
28	Wythall RC 'B'	B	572	G0EYO	G6ZDQ	G0ICJ
29	Kings Lynn ARC	-	532	G7NCG	G8CDW	G0OJP
30	Harwell ARS 'C'	-	517	G0MCN	G0RWJ	G7OJP
31	Sudbury & D RA	C	455	G0IBZ	G7HMF	G1YGL
32	Torbay ARS	-	421	G0UWS		
33	Dacorum AR & TS 'A'	C	398	G0TCD	G0TIW	G7KFQ
34	Telford & D ARS	-	354	G4ZJY	G0UYE	
35	Colchester RA 'B'	C	267	G3FIJ	G7BIV	G0OLM
36	Clifton ARS 'C'	-	199	G0MWO	G7RRH	G3SBV
37*	South Manchester RC	A	191	G4IRB	G4NTY	
38	Bromley & D ARS 'B'	-	172	G0BRV	G4OIM	G0MEG
39	Dacorum AR & TS 'B'	C	61	G0TPK	G7NXO	G0VBB
40	Plymouth RC	-	49	G8PRC		
41	Colchester RA 'C'	C	15	G0OSR		

Check logs received from: GJ4ZUK/P, G3TAD/P

NOV 1994 144MHZ CW AND MARCONI MEMORIAL

There was a great deal of similarity with last year; most entrants reported poor conditions and little activity in the UK, and the results table is very nearly the same. The low level of local interest remains a puzzle, since the Marconi contest stimulates widespread activity throughout the rest of Europe with excellent DX from HB to LA available, even under flat conditions.

G4XBF and friends repeated their efforts in assembling a sizeable portable station, and were rewarded with an impressive score. All other entrants improved on their scores from last year. GM4VVX/P found an aurora in the last hour, but only two contacts came from it. Logging accuracy was better than expected for a CW contest, and 100% cross checking made no difference to any positions.

Congratulations to all certificate winners (marked *), GJ3JJZ being the leading low power / single aerial station. Logs from G4OUT, G4XBF/P, GJ3JJZ and GM4VVX/P have been sent forward for the Marconi contest.

GW8GSQ

6 HOUR SINGLE OPERATOR

Pos	Call	Points	QSO	Loc	Pwr	Aerial	DX	km
1*	G3JRM	16376	53	JO02	100	17	F5EJZ/P	600
2*	G0ADH	8263	38	IO91	100	13	DK0BN/P	652
3*	G3JJZ	7619	33	JO01	25	8/8	HB9WW/P	691
4	G4XPE	5093	18	IO92	10	10	DF2ZC	645

6 HOUR ALL OTHERS

1*	G0PNT	13725	52	IO91	150	16	DK8ZB/P	719
2*	G0FBB/P	11712	47	JO01	120	17	DF0CI/P	685

4 HOUR SINGLE OPERATOR

1*	G4OUT	16117	54	IO92	40	12	F6KIM/P	747

24 HOUR ALL OTHERS

1*	G4XBF/P	77460	212	JO00	400	4x9/2x9	DK0OG	920
2*	GM4VVX/P	2422	8	IO78	150	17	DL0HU/P	879

144MHZ CONTEST - SEPTEMBER 1994

This contest was remarkable for the variability of the band conditions across the country. Some groups reports good conditions, while others reported flat or worse conditions.

Congratulation to the Northern Lights for once again winning the Open section, G4PIQ and G4RKV for winning the 24-hour and 6-hour single operator sections respectively and to BRS25429 for winning the SWL section.

G0FCT

MULTI-OPERATOR

Pos	Callsign	LOC	Points	QSO	Power	Best DX	Km
1*	GU0EMG/P	IN89VR	14,849	936	400	EA3DJL	894
2*	G7SEU/P	JO01PU	11,303	797	400	OE1XTU/3	1075
3	G0RDI/P	JO01KJ	10,325	737	400	EA2LU/P	945
4	G4DSP/P	JO03AD	8,232	622	400	DG1GBX/P	844
5*	G0KPW	JO02PA	8,147	610	400	DK0OG	897
6	G8TIC/P	JO02PV	6,141	485	400	HB9MED/P	937
7*	GD4IOM	IO74QD	5,523	445	400	F8KLW/P	921
8	GW4BVY/P	IO81NV	5,189	481	400	F6DIF	870
9	G3WRS/P	IO94MJ	5,076	456	400	F1DZF/P	889
10	G6SRC/P	JO01JG	4,876	423	300	DL0MA	728
11	G4ERG/P	IO94PH	3,960	374	400	DF0RB/P	809
12	G2XV/P	JO02AD	3,865	321	300	DF0YY	852
13	G7PBI	JO02PD	3,037	251	400	FA1JZH/P	767
14	G6BRA/P	IO91PK	2,947	279	400	HB9S/P	741
15	G4CRA/P	JO01IT	2,923	255	100	DF0YY	810
16	G3VEF/P	IO90MX	2,685	323	100	GM0BQM/P	716
17	GM0CLN/P	IO85RU	2,646	208	80	DL0HA	826
18	G8MNY/P	IO91XG	2,489	297	200	DL0UL/P	757
19	G8NJA/P	IO80FP	2,433	206	200	HB9S/P	850
20	G8SRC/P	IO91CL	1,687	207	130	F5FJL/P	754
21	G3LRS/P	IO92IO	1,607	208	200	DF0RI	709
22	G4ADV/P	IO70PP	1,441	127	85	GM4AFF/P	733
23	G6OI/P	IO82UN	1,138	157	70	PI4GN	620
24	G1WAC/P	IO82QL	1,062	126	25	F8KLW/P	694
25	G7FDC	IO80FI	578	58	150	PA0LMD/P	687

SINGLE OPERATOR - 24 HOUR SECTION

Pos	Callsign	LOC	Points	QSO	Power	Best DX	Km
1*	G4PIQ	JO01MU	8,670	634	400	EA2LU/P	998
2*	GJ4ZUK/P	IN89WF	4,917	360	400	DF0RI	853
3*	G8DWD/P	JO02QV	3,637	250	300	DF0YY	759
4	G8FBG/P	IO91SF	3,136	318	400	DL0EV/P	733
5	G0RSR/P	IO91IH	1,442	172	100	EA2LU/P	950
6	GW0UVJ/P	IO72QT	1,120	98	80		
7	G7GUC/P	IO93CF	1,064	125	25	DF0RW/P	607
8*	G1TWS	JO01HO	1,062	120	25	DL0UL/P	710
9	GW8ZRE/P	IO83JA	535	75	10	PA3BZZ/P	589
10	G3FIJ	JO01KV	515	61	15	F8KLW/P	512
11	G8GFF	JO01FT	371	51	20	GM0CCC/P	549
12	G8CDW	JO02IP	310	37	10	GJ4ZUK/P	428
13	G3FDW	IO84ME	281	25	20	F6KBF/P	548
14	G5UM	IO92MP	169	27	10	F6KBF	363

SINGLE OPERATOR - 6 HOUR SECTION

Pos	Callsign	LOC	Points	QSO	Power	Best DX	Km
1*	G4RKV	JO01OI	2,369	180	400	HB0/DF0FA	770
2*	G6HKM	JO01FT	1,401	155	160	DL4OL	663
3	GW8OQV	IO81QR	1,386	161	400	DK0BN/P	759
4	G3MEH	IO91QS	1,115	143	400	DL0OU/P	717
5	GW0PZT	IO72PT	907	74	100	F6HPP/P	686
6	G4KDL	JO02UL	899	83	100	DL0DR	614
7	G0ADH	IO91KO	398	48	100	GM0USI/P	527
8*	G0TCD	IO91SS	364	58	15	GM0CCC/P	514
9	G6XDI	IO91SM	291	33	25	PA0LMD/P	445
10	G7HCD	JO01GQ	271	47	25	F8KLW/P	500

SWL

Pos	Callsign	LOC	Points	QSO	Best DX	Km
1*	BRS25429	IO93FX	640	62	F6HPP/P	620

* = Certificate winner; check logs: G0UCU, G2VJ/M

1994 1.3 / 2.3GHZ CUMULATIVE RESULTS

It was pleasing to see that the gentle prodding which I gave in last year's write-up may have resulted in the entries on 13cm tripling and on 23cm almost doubling. It was just a shame that the good conditions which had occured between some of the sessions did not occur during them! In spite of this, people generally enjoyed the contests although the last session was pretty quiet. G8NEY had hoped to be on 13cm, but just didn't quite make it. Congratulations to John Quarmby, G3XDY, and John Smith, G8ZQB, for once again winning the 23cm and 13cm sections respectively; to Gerard Vervenne, PA0GHB, for winning the overseas section, and to the runners-up in each section. All will receive certificates.

Andy Cook, G4PIQ

1.3GHZ SINGLE OPERATOR FIXED SECTION

Pos	Callsign	5-Oct	21-Oct	2-Nov	18-Nov	6-Dec	Norm	QSO	Loc	Pwr	Ant	km
1	G3XDY	107	107	111	101	65	3000	66	02OB	250	8 x 23Y	453
2	G8NEY	89	92	98	82	80	2692	65	81VK	250	55Y	422
3	GD4GNH	29	81	136	77	0	2519	25	74QD	10	8 x 23Y	452
4	G4ZTR	0	0	99	81	53	2192	45	01KW	75	55Y	442
5	G4GCM	0	77	77	60	40	1880	37	90EX	300	8 x 23Y	406
6	G3MEH	69	56	46	52	50	1793	77	91QS	100	2 X 50QLY	315
7	G8ZQB	70	45	90	39	0	1737	54	74QD	150	40QLY	374
8	G8CRN	0	64	69	55	29	1650	43	02FB	30	55Y	411
9	G6SPS	38	32	39	44	7	1090	37	83SB	18	2 x 23Y	225
10	G6XDI	16	15	19	0	24	590	28	91SM	20	28QLY	129

1.3GHZ OVERSEAS SECTION

Pos	Callsign	5-Oct	21-Oct	2-Nov	18-Nov	6-Dec	Norm	QSO	Loc	Pwr	Ant	km
1	PA0GHB	0	63	130	19	64	3000	31	11WH	10	4 x 55Y	422
2	PE1EWR	14	0	0	8	0	1421	4	11SL	10	23Y	173

2.3GHZ SINGLE OPERATOR FIXED SECTION

Pos	Callsign	5-Oct	21-Oct	2-Nov	18-Nov	6-Dec	Norm	QSO	Loc	Pwr	Ant	km
1	G8ZQB	3	1	3	1	0	3000	8	92JN	8	1.6m	50
2	G4GCM	0	0	0	1	1	2000	2	90EX	2.5	84QLY	22
3	G6SPS	1	1	1	0	0	1667	3	01IS	0.4	25Y	47

VHF CHAMPIONSHIP 1994

This is the second time that an overall championship has been run by the VHF Contests Committee to find the top Club / Group (multi-operator fixed or portable stations) and Home station (single operator, fixed station as defined in the General Rules). Entry to this competition was automatic if you participated in one or more of the individual contests that were part of the VHF Championship. These contests were: March 144 / 432MHz, 50MHz Trophy, 70MHz Trophy, 144MHz Trophy, 432MHz Trophy, 1.3GHz Trophy, 2.3GHz Trophy, May 144MHz, 144MHz QRP and the 432MHz QRP. The normalised results for these contests were added together to produce the final Championship table shown below. This year has seen a 10% increase of in the number of different clubs / groups and single operators listed in the two sections of the Championship.

Congratulations to the Northern Lights for winning the Open section for the second year. They will receive the Racal Radio Cup for this achievement. Congratulations to Andy Cook, G4PIQ, for winning the Single Operator section for the second year. He will receive the John Pilags Trophy for this achievement. The winners and runners-up will also receive certificates.

Ian Pawson, G0FCT

OPEN SECTION

	Group	Points	Number of Contests
1	The Northern Lights	7070	9
2	Spalding & District ARS	5553	9
3	Windbreakers and HADRABS CG	4183	7
4	A1 Contest Group	3304	5
5	Warrington Contest Group	2824	5
6	Black Sheep Contest Group	1841	4
7	11th Hour CG	1700	7
8	Swale ARC CG	1664	6
9	Bracknell ARC	1466	7
10	Wirral & District ARC	1459	4
11	Three Spires Contest Group	1288	2
12	GW4BVY/P	1280	3
13	Flowerpot Men CG	1248	2
14	G8FBG/P	939	3
15	Isle of Man Amateur Radio CG	936	2
16	Colchester Radio Amateurs	872	5
17	GW4UDE/P	832	2
18	Fareham & District ARC	815	3
19	G8DWD/P	705	3
20	Kintyre Window Cleaners CG	649	1
21	South Devon RC	597	4
22	Wythall RC	588	5
23	Northumberland CG	558	2
24	Martlesham DX & CG	549	1
25	GM4CWH/P	532	1
26	Victory CG	488	1
27	Atherstone ARC	468	1
28	Victory CG	463	1
29	GJ3YHU	461	1
30	G8DDY/P	458	3
31	G3PJX/P	443	1
32	Bromsgrove & D ARS	421	1
33	GJ4ZUK/P	409	3
34	Wakefield & District RS	342	1
35	GW1ATZ/P	301	1
36	Gwent UHF Group	301	1
37	G4DDL/P	292	2
38	G4LCQ/P	291	2
39	Tatsfield ARTS	288	1
40	North Wakefield RC	284	2
41	Scunthorpe VHF CG	267	1
42	Cambridge & District ARC	260	1
43	GM0USI/P	246	1
44	G4SJH/P	238	1
45	G0MSA/P	236	1
46	G7PBI	205	1
47	Gloucester ARS	202	1
48	GW7HYS/P	201	1
49	G8MNY/P	199	1
50	G8JAY/P	184	2
51	South Birmingham RS	179	1
52	Cockenzie and Port Seton ARC	178	1
53	G8VOI/P	177	1
54	Torbay ARS	164	1
55	G3PIA/P	163	1
56	Southampton Univ RC	162	1
57	Ipswich Radio Club	147	2
58	G1WKS/P	140	2
59	GI4TAJ/P	136	1
60	Paul Bradbeer	132	2
61	GW0UVJ/P	128	2
62	G4SRS/P	122	1
63	GD7PIO/P	115	1
64	Swindon RC	114	1
65	Chesham + Dist ARS	110	1
66	Leicester RS	108	1
67	Far Canal CG	98	1
68	Reading & District ARC	97	1
69	Newquay ARS	97	1
70	G3FKF/P	96	1
71	GM0UEP/P	93	1
72	G0TUQ/P	90	1
73	G0CLP/P	81	1
74	Guildford RS	78	1
75	Stourbridge & District ARS	77	1
76	G6OM	65	1
77	GW0RTP/P	64	1
78	G0GZI/P	49	1
79	G0TSN/P	49	1
80	G7LQD/P	48	1
81	G0HDV/P	46	1
82	GM4VVX/P	40	1
83	G0RFM	38	1
84	Welwyn Hatfield ARC	37	1
85	GW8ZRE/P	36	1
86	G6TTL/P	36	1
87	G4IDF/P	35	1
88	GD7JUH/P	31	1
89	Lowestoft RC	29	1
90	G1GCT/P	28	1
91	G4JBH	24	1
92	2E1AFN/P	17	1
93	Wood & Douglas CG	16	1
94	G4RVR/P	15	1
95	GI7JYK/P	12	2
96	G0LJD/P	11	1
97	GW4CC	7	1
98	G4RYV/P	5	1
99	G8TNK/P	1	1

SINGLE OPERATOR, FIXED SECTION

	Callsign	Points	Number of Contests
1	G4PIQ	4281	5
2	G3MEH	1881	4
3	G3WSC	1223	2
4	G4WFR	1035	2
5	G6HKM	1005	4
6	G0GAG	1000	1
7	G8APB	1000	1
8	G8ZQB	1000	1
9	G3XDY	881	1
10	G0GXT	725	2
11	G0AEV	679	1
12	G0NYL	662	2
13	GW8OQV	589	3
14	G4DEZ	469	2
15	G3RHH	454	4
16	G3UKV	448	1
17	G1TWS	381	4
18	G0EHV	347	1
19	GI4KSO	332	1
20	G3FDW	329	4
21	G8NEY	304	1
22	G3LVP	280	1
23	G3FIJ	279	3
24	G4RKV	273	1
25	G3NKS	272	1
26	G4AFJ	261	1
27	G3HYH	239	1
28	G0TCD	233	4
29	G4KDL	228	2
30	G8ZRE	225	3
31	G7AZP	215	3
32	G0TDF	205	1
33	G6MXL	183	2
34	G0MYE	172	1
35	G0SOO	162	1
36	G3JYP	139	1
37	G5UM	136	5
38	G4LDR	133	1
39	G0ADH	129	2
40	G3YHF	126	3
41	G7GAB	123	1
42	G6SPS	118	1
43	G7KAO	118	1
44	G4OUT	118	1
45	G3BPM	116	1
46	G0RRC	105	1
47	GW0PZT	105	1
48	G6RAF	102	1
49	G1NRM	94	1
50	G7MHZ	93	2
51	G6FQZ	83	1
52	G8JXV	82	2
53	G7JYD	81	1
54	G8PNN	77	1
55	G4BIK	74	1
56	G0UWS	71	1
57	G3JJZ	71	1
58	G3FFH	66	1
59	G7KXZ	63	1
60	G3CKR	59	1
61	G7MFV	58	1
62	G4XPE	50	2
63	G0THY	45	1
64	G8GFF	43	1
65	G4LRT	38	1
66	G8CDW	36	1
67	G6ZWP	35	1
68	G0JDL	35	2
69	G8LHT	35	1
70	G6XDI	34	1
71	G7HCD	31	1
72	G8IFU	31	1
73	G7JHZ	30	2
74	G0ODQ	25	1
75	G4TVR	24	1
76	G1WAC	21	1
77	G3JRM	20	1
78	G7PDP	18	1
79	G0UPU	16	1
80	2E1CBI	15	1
81	G4ZDA	14	1
82	G4CUF	12	1
83	G4ZTR	8	1
84	G3FPK	8	1
85	G0TLG	5	1
86	2E1AQS	3	1
87	G7JCW	2	1
88	GW0ESU	1	1

144MHZ CW MARCONI MEMORIAL CONTEST 1994

Results for this contest have been received from ARI. The single op section was won by I4XCC with 132218 points and the multi-op section by HB9WW/P with 177026 points. UK stations were: Single op (290 entries) - G4OUT (157th) 16117 pts, G3JJZ (216th) 7619 pts, GM4VVX/P (266th) 2230 pts. Multi-op (129 entries) - G4XBF/P (39th) 76919 pts. For a copy of the full results, please send a SSAE to P O Box 29, Bridgend CF35 5YA.

432MHZ LOW POWER JULY 1994

Well we got it wrong again! - These Tropo openings are ruining our well established reputation. We will have to pray to the god of dismal conditions for next year to get our own back! Seriously though, most entrants found plenty of DX to work although in many cases conditions faded after an hour or two. The majority of stations were QRV on 144MHz the previous evening and being aware that the band was open couldn't wait for the off! Congratulations go to G4DSP/P who amassed a fantastic score made up of flocks of DLs & PAs. At G0EMG conditions faded after two hours leaving the band dismal and quiet. Unfortunately some of you missed the new multiplier rule which included Locator squares as well as counties and countries.

Well done to all section winners and runners-up. Hopefully we will see you all again next year.

G4XUM

OTHERS

Pos	Call	Loc	Score	QSO	Mult	km
1	G4DSP/P	03CE	190164	162	78	852
2	G0EMG	94BP	111444	94	74	910
3	GM4ZAP/P	85DJ	107016	94	84	749
4	G6CTU/P	91XG	101946	127	79	873
5	G3VEF/P	90MX	89550	108	75	910
6	GW4MGR/P	83JA	72600	98	75	870
7	G3CKR/P	93AD	67705	118	55	1012
8	G6SRC/P	01JG	67266	85	74	876
9	G8PNN/P	95CK	58882	64	59	774
10	GM0USI/P	85RU	46872	50	54	827
11	G6BRA/P	80ST	43674	61	58	886
12	G4DDL/P	91MP	41664	77	64	637
13	G4LCQ/P	92FM	22278	73	47	591
14	G6TTL/P	01OI	6800	22	34	554
15	G1WKS/P	01ED	5632	30	32	523
16	G8TNK/P	01BK	134	26	19	427

SINGLE-OP PORTABLE

1	GW4UDE/P	82IS	102808	104	71	892
2	GW1ATZ/P	82KX	57288	80	62	890
3	G0CLP/P	93AF	15457	63	41	796
4	G8DDY/P	90JO	10426	53	26	673
5	GD7JUH/P	74SF	5900	21	20	763

SINGLE-OP FIXED

1	G3WSC	91VC	32640	70	51	728
2	G3MEH	91QS	22446	59	58	558
3	G4VIX	01CN	7708	28	41	498
4	G3RHH	82UB	6396	28	39	377
5	G4LDR	91EC	4356	20	33	482
6	G5UM	92MP	2214	18	27	312
7	G8JXV	91VE	2074	18	17	530
8	G3YHF	92BK	1848	24	24	383
9	2E1AQS	91WP	91	7	7	94

OVERSEAS

1	PE1EWR	11SL	8640	30	24	629

Checklogs: G4IDF, G4RVR/P

144MHZ LOW POWER JULY 1994

From the comments received it seems that everyone was happy with this one for a change and no wonder! Conditions gradually improved during the day until early evening time, when most of the UK were able to work deep into Scandinavia and Germany with many QSOs exceeding the 1000km mark. The Low Power ruling didn't seem to be a barrier to stations located in the East and North Eastern parts of the country with G0EMG and G4DSP/P working at least 20 SMs, OZs and LA stations. Even participants deep in the South West managed at least a few DX contacts. Entries were up, as would be expected with the high level of activity - long may this continue. The new multiplier rule was well received and it will be retained for next year's events.

Congratulations to all section winners and runners-up, and thanks for the helpful checklogs.

G4XUM

OTHERS

Pos	Call	Loc	Score	QSO	Mult	km
1	G0EMG	94BP	841890	360	133	1137
2	G4DSP/P	03CE	511481	309	97	1161
3	G8LNC/P	90JO	410981	312	113	1219
4	GM4ZAP/P	85DJ	339722	205	118	973
5	G6SRC/P	01JG	310300	271	100	1161
6	GW4MGR/P	83JA	270816	260	112	
7	G3CKR/P	93AD	233424	283	72	1189
8	G8PNN/P	95CK	209274	201	78	784
9	GW7HYS/P	81KW	168896	201	91	927
10	G6BRA/P	80ST	154350	174	98	1311
11	G4LCQ/P	92FM	146496	216	64	1137
12	G4ZTR	01KW	139214	177	94	558
13	G3VEF/P	90MX	137456	170	88	1223
14	G1WAC/P	82QL	111864	154	79	1197
15	G4SRS/P	81WS	102393	169	93	621
16	G1WKS/P	01ED	92745	138	81	586
17	G3FKF/P	91EC	80750	134	85	870
18	G6CTU/P	91XG	63450	123	75	704
19	G4DDL/P	91MP	61754	125	77	584
20	G4IRC/P	02OD	57769	132	41	980
21	G6QM	94DB	54756	117	52	615
22	G0TSN/P	92WH	40832	83	58	568
23	G4SSD	80FI	34282	66	61	512
24	G0RFM	83XN	32400	101	48	482
25	GW4CC	71XO	6020	27	28	418

SINGLE-OP PORTABLE

1	G8DWD/P	02QV	254474	210	86	1097
2	GW4UDE/P	82IS	245300	205	100	892
3	G8JAY/P	91AW	115200	151	90	733
4	GI4TAJ/P	74CV	114736	114	71	851
5	GD7PIO/P	74SF	96900	144	57	750
6	GW0RTP/P	81FP	54000	130	60	564
7	G7LQD/P	83PF	40320	102	64	325
8	G0HDV/P	93SN	38472	100	56	570
9	G4IDF/P	82TC	29055	85	65	376
10	G8DDY/P	90JO	23982	82	42	558
11	GI7JYK/P	74BR	9238	30	31	590

VHF RULES

144 TROPHY / SWL

2 / 3 September, 1400 - 1400UTC

General rules apply.

Sections: S single operator fixed or portable, M multi-op fixed or portable, L listeners, SS six-hour section fixed stations.

IARU contest: please score 1pt per kilometre for IARU entry and also radial ring for RSGB. Entries scored by kilometres will be entered into IARU contest. Please duplicate cover sheet and logs if entering IARU. SS operation for any contiguous six hour period (no breaks, continuous six hours) starting at any complete hour, ie 1400 - 2000 or 0000 - 0600, not 0823 - 1423). Only one such entry per station. Entry to both the full 24h and 6h sections is not allowed, choose one or the other not both. Certificates will be issued for the 1st and 2nd places in each sections S and M for both fixed and portable stations (four certs per section).

Adjudicator: S Thompson, Unit 8, Nantlais, Corntown, Bridgend, Mid Glamorgan CF35 5SA.

4TH BACKPACKERS 144MHZ CONTEST

3 September, 1100 - 1500UTC

See separate rules.

Adjudicator: D Johnson, 65 West Street, Bourne, Lincs PE10 9PA

70 MHZ TROPHY / SWL

24 September, 0900 - 1400UTC

General rules apply. Rule 14a applies (County / Country multipliers). QRA information including county code or county name to be exchanged, eg JO01IN ESSEX or ESX, full QTH information is NOT required.

Sections: F single operator fixed, O all other, L listeners.

Award: overall winner will receive the VHF Managers Trophy.

Adjudicator: c/o PO Box 29, Bridgend CF35 5YA.

1.3 AND 2.3GHZ CUMULATIVE

3 / 18 October, 2 / 16 November, 4 December, 1930 - 2200 local time

General rules apply, including rule 10. One summary sheet including all entries, plus a cover sheet. Best three logs of maximum five days, please send all logs for checking purposes, as normalisation will select the best three.

Sections: S single operator fixed, O all others, L listeners.

Adjudicator: A Cook, Fishers Farm, Tendring, Clacton-on-Sea, Essex CO16 9AA.

432MHZ - 24GHZ, 1.3GHZ TROPHY & SWL CONTEST, 2.3 GHZ TROPHY & SWL CONTEST, IARU 432MHZ - 24GHZ

7 / 8 October, 1400 - 1400UTC

1296MHz Trophy: This will run between 1400 and 2200 on the Saturday.

2.3GHz Trophy: This will also run between 1400 and 2200 on the Saturday.

General rules apply.

Sections. IARU and RSGB: S single operator, M multi-operator, L listeners.

Scoring: RSGB radial ring on 432 MHz, 1 pt per kilometre all other bands. IARU 1pt per kilometre (logs will be forwarded). Separate cover sheets and logs for RSGB and IARU (if you want to enter both contests that means two 427s and 4422s).

Stations can enter all contests (IARU or RSGB 24h or 1.3 and / or 2.3GHz Trophies) but please separate logs and cover sheets for each contest.

Adjudicator: A Cook, Fishers Farm, Tendring, Clacton-on-Sea, Essex CO16 9AA.

432MHZ CUMULATIVE

11 / 26 October, 10/ 27 November, 12 December, 1930 - 2200 local time

General rules apply, including rule 10.

Sections S single operator fixed, O all others, L listeners.

One summary sheet including all entries, plus a cover sheet. Best three logs of maximum 5 days, please send all logs for checking purposes, as normalisation will select the best three.

Adjudicator: I Cornes, 6 Haywood Heights, Little Haywood, Stafford ST18 0UR.

2ND 1.3GHZ AND 2.3GHZ FIXED / SWL CONTESTS

29 October, 1800 - 2200UTC

General rules apply. Two contests running concurrently, seperate cover sheets and logs. A Summary sheet is NOT required.

Sections for both contests: S single operator fixed, M multi operator fixed, L listeners.

Adjudicator: S Thompson, 8 Nant Lais, Corntown, Bridgend CF35 5SA.

144MHZ RSGB CW 6 HOUR

4 / 5 November, six hours between 1400 - 1400UTC

General rules apply. 1pt per kilometre. Period of six hours must start on the hour as in other contests with six-hour sections.

Sections: S single operator fixed, O all others, L listeners.

Adjudicator: For 6h and 24h contests: S Thompson, GW8GSQ, 8 Nant Lais, Corntown, Bridgend CF35 5SA.

SINGLE-OP FIXED

1	G0GAG	93JD	285572	221	98	1118
2	G0GXT	81RU	167155	208	101	693
3	G6HKM	01FT	154619	201	88	1089
4	G3MEH	91QS	129726	167	84	1145
5	G0NYL	93QN	110415	156	85	644
6	G3WSC	91VC	63595	103	79	975
7	G0TCD	91SS	40536	83	72	931
8	G1TWS	01HO	33960	76	60	490
9	G0RRC	02MB	29952	70	52	453
10	G1OGY	01GR	24480	60	60	548
11	G0ADH	91KO	23780	72	58	455
12	G7JYD	01IQ	23016	51	56	559
13	G0UWS	80FJ	20257	45	47	556
14	G3FFH	80MR	18928	46	52	521
15	G3RHH	82UB	13583	48	47	464
16	G0THY	91IT	12920	57	40	428
17	G7PDP	01FQ	5270	24	31	495
18	G0UPU	91AX	4672	24	32	427
19	G4CUF	83QL	3360	24	21	330
20	GW0ESU	73TG	226	30		

OVERSEAS

1	PE1EWR	11SL	25530	54	37	655

HF RESULTS

21/28MHZ SSB CONTEST 1994

Conditions at this stage of the sunspot cycle do not favour 28MHz, and the scores on that band reflect this. On 21MHz, after a slow start, with many commenting that they heard little or nothing in the first hour, conditions picked up later in the event. Congratulations to Keith Ginder, G3NAS, who as leading single operator entry wins the Powditch trophy. Stephen Reed, G0AEV, wins the Whitworth Trophy for leading UK station on 28MHz. Martin Bayes, W1/G4DZC, wins the overseas section, operating from Massachusetts, USA. In the SWL section, Bob Treacher, BRS 32525, again wins the UK section.

Don Beattie, G3OZF

UK SECTION

	Call	Score	28MHz score
1	G4MRS *	214020	2016(1)
2	G3NAS	155448	1404(2)
3	G3TBK	119168	1710(1)
4	G4OOC *	96696	360
5	GW4CC *	91476	420
6	G4DUW	83394	1536
7	G3TTJ	73476	145
8	G4IRC/P *	58460	897
9	G3FFH	57888	585
10	G4RFR *	53136	---
11	G0FDX *	47412	328
12	G4IUF	41724	264
13	G0FUN *	35400	897
14	G0JJN *	25920	---
15	G0GAG	23373	270
16	G0ORH	23079	12
17	G2QT	21060	72
18	G2FNK	18522	897
19	G3JRM *	17484	27
20	G0OCE/P *	17262	288
21	GM3CIX	14640	63
22	G4IQM	13464	828
23	G0HDV	11280	147
24	G0AEV	8277	8277(2)
25	G0TSM	5994	525
26	G0IHB	4410	4410(1)
27	G8CA	2808	27
28	G4ZYF	2736	96
29	G4ORC *	2565	---
30	G6QQ	1188	48
31	G3WBM/P	1044	---
32	GW6GW	105	105

*Multi-operator (1) Certificate winner (2) Trophy winner

OVERSEAS

1	W1/G4DZC	27507
2	HA8EK	27225
3	N4UH	19110
4	LY2OU	10800
5	9H1DE	10718
6	SM6VAO	6045
7	SM4BTF	5445
8	SM6TIA	3906
9	RA3XO	3780
10	RX6AOI	3741
11	SM0ARR	3078
12	SP2AHD	2772
13	SP9OON	2592
14	UR4LCB	2376
15	UT4PZ	1848
16	UN9PQ	1716
17	YU7SF	1539
18	IK4RSK	1173
19	LY2BG	1104
20	UR5ZOK	660
21	LZ2FM	585
21=	VK4NEF	585
23	ZP5XYE	363
24	EC7ADJ	300
25	SP6JOE	351
26	OK2SG	330
27	K4UK/M	192
27=	VE2AIL	192
29	LZ1KBB	162
30	OM3YK	133

SWL UK

1	BRS 32535	9594
2	RS 94781	8118
3	BRS 20249	6216
4	BRS 28198	3321

SWL OVERSEAS

1	SP-0189-GD	1343

Checklogs gratefully acknowledged from EA6BXO, EA6ZY, OH3W and NM9J/G3VNQ.

● THE *VHF Contesting Handbook* compiled by the VHF Contests Committee (see April *RadCom News*, page 15) is now available from RSGB HQ at £4.00 per copy. It includes sections on choosing a site, equipment, antennas and recent rule changes and should appeal to contesters of all levels of ability and experience. ♦

Members' Advertisements

RSGB Members wishing to place an advertisement in this section must use the official form incorporated on the label carrier of Radio Communication. This will prove membership and must be for the current month. No acknowledgment will be sent. Ads not clearly worded, or which do not comply with these conditions will be returned. If an ad is cancelled no refund will be due. An advertisement longer than 60 words will be charged pro rata. Trade or business ads, even from members, will not be accepted. Traders who wish to use this facility must send a signed declaration that the items for sale are part of, or intended for, their own personal amateur station. The RSGB reserves the right to refuse ads, and accepts no responsibility for errors or omissions, or for the quality of goods for sale or exchange. Each advertisement must be accompanied by the correct remittance, as a credit card payment, cheque or postal order made payable to the Radio Society of Great Britain. Please note that because this is a subsidised service to members, no correspondence can be entered into. Licensed members are asked to use their callsign and QTHR, provided their address in the current edition of the RSGB Amateur Callbook is correct. RS members will have to provide their name and address or telephone number. Please include your town and phone number in the free boxes provided to assist readers. Advertisements will be placed in the first available edition of *RadCom*.

Warning: *Members are advised to ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The 'purchase' of goods legally owned by a finance company could result in the 'purchaser' losing both the goods and the cash paid.*

FOR SALE

ICOM 781 antenna switching unit Icom 781 with all whistle and bells; £2,800. No time wasters. 01776 853283 (Stranraer).

ICOM IC 735 bxd: £550. AT150, bxd: £250 mint condx. Pneumatic mast 50': £200. (Ware) 01920 843125.

KENWOOD TS130S; £400. Clarks WT5 pneumatic mast 55ft extended + Landrover tilt/mount + compressor; £475. CDE HAM 2 rotator & controller; £160. SM220 scope; £150 AT230; £100. Hygain TH3 MK3 tribander; £175 KWM2A in Samsonite case; £250 C520 2m/70cm scanner tcvr; £250. All mint. 01258 830688 (Blandford).

KENWOOD TS4505 & P533 new:£1,200 on16.1.93. As new: £850 with manuals. (Alsager, Stoke-on-Trent) 01270 882807.

KENWOOD TS830S with MC50 desk mike: £500. Capco magnetic loop model AMA6 40+20+17+15+12 metres complete with controller as new: £150. Capco SPC300 ATU (with roller coaster): £150. Western SWR/power meter: £50. CT.1600 VHF 144MHz (800CHNL) 142 - 149MHz hand held with charger: £97. GD0BCM, QTHR, 01624 621720 (Isle of Man).

KENWOOD TS930, with FM, CW filter. Excellent condx, bxd; £750 ono. MFJ Versatuna 2 ATU; £50 ono 01527 872890 (Bromsgrove).

KENWOOD/TRIO TS520S & mic additional VFO520 & man, good condx original packing: £300. (Colchester) 01255 431221.

LOWE HF225 Europa Rx fully equipped £420. Signal R535 VHF/UHF airband scanner; £220. Datong FL3 multimode with man & auto notches; £100 RF systems antenna switch, filter, splitter, combiner, attenuator; £90. Global AT100 ATU; £60. Palomar RX100 noise bridge; £50. RF Systems magnetic long wire balun (RX only); £26. Ex-WD passive preselector 2-27MHz; £20. Datong broadband pre-amp; £15 all vgc. Complete with mans. 01506 653311 (Bathgate, W Lothian).

MINT SG-2000 150 watt SSB radiotelephone 1.6-30mcs, data & voice. Ultra stable, RS232 interface, variable dwell & frequency steps. Factory programmed with 644 ITU data & voice channels. Additional 100 channels field programmable, detachable control head FCC approved for commercial marine & amateur use, manual; £1500. Buyer collects. G3LYD, QTHR (Ventnor, Isle of White).

MODERN 3-bedroomed semi-detached house. Pleasant cul-de-sac in attractive Cardiff suburb. Convenient for rail and bus, within walking distance of parks & local shops. Gas c/h, d/g. High spec property in good order throughout. Purpose built, sound proofed shack. Gardens front & rear with 80/40m trap dipole & Cobwebb at respectable heights. Garage & hardstanding. Security alarm. Freehold. GW4BVJ, QTHR. 01222 751746 (Cardiff).

SHACK clear out. AEA Comm Pakratt Fax C64. Complete with C64C Commodore Computer, monitor, MPS 1230 printer, 1541 Disk Drive, AEA PK232, all leads manuals interface etc, spare cartridges. Just connect to your rig for fax, ASCII, Baudot, Amtor, Morse, Packet; £375. May split. AEA Comm Packratt for Commodore 64; £35. Daiwa DK210 Electronic Keyer; £35. Bencher BY1 Paddle Key; £35. MFJ Versa Tuner 2 949C; £85. Lowes FX1 Wavemeter; £20. Icom 251E 2m multimode with Mutek; £325. SX200 SWR Power Meter; £35. Drake TV3300 LP filter; £20. Yaesu FR 101 digital receiver with 2 & 4 metres plus matching speaker; £200. Daiwa PS30XM2 power supply; £85. Datong Active Antenna; £35. Codar RQ 80 ATU; £12. Black Star Meteor 1000 5Hz-1GHz frequency counter; £50. Altai HC-2010BZ multi range test meter; £15. Metrohm model 9A Megger; £35. X50 2/70 dual band antenna; £35. 0151 608 1504 (Wirral).

SHACK clearance! Yaesu FT736R 2m/70/6M; £1150. Yaesu FTONE every option fitted inc spare 100w PA; £850. SP767 spkr; £40. KAM TNC + Pactor; £200. HL166V 160W 6m Linear; £200. Mirage B2516 160w 2m Linear; £200. Microwave modules 100w 70cms Linear; £195. BNOS twin metred 40 amp 13.8V PSU; £150. Katsumi MK1024 message keyer; £70. Hansen 2m PEP SWR meter; £35. Hansen 6m PEP SWR meter; £35. Diamond SX400 2m/70cms SWR meter; £40. All meters 200w handling. IBM 486, tower 260MB HD, 16MB ram triple speleo CD ROM, 32BIT SC51 sound card, 2mb Diamond Viper video card, 17in NOKIA Trinitron monitor spkrs & thousands of pounds worth of CD ROM Panasonic KXP400 4PPM led laser; £275. USR courier V34 fax modem; £230. APL smart-ups 900 UPS; £450. Techmar external tapeport 250mb Streamer; £195. Sony handycam video camera; £295. All my equipment is absolutely mint & bxd with all mans. Laurence Knott, tel; eves; 01252 815813, or mobile; 0802 264269. (Fleet).

SUPER coax relays SP30 12 volt RF/audio 450MHz some flying BNC plug/leads: £15. + postage. G3AOS, (Macclesfield) 01260 252287.

TRIO 201A 2m mobile tcvr 5/25w with FC10 remote control unit, m/mount, manual, bxd, very good condx; £175. Rabbit cordless telephone system comprising: base, two handsets, two stand/chargers, manuals, bxd, very little se; £80 ono. Paddle key by G4ZPY, unused, bxd; £30. Jaybeam 4-element 2m quad beam perfect; £28. Discone antenna perfect; £18. 01582 605693 (Dunstable).

TRIO TS-711E 2 metre base station, USI fitted manual, bxd; £550. TR-2500 handheld 2 metre man, bxd; £80. Goldstar GT212 286. 40 meg harddrive 1mb ram can be extended. SVGA monitor DOS 5.0, mouse, all mans, software; £180. Buyer collect. G0NSC, 01226 289578 (Barnsley).

TRIO TS530S good condx with MC35-S mic, original packing & man; £400. Yamaha PSR-50 keyboard; £50. Please phone after 7.30pm. 01793 870681 (Swindon).

TS530S excellent condx, one owner, little used transmit no mods, no faults just good no frills radio like Grandpa had. Don't ask how many memories or dual digital VFO's because it has none. Good transmit audio 100+ watts allday if necessary. Excellent receiver. Don't ring to haggle not at this price; £390. Ring after 6pm. QTHR, 0161 748 4010 (Manchester).

VALVES Octal B7G B9G quantity 170 unboxed many unused types include KT66 6L6G, 6V6G, 6K8M, 6BX6, 6SN7G. Offers lot lists. 01323 897145 (Seaford).

VERSATOWER BP60 complete with headunit & winches, ready to transport! vgc: £450. Kenwood TL922 linear vgc, bxd: £950. Kenwood TS940S vgc, bxd, £950. Daiwa multimotor rotator vgc: £180. Jaybeam TB3: £100. Buyer collects. G4YME, QTHR, (N Berks) 01488 638463.

VINTAGE & audio valves new (unused); £3 each: 6K7G/GT, 6K8G/GT, 6SL7GT, 35AS, 35Z3, 35Z4, 41, 63-SPT (EF50), 328, 807, 832, 1616, 1622, 1638, 1923, AC/P, ACPI, EF55, EL38, GZ37, H63, KT44, KT67, OC3, PEN46, PL33/38, QVO4-7, SP41/61, U17/24, UU8. Also at £6.00 each: 6L6G/GT, 6080, PL519, EF6/8, EK2, EL2, EZ2, HL13C, HL41DD, ECC33, UU4, UU5, 7B7, 7C6, 7K7, 7N7, 7Q7. 0121 472 3688 (Birmingham).

WANTED; Powertriodes; DA-30, DA-60; DA-100, STC-4300A, STC-4212, DET-25; DA-250; RS-237, PP3/250 PP5/400; PX-4/25; LS-5/6; P15/250 P27-500/600 P25-450/500; 0-75/1000; ES-250/M STC-4275A & similar. Pentodes: KT-66; KT-77, KT-88, EI34 (new) EL-37, AVO-MKIV Valve tester; value tester valves 500-1000V. Decca stereo-decola. Decola separates SME-300g/l & 3012 calls 9am-7pm. H.Jakobi, Cambridge House, Cherry Lane, W Sussex. 01444 881184.

YAESU FT-77 HF amateur band tcvr with FC-700 ATU bxd with leads & mans, no split so don't ask; £500. No offers. Also Trio TR-9130 25watt 2 metre all mode tcvr bxd with two mobile mounting brackets and Microwave modules 12db pre-amp & mans; £375 no split, no offers. Also complete VHF/UHF packet system comprising Baycom terminal leads software & man with Amstrad PPC512 Laptop twin disk computer; £180. 01388 745787 (Willington, Crook).

3 ELE Triband Yagi 20,15,10 Western DX33 Penetrator; £60 ono. G3HQG, 0114 247 0277 (Sheffield).

AAA SPC300D 1kW ATU, vgc, man: £175. Sandpiper 80m dipole, vee & vertical centres, as new: £20. GOEOL, QTHR (Winsford, Cheshire) 01606 554857.

ADONIS AM303G desk mic bxd exc condx with lead for TS850 £40. Works for Windows V3 unopen. unreg: £45. G0RTH (Basildon) 01268 413598.

AEA PK88 TNC suitable for both HF & VHF packet, excellent condx, with man, software & cables: £100. G3KZU (Oxford) QTHR.01865 63000.

AMSTRAD 486 33MHz PC 214Mb HD SVGA colour monitor 4Mb ram windows 3.1. MS-DOS 6. G0FOF. 01234 711904 (Milton Keynes).

AMSTRAD PC1512DD computer, colour monitor, good condx, buyer collects; £90 ono. Paul, G4MJM 01375 361210 (Stanford-Le-Hope).

AS new Honda EM650 handy generator run only approx 60hrs cost £522.87 accept: £375 ono. Buyer must collect & test. FT290 MK II & clip on 25 watt linear amplifier: £375 HX240 transverter: £40 2 mtrs to HF mobile bracket for FT290 free with tcvr. (Huddersfield) 01484 423282.

BASE station H/F tcvr about £1400 new Yaesu FT-one in present use; £680 hand books. G0UAU, QTHR, 0121 358 3639 (Birmingham).

BBC computer mono monitor disc drive ATPL board Prestel adaptor printer cable RTTY Rom; £95. Bill, G0LWV, 01689 876733 (Orpington).

BRAND new 2C39A; £10. ex-equip 4CX250BC; £8. QQV0640A; £8. 3E29; £5. QQV0310; £3. 4X150G; £6. pye F401 base station as new xtalled 70.26 CW desk controller & microphone; £40. Tait T198 VHF HI PMR tm; £30 Icom ICHIO hand held; £195. Tait T535 hi band mobile; £150. Eddystone 680X Rx gwo; £100. Avo 8 GWO; £50. Tait T336 Tx; £100. Bird 61 Termaline; £40. 01354 741168 (Cambs).

BUTTERNUT 6 band HF6VX used 1 month only; £85 ovno. Update PK232 to MBX all req. EPROMS need PCB. Have updated; £30 ovno. All above collect or p&p. Due to disability going QRT. Please call any time, no problem. Even Icom UK have not got an original w/shop manual for IC745 only photostat. Have been on order for year. A photostat copy will cost you £18.00 + p&p. VCI ATU model 300 4 ant i/p; £80 + p&p. 0181 949 4503 (New Malden, Surrey).

BUTTERNUT HF5B Butterfly Beam. Good condx: £175. Star LCIOC colour printer CW software & interface for PC: £50. G0PHT, QTHR, (Loughborough) 01509 231289.

CAMBRIDGE Z88 died so accessories available. Case. PSU. 32K 128K IMB rams. 32K 128K eproms. Serial and parallel printer, leads. Z88 magic & computing books; £100 the lot including postage or offers individual items. Phone evenings or write; G3NTM, QTHR. 01784 456567 (Staines).

CAPCO magnetic loop 10MHz - 30MHz with controller & cable buyer collects: £120. GOKYA (Norwich) 01603 503076

COLLINS 'S' line 75S-3B RX (WARC bands fitted) 32S-3 TX 516-F2 PSU GWO with new factory manuals spare valves & 'tubesters': £450 the lot OR straight swop for Icom IC720A. G3RFH, QTHR (Blackpool), 01253 300666.

COLLINS equipment in original Samsonite suitcases. KWM-2A HF-T/R, 30L-1 linear, PM-2 mains PSU, 312B-4 swr/pwr/phn & spkr unit. Collins desk mic. Plus spare valves offers around: £550. Wanted: Icom R1 handheld scanner; dual-band mobile; 70cm handie; HF gen/cov receiver. (Abingdon) 01235 532653.

COUNTER Maplin Universal counter timer 10Hz to 1GHz model MF1000 handbook: £100. (Winscombe Avon) 01934 843507.

DETACHED 2-bed bungalow, GCH, garage, very good order, village location, near Holywell, North Wales. Easy access to coastal resorts, mountains, Chester & Manchester. 750ft ASL, excellent take off across NE Wales, N England, N Midlands. Antennas for 70cm, 2m, 6m and HF, negotiable. Ample garden space. Photos available. Reasonable offers considered. Derek (Holywell) GW0UDJ 01352 781311.

DRAKE 2B Rx complete with Q multiplier spkr. Buyer collects; £80. GW4DEP, QTHR 01938 810069 (Nr Welshpool).

DRAKE CW75 keyer: £75. WH7 wattmeter: £75. CS7 remote coax switch: £120, all new with mans. Postage inclusive. G3YFK. (Shrewsbury) 01743 884858.

DYMAR 2000 PMR with 2m mods toneburst: £80 Baycom packet modem & software: £15. G8FDJ (Sheffield) 0114 233 3847.

FOR sale; Strumech Versatower 40ft lattice section mast with ground post winches 21in wall stand off. Good condx, offers. 0181 842 1688 (Hayes, Middx).

FT 727 h/held 2/70 bxd with base, mobile, wall chargers MH12 A2B spkr/mic; £275. Mbile clear out - TS701E. 2/70 H5155B switch box/tone burst H5 15 boom mic gutter magnetic mounts MA 4000 dual band ant. Duplexer bxd, man; £325. All in good order. 01789 750 889 (Stratford).

FT 902DM, man, w/man, silver Easle mic, FC 902 ATU, SP 901 spkr, exc condx; £630 ono. 01654 767 367.

FT101ZD mkIII Fm & CW filter WARC superb condx, very little use; £385. FT 707 HF mobile excellent condx; £375. FC 707 ATU excellent condx; £100. Hy-gain 204BA-S 20m 4-element beam as new, still in box. Cost £430, accept £280 ono. 01792 817957 (Swansea).

FT102 FV102DM FC102 SP102 vgc, no splits; £850. Amiga 600 KCS powerboard Wordworth M.S Dos 5, little used; £250. 01289 382464 (Berwick).

GLOBAL AT-1000 receiver ATU in excellent condx with instructions. Only £55 ono Paul, G4VAM (Peterborough) 6pm. 01733 346254.

HELIAX coax two lengths 13mtrs & 10mtrs 30mtrs UR74; £45 the lot. 4 x 23el Tonna for 23cm; £85 19el MET for 70cm; £15. Microwave modules MM144/28 transverter; £50 MM432/28 transverter; £60 SSB electronics LT235 23cm transverter; £270 Coax relax RK500; £10. 23cm masthead preamp DX12965; £50. Daiwa cross pointer SWR/PWR meter for 23cm; £40. Buyer collects. 01733 54331 (Peterborough).

HILOMAST NK9 pneumatic 30 foot 5 section mast complete with wall brackets & free standing support brackets. Hilomast 230/250 mains compressor for NK9 mast. Kenpro KR400RC rotator complete with top/bottom brackets & 30mtrs 5 core cable. G4MH minibeam with choke 10mtrs cable. Jaybeam professional type 7556 70cm 500hm vertical 420-445 MHz antenna. All items excellent condx. First reasonable offer secures. Prefer buyer inspect &

collect. Cyril, G3LPA, 01953 883826 (Watton, Norfolk).

HP Spectrum analyzer model 851B & RF unit model 8551B 0-42GHz; £500.00 Bird Thruline model 45; £125. MM144/100 Linear; £150. MM 432/50 Linear; £150. 432MHz GJ4ICD 1KW Linear & PSU; £300. Rohde & Schwarz frequency meter 30MHz-500MHz; £175. Marconi signal generator 10-500MHz; £400. Robot SSTV converter; £150. PYE PF85 VHF h/held; £85 each. Dual power supply unit 0-30V 2amp; £75. Ferrogaph distortion meter & oscillator; £250. Video show professional 180 £300. Tono 7000E RTTY & Morse converter; £200. (Welling) 0181 304 8390.

HUNTER linear amp: £700 bxd with man as new, can deliver up to 50 miles. John, G0DWD, QTHR, (Reading) 01734 694040.

HYGAIN TH3JRS 3EL bought April 94 used 6 months cost £325 sell; £175. bxd. Peter (Lutterworth) 01455 557263 Arva receipt shown.

IC271H 2m multimode 100W internal PSU. Mutek front end. HM1Z mike. Recent ICOM checkup; £600. AOR 1000 scanner 8.6-1300Mhz with charger; £110. Mutek bandpass filter; £10. HF 3 way switch,; £10. Jaybeam minimax triband antenna 10/15/20, vgc, fits on car roof rack. Buyer collects antenna; £175. 01474 823797 (Gravesend).

ICOM 720A 100W. HF rig, all bands, excellent, bxd, matching PSU, mic, handbook; £325. Ring after 7 June. John, 01963 240319 (Somerton).

ICOM 735 HF tcvr with matching AT150 power supply plus AT150 auto tuner. All mint condx, bxd AT tuner never used on TX nearest offer to £800. Ray, G0EMI, (Wallasey, Wirral) 0151 639 3294.

ICOM IC-761 HF tcvr. Mint, C/W Icom HM.12 mic: £1100 ono. G3RDG, QTHR (London) 0181 455 8831.

ICOM IC24 ET dual band handheld tcvr with CTCSS, spare battery box, extended receive, bxd in excellent condx; £275. 0191 384 7306 (Durham).

ICOM IC736 HF +6m 100W built in PSU atuo ATU see May Radcom's review this radio is as new with matching speaker CW filter hand mic all bxd used receive only £1,200 ovno. PX best Rx + cash or Tx + cash? Eddystone 1650. 01332 372696 (Derby).

ICOM IC970H 2m 70cms multiband boards fitted VGC, PSU 15A base microphone; £120 ono, complete. 01952 240661 (Telford).

ICOM-735 HF-tcvr; £625. Icom-AH2 automatic ATU new; £375. Alinco-DR599 dual bander extended-Rx remote kit; £475. Jaybeam type 7046 four staked centre-fed folded dipoles 70cm repeater antenna's with specifications as new cost £225.33, offers. Wanted 23cm Yagi. 23cm ATV-Rx. Multimode TNC. 01328 710641 (Norfolk).

JST 135 HF tcvr with mic, excellent; £775. Drake RR-1 Marine HF receiver (rack mounting SPR-4); £90. Lowe dip oscillator; £40. 01963 240319 (Somerton).

KENWOOD TH77E dualband handheld include charger manual box; £280, CQL5114 2m PMR with conversion information; £20, CQL614 2m PMR xtals microphone; £20, Dymar Lynx 4m, xtals microphone 25w; £30, 4m variable pre-amp bxd; £10, 2m 8ele quad (Jaybeam); £40 or swap any/all for 24cm ATV equipment monitors cameras etc. 01474 533454 (Gravesend).

KENWOOD TL-922 linear, as new, used on several occasions only, bxd, absolute mint condx: £1199. (Northants) 01604 881 971.

KENWOOD TS-690S fitted auto antenna tuner, 2.4KHz SSB filter. Hardly used, mint, as new, bxd: £1199. (Northants) 01604 881 971.

KENWOOD TS140S HF tcvr mic, man, bxd. VGC; £550. Prefer buyer collects. G3ZJF, 01727 811851 (St. Albans).

KENWOOD TS530S, ext VFO, MC35s, both mans, excellent condx to spec: £400. plus carr, callers welcome. Peter, G3GYE, QTHR. (Penzance) 01736 62486.

KENWOOD TS680S & PS480 PSU hardly used: £725. Yaesu G400 rotator: £70. Sandpiper 6m 6-ELE beam: £60. Capco 3000 ATU: £75. Datong FL3 filter: £80. Dee-com portable 6m antenna (unused): £25. Vigcen genie 286 computer 1mb ram 40mb h/disk vga colour, mans,: £200. Amstrad 8512 computer. Lots of software, contronics interface plus other 'piggy backs', mans, dozens of 42dd disks. (Huntingdon) 01480 392380.

KPC-3 Kantronics T.N.C few months old: £85 ono. PRO2005 realistic scanner 25MHz to 1300 MHz: £150 ono. (Farnham) 01252 332035 (eves).

LAST items of silent key (G3KWU) sale FT290 MKI with mic & mobile control unit & head-set boom mik: £200 unused Jaybeam 50MHz 4EL. Yagi beam: £40. Prefer buyer collects G3ABA (Southampton), QTHR. 01703 732997.

MAINS isolation transformer 240 volts to 240 volts tapped primary & secondary windings 3KVA, excellent condx; £45.00. G0UYN. 01462 711255 (Hitchin).

MORSE talker microwave MMSI; £35.+ pp. Goodmans HiFi Unit cd/record/PL3 band frequency, 80watts. Tape recorder, twin; £250+pp. Remote control, graphic equaliser 10 (new). (Clapton Common) 0181 806 4470.

NEMS Clarke R1037F 400 - 560MHz Rx with Spectrum display; £55. Collins R278 UFH aircraft band 225 - 400MHz ground Rx; £55. Mint Marconi TF2431 freq counter; £55. Buyers collect. G3VXZ, 01628 27350 (Maidenhead).

OPTO 3000, freq counter/sniffer, 10Hz/3GHz; £200. VHF/UHF cavity wavemeter; £35. FT703, 70cm handy, very clean; £95. KPC-4 dual port T.N.C; £180. BNOS 3w/50w 70cm linear, new unused; £275. Ring for further details 01895 234126. (Hillingdon).

OSCILLOSCOPE telequipment 554A mint: £70. Desk microphone Yaesu UD844: £15. Many books, magazines, SAE for list. Heathkit HM 2102 watt meter: £15. 01843 831069 (Westgate, Kent).

OSCILLOSCOPE Hewlett Packard HP140A, D.C - 20MHz Hybrid, old but G.W.O; £65 ono with mans (twin beam). G4CSG, QTHR, 01323 483659 (Eastbourne).

PHILIPS BC34 fast single unit charger for PF85 or PFX as new; £17.50 Bird Thruline lovely condition; £95.00. Tait T286 PSU; £30. Brand new leather case for PF85; £10.. Ferguson model 3V20A colour video camera & case. Hitachi VT 7000E portable VHS video recorder with case VT-TU70E tuner makes complete VHS video system all vgwo; £250 the lot. Cost over £1,300 new! 01354 74168 (March, Cambs).

PSION LZ 64 R5232 comms link, 32k data pack, spelling checker filemaster pack formulator pack, power supply, mans & various books cost £400+ selling for £100 the lot, also internal modem/fax card 2400/9600 including software; £25. Malcolm, 01489 577033 (Southampton).

QRT sale FT736 RDX mutec front 2,70 & GMTR; £1,300. Sagra 600 2mtr amp; £500. Tempo 2004A 70cm amp; £1,000 70cm 50watt amp; £40. KR500 rotator; £90. 70cm Cushcraft ant 424B; £40. 5 ELE tonna 6 mtr; £20. 4 off 26ELE Eager DJ9BV 70cm ants; £75 each or £300 for all. 4 ant with splitter 2mtr mast head preamp; £50. Palomar filter; £45. 01403 255011 (Horsham).

QRT sale. Includes TS850SAT, extra filters, VS2 V/Synth. Daiwa 32/40A PSU. Linear amp UK 'Hunter'. TM733E 2m/70cms FM D/bander. 40ft w/mounted tennamast. Gem-Quad 10, 15, 17, & 20m. MFJ264 1.5KW d/load. G600RC h/duty rotator. Revex meters: W510, W540. Kent s/paddle & PRC-KT1 keys. SP31 spkr. Diamond X300 VHF/UFH colinear. All Suberb! Boxes, mans, warranties. Much more! SASE for list. G0EOL, QTHR or tel; 01606 554857 (Winsford, Cheshire).

RACAL equip RA 117's (two) RA218 S/B adaptor RA137 LF adaptor inc manuals also genuine RA17/117 cabinet + 5ft rack; £250. the lot. 01332 671536 (Derby).

ROHDE & Schwarz freq meter 30-500MHz; £75 MM144/100 Linear: £80. Marconi SIG-GEN VHF TF993A; £100. Marconi. SIG-GEN VHF TF801D; £100. Robot 300 SSTV converter; £50. Pye PF85 VHF h/held with PSU; £25. Tono 7000E RTTY & morse converter; £100. Dymar mod meter type 1785; £50. SOU load resistor 0=3000MHz 50W: £25. 2 quad 22 power amp 8 pre amp; £250. Garrad 301 T/Table; £50. Thruling IW 95-125 5W 900-1200 IW425-850 2.5W 150-250 all £15 each. Marconi power meter 0=5 0=25W £25. Sony col camera HVC 2000P; £25.00. 0181 304 8390 (Welling).

SCARAB MPTU-1 terminal unit for RTTY: £35. AR-40 antenna rotor with automatic control unit: £50. (Aldridge) 01922 57489.

SELECTION of Watkins Johnson receivers, pan displays frequency counter & demodulator all 19in rack mounting: £250 complete or will split. (Buckingham) 01280 847980.

SILENT key (G3IDX). Kenwood TS-940S HF tcvr: £1,000 ono. Kenwood AT-230 ATU: £120 ono. Yaesu FT-290-R 2m portable, linear/preamplifier, power supply & mobile mic: £200. Mosley TA-33 HF Yagi & Daiwa MR-750 rotator: £200. G3IJS, QTHR, tel/fax (Bognor Regis) 01243 861578.

SILENT key sale AR88LF CR100 Eddystone 888 trio R1000 display fault KW Vanguard plus many other kits, bits, valves etc. SAE for full list. G4IDF, 60, Linksview Crescent, Newtown, Worcester WR5 1JJ.

TEKTRONIX 545 oscilloscope + extra dual trace preamp needs new EHT rectifier; £49. Brother thermal printer HR5TTP; £10. Buyer collects. 01403 753339 (Billingshurst).

TEN-TEC Paragon tcvr with PS & filters, as new; £700. FT736R all mode 2m. 70cm. 1.2GHz; £1000. TS130S tcvr with WARC bands, mic, 100W pep; £500. DFC230 remote VFO & control head for TS130S; £100. Microwave modules 2m masthead amplifier; £25. Mirage D1010 100w 430-450MHz linear; £290. BNOS LPM144 10-180w 2m linear; £190. Antenna Analyser MFJ-247; £100. Palomar R-X Noise Bridge; £40. AEA Morsematic keyer; £100. Microlog ATR-6800 terminal with software (cost $2500); £150. Ferrograph seven series stereo reel to reel recorder; £250. SMC Polarphaser II; £20. 2m 2 way power splitters; £20. Superscaf audio filter; £100. All items in as new condx. Buyers inspect & collect from SW London. Fax 0181 332 0568.

TOKYO hi power HL-166V 180W six meter linear, very little use, bxd: £229. (Northants) 01604 881971.

TOKYO hi-power transvt HX-240 2m-HF mint: £150. Datong morse tutor D70 with h-phones & key: £35. (Yeovil) 01935 20610 (eves).

TOKYO hi-power 80m tcvr type HT-180 SSB & CW 20w output as new, bxd: £230. Mizuho 20m hand-held tcvr SSB & CW, xtals for 14.05-14,1, 14.2-14.25 & 14.25-14.3 2W output, as new: £160. G0DZU, (Romsey) 01794 884286.

TOWER Altron H557 57ft 4 section telescopic tiltover, 22ft retracted, basepost mounting, 5 years old; £650. G3TTC, QTHR (Warwick).

TRIO 700G 2m multimode with VOX unit: £240 RN Elextronics 2m to 6ms transverter 25W output: £125. (Dorset) 01425 672927.

TRIO 9000 used mobile complete with MM 30 WTT linear amplifier mobile bracket & 7/8 whip antenna case slightly marked. G6OUG, QTHR, 0171 359 3841 (London).

TRIO 9130s 2m mobile multi mode. Good condx: £295 ovno. (Ongar) 0181 967 9406.

TRIO TS-130V/AT-130 10-80m warc bands. fitted YK-88C CW filter. Bxd, new condx. Inspect & collect. Ideal mobile rig; £325. No offers. GM2FHH, QTHR (Aberdeen).

TRIO TS-520 HF tcvr inbuilt 240V-AC power supply or external 12V-DC with man, sub-filter, mic; £350. Alinco ALR-72 70cm 24W; £185. Grundig multi-band Rx FM/AM/AMW SSB-unit service man; £150. RCA valve-volt meter service man; £35. Handportable spkr/mic; £10. Mobile spkr; £15. 01328 710641 (Norfolk).

TS 711E two metre multi mode tcvr, voice unit, mint condx, bxd: £625 ono. 01952 618016 (Telford).

TS120S 100W/HF; £295. TS770E 2m/70cm multimode, Tx fault hence; £325ono. Drae PSU 24A; £75. Sony ICF2001; £85. SP102; £60. Welz SP200; £45 m/m 432/100; £150. TS700G +vox unit; £250 Diawa CN630 140-450MHz; £65. TS440S; £550. Sota 144/100 linear with pre-amp; £95. Philips HCS31 8in colour monitor; £75. Offers invited for 726 2m/70cm, Dressler 2mQRO linear. Wanted 12/240V 19in rack public address amplifier. G4DVE, QTHR, 01384 255816 (Dudley, W Mids).

TS940S tcvr. Exceptionally clean condx. All HF bands. 100W, bxd; £900 + shipping & insurance. G4BKI, QTHR 01736 796088 (St. Ives, Cornwall).

TWO tcvrs for disposal KDK 2025 VHF 2m good condx working with handbook; £60. Also Trio TR8400 UHF 70cm working but needs xtal for simplex with hand book; £60 or £100 for both. Each of these radios are mobile types. 0181 337 7117 (Surrey).

VALVES brand new: £3.00 each: 6AK5, 6AN8, 6AQS 6AS6, 6BJ6, 6BN6, 6BQ7A, 6BR7, 6BW7, 6C4, 6C9, 6CB6, 6CH6, 6CW4, 6CW5, 6F33, 12AX7WA, 12BH7, 35Z3, 35W4, 65ME, 150B2, 1299A, 5763, CV4004, DAF91, DAF96, DF92, DF96, ECC81, ECC83, EL84, EM87, EZ81, QV03-12. Also at £1.00: ECC91. Please add £2.25 postage. Cheques to: K.Bailey, 40 Seymour Close, Birmingham B29 7JD.

VALVES many types available from 50p ea. SAE for list to 11, Rosedale Leven Beverley, E Yorkshire. H17 5NE. No hi-pwr TX valves.

VERSATOWER BP60 located Amersham, Bucks; £390. KLM KT34A 4EL tribander, needs some attention but works FB; £140. G4FXT (not QTHR) 01753 694607 (24hr answer phone).

VERSATOWER mobile 60ft; £750, Cushcraft A3S 3 band Yagi original packing instructions; £170. Emotator 747SRX rotator 451 universal coupling + double bearing ready aligned on head unit, 50 metres rotator cable handbook complete. Excellent order; £180. G4FKR, 01962 880411 (Winchester).

VIDEO camera Philips V100 B/W sound viewfinder zoom lens: £45. Dymar 2m rig with tone burst: £40. DNT 10m FM rig £25. KW Z-match ATU: £15 BBC micro (needs attn): £10 Philips VR2020 vcr (needs attn): £25. Aries IEEE interface for BBC micro: £25 Acorn IEEE interface for BBC micro: £25. (Devizes, Wiltshire) 01380 725075.

YAESU 4700 dualband mobile: £300 MC85. Kenwood mike desk: £60. Capco magnetic loop ANT £150. Dualband mobile antenna guttermount: £20. (Warwickshire) 01203 349156.

YAESU FP-757HD 20A PSU; £160. Cushcraft A3S triband Yagi; £150. Tandy rotator; £15. DSP auto notch filter; £80. Carl, 01280 705676 (Northants).

YAESU FRG 7700 gen cov receiver; £200 or offers. G3NDC, QTHR. 0181 954 1309 (Stanmore, Middx).

YAESU FRG-100 HF receiver, two months old. Perfect condx with TCXO, PSU. Bxd with man; £400 including postage. G1VCY, QTHR. 01268 753508 (Benfleet, Essex).

YAESU FRG7 communications Rx, continous coverage 0.5 to 30MHz, with handbook; £90, or nearest offer. G4SXH, QTHR, 01582 881935 (Nr Luton).

YAESU FT 480R 2 metre multi mode G.W.O; £225. ono. Tokyo VHF-HF transverter. HX240 GWO; £195 ono. Heathkit 2 metre fault on Tx hence; £45. All bxd with mic & mans. Open to sensible offers, prefer buyer to inspect & collect. 01443 690 608. (Merthyr Tydfil).

YAESU FT101Z HF trans. vgc with mic, fan & handbook ex G4GXK; £275, evenings, 01752 844321 (Saltash).

YAESU FT102 tcvr excellent condx, extra filter SSB/FM + FV102 Dm & Sp102. Inel spare valves & mans. A real Dx hunters rig; £700 the lot. G3NDC, QTHR, 0181 954 1309 (Stanmore, Middx).

YAESU FT290R/1 c/case m/mount whip charger; £200 ono; FT208 spkr mic c/case; £110 ono; packet. Kam multi mode; £200 ono. 01384 635969 (Halesowen).

YAESU FT470 70/2m handheld nicad pack, charger, bxd with instructions, vgc, seldom used portable; £250 ono 01698 457499 (after 6pm) (Central Scotland).

YAESU FT708R tcvr with NC8 PSu-charger spkr mic new Nicads bxd with man base only; £120. Exchange colour hand scanner. G6RHP, 01474 707678 (Dartford).

YAESU FT747GX all filters and FM board fitted, mobile mount, immac condx, matching FP700 PSU. GM3WYL, QTHR (Glasgow).

YAESU FT747GX vgc: £520. H/brew 30amp PSU: £70 both together: £550. Yaesu FT107 G.C: £350. Bound copies P.W 1964-1974: £25 prefer buyer collect. or haggle on carriage. G4IDF, QTHR, (Worcester) 01905 351 568 (eves).

YAESU FT757GX MHI-B8 h/mic Yaesu FC757 full auto ATU all leads manuals, never mobile, original packing: £675. Yaesu FT101E h/mic DC leads clean condx: £275. May exchange for 2m m/mode WHY. Derek, GM0UEL (QTHR) 01259 752968 (Coalsnaughton).

YAESU FT902DM good condx, leads, mic, handbook: £400. (Tyneside) 0191 257 2852.

YAESU FT980 HF. tcvr serviced by Yaesu 9 months excel condx sale due to ill health: £650 ono. All books phone after 6.30pm please. Yaesu FL2100Z very good condx new valves fitted by Yaesu but never used: £500 ono. (Swindon) 01793 849896.

YAESU FTDX401 tcvr producing well over 200 watts output; £150. will consider meeting halfway with delivery. Phone Paul, G0UFN, 0191 5819066 (Seaham).

ZC-1 MK I New Zealand WW II tcvr, 2-6.5MHz, some mods but no scars, no case, untested; £75 carriage extra or swop. Please phone after 8 June. (Somerset) 01963 240319.

WANTED

AP1086 issue 1 (RAF radio stores Ref no's) also Ap1186A B-C-D-E all sections & AP's relating to radio, radar equipment. Would purchase post-war to current Magnetrons, Klystrons, T/R cells, Ignitrons, Thyratrons, Microwave Planar tubes, T.W.T's & special CV types reqd R1355 IOD/13032 IFF Rx' R3002, R3067, R3121 control - unit type 17 all unmodified excellent price offered. RS91943, tel or fax anytime, 0171 511 4786 (London).

FOLLOWING valves req to keep my old rigs heating the shack. 6AZ8, 6BN8, 6CL6, 6DC6, 6EB8, 6U8A, 6146. Please look in your redundant spares. Your help is appreciated. Reasonable prices paid. Please write: Terry, 7 Cavendish Drive, Clowne, Chesterfield, Derbyshire.

G4MH mini-beam: Any review articles please. 'Pour Boire' willingly donated, desperate. 01634 379140 (Kent).

MOTOROLA or similar synthesised hand-helds in dead or alive condx + chargers & accessories, time-lapse colour VCR, auto-focus colour CCTV camera, WHY. Philip, G4ZOW, 01582 461952, office hours or leave message or fax. (Harpenden).

TOWER 30/40ft telescopic for HF medium weight array. 0121 478 1579 (Birmingham).

MEMBERS' ADS

WANTED: Powertriodes: DFI-30, DA-60, DA-100, STC-4300A, STC-4212, DET-25, DA-250. RS-237, PP3/250 PP5/400 PX-4/25, LS-5/6, P15/250 P27-500-600 P25-450/500, 0-75/1000, ES-250/m STC-4275A & similar. Pentodes: KT-66, KT-77, KT-88, EI34 (new) EI-37, AVO-MKIV valve tester, valve tester for valves 500-1000V. Decca stereo-decloa. Decola seperates SME300G/I + 3012. Mr H Jakobi, Cambridge House, Cherry Lane, Bolney,W Sussex RH17 5PR. 01444 881184. (between 9am - 7pm).

6MTR unit for FT767GX no silly prices please. (Sheffield) 0114 2320008.

AP/086 issue 1 (RAF radio stores ref nos) also air publications relating to radio, radar equipment & AP1186A, AP1186B, AP1186D, AP1186E. Exc. price offered. Would purchase post-war to current magnetrons, klystrons, T/R cells, photo multipliers, thyratrons, ignitrons, planar-ceramic, Microwave & special C.V types. Req Rx type R1355 10D/13032, ABK-ABK1 IFF units & control unit type 17/18 (London). 0171 511 4786 (phone or fax a/time).

AR88LF wanted in excellent condx must be unmodified prefer with spkr but not important, will collect reasonable distance. Cash waiting. 01202 480088 (Bournemouth).

COLLINS 51-J4 75 A-3 75-A-2 75-A-1- KWM.I KWS-I 30-L-I 30-S-I 51-S-I-Rx original condx. 0181 813 9193 (Middx).

CORSAIR 2 or Corsair; KVG SSB crystal filter XF-9B. Write to Noel, EI4DZ, QTHR (no telephone) (Irish Republic).

DRAKE ATU MN2000 or MN2700. Also R4C Rx with Sherwood filters. G3TKR, QTHR, 01535 645574 (Keighley).

FT726R satellite board wanted must be in good condx. G0PHT, QTHR, (Loughborough) 01509 231289.

IC970 or TS790 also Icom dual band mobile icom SM8 SM10 mikes (Bolton) 01204 667400.

KENWOOD model SW100A swr/power meter for round the World yachtsman (not me). G3DUZ, QTHR. 01794 322233 (Romsey, Hants).

KENWOOD TS850S have new unused KLM KT34A still in sealed packing to part exchange with case for above tcvr. 01953 488267 (Thetford, Norfolk).

MICROWAVE modules MMT 1296/144 linear transverter for 23cms 2 watts output version in good working condx. Peter (G3TZV) QTHR.

MINIATURE ceramic triode type Y-1641 for local oscillator A, textronix 491 Spectrum analyser (Tektronix part number 154-0506-00). G4KGP, QTHR. (Hatfield) 01707 269558.

SAISHO radio double cassette working or not working; soldering iron about 125W, mains, similar Henly Solon. G3KTH, QTHR (Droitwich).

TEN-TEC Argonaut 515 wanted. Must be in sound working order & preferably unmodified. Also matching PSU & mike. G0FNZ, QTHR, (Shepperton) 01932 221586.

TRIO TS780 in good condx OBO severely disabled OP - contact GM1TDU, QTHR - good price paid according to condx. 01224 706619 (Aberdeen).

URGENTLY require photo copies of JRC equipment options, CFG515 internal antenna coupler, NDH518 memory unit. All costs paid for. Also late model TS940 with Lowes mods, and in near mint condx, one owner from new. Bob, GW4TYQ, QTHR (Port Talbot). 01639 813413.

WANTED to replace unit lost in transit. PSU and schematic for mk2 KW Vespa. Working or not. Would consider Tx & PSU working or not if price asked agreeable, also FM board Icom IC505 50MHz. Ray, 2E1CQL (Hounslow) 01604 24486.

WANTED top section for 60ft versatower, must be in good condx. No head unit req. Phone with price: Tom, GM4FDM (Elderslie) 01505 322749.

EXCHANGE

APPLE IIE europluse complete, monitor, d/drive mans. Some software & expansion boards, inc. remote numeral keypad. Wanted frequency counter to 500MHz or RF signal generator, Commodore 64 complete swap for crystal scanner or AOR22 monitor to cover 2 metres. Dave (Kings Lynn) 01553 760142.

TAIT low band base modules T335 T336 sell for £100 each or exchange for high band T355 T356 modules. 01354 741168 (Cambs).

TEKTRONIX 22/3 60MHz dual beam oscilloscope, very good condx. Has been regularly serviced & calibrated, books, leads, probes, would prefer to exchange for HF Tx/Rx with general coverage Rx, or consider sensible offers. 0161 456 4300 (Stockport).

EVENTS DIARY

CLUB NEWS

DEADLINE - Items for inclusion in the August 1995 issue must be sent to HQ marked "Club News - DIARY", to be received by 23 June latest. If news is received by the published deadline, it should appear in the listing. It is your responsibility to ensure that items are sent DIRECT to HQ in good time. News items should be sent in writing, preferably typed or written legibly, and be signed by the club secretary or the person responsible for publicity.

NOTE: This is primarily a service for clubs affiliated to the RSGB, to whom priority will be given.

AVON

BRISTOL ARC - 1, Longleat activities; 8, Further projects discussion; 15, Computers; 23, Final Longleat arrangements; 30, Final VHF field day arrangements. Details 0117 9654886.

RSGB CITY OF BRISTOL Group - 27, Half yearly EGM. Details 0117 9672124.

SOUTH BRISTOL ARC - 7, 80 metres activity evening; 14, DX TV Reception demonstration; 21, Preparation for Longleat Rally; 28, Judging of the home construction contest; July 5, 10 metres activity evening; 12, Talk 'Gardening with Aerials and Flowers'. Details 01275 834282.

BEDFORDSHIRE

SHEFFORD & DARS - 1, Visit to a radio emporium in Ealing; 15, Talk 'Fibre Optics' by Don, G4LOO; 22, Pedestrian DF Hunt; 29, VHF field day planning and final equipment count; July 1/2, VHF/UHF field day contest; 13, Mobile DF hunt. Details 01462 700618.

BERKSHIRE

NEWBURY & DARS - 18, Car boot sale. Details 01635 863310.

READING & DARC - 3/4, HF NFD; 25, VHF NFD planning; July 1/2, VHF NFD. Details 01734 698274 (eves).

READING & WEST BERKSHIRE Raynet - Now meets every 3rd Tuesday of the month in the Emergency Operations Centre, Shire Hall, Shinfield, Reading. New members welcome. Details 01734 698526.

BUCKINGHAMSHIRE

AYLESBURY VALE RS - 7, Talk 'Packet Radio and DX Cluster' by A Ralph; July 5, Talk 'Operating Techniques' by I Eamus. Details 01296 437720.

MAIDENHEAD & DARC - 20, Fox hunt. Details 01628 486554.

CAMBRIDGESHIRE

CAMBRIDGE & DARC - 9, Talk 'A Bridge Too Far' by Chris, G3RSE; 30, Preparation for VHF FD; July 1/2, VHF NFD. Details 01954 200072.

CHESHIRE

CHESTER & DARS - 13, Talk 'Fax' by Mike Tyrrell, G6GAK; 20, Outside operation on the Yeld; 27, Surplus equipment sale; July 11, barbecue. Details 051 608 3229.

CORNWALL

CORNISH ARC - 1, Talk 'Antennas for Restricted Space' by David, G3NPB. Details 01209 820118.

PLYMOUTH RC - 3, Barbecue and field day; 20, Business meeting and Rally Facts. Details 01752 563222.

SALTASH & DARC - 2, Barbecue. Details 01752 844321.

DERBYSHIRE

BUXTON RA - 13, Treasure Hunt; July 11, Talk 'PMR/EPROM Conversion' by Mike, G0TGS. Details 01298 25506.

DERBY & DARC - 7, Junk sale; 14, DX TV reception - A demonstration by Paul Hamer of H S Publications; 21, Talk 'Domestic Fire Safety' by Chris Walker of Derbyshire Fire Service. Details 01773 852475.

DEVON

TORBAY ARS - Talk 'Modern Telecommunications' by John, G3YCH. Details 01803 526762.

DORSET

FLIGHT REFUELLING ARS - 4, Talk 'A Layman's Guide to the Personal Computer' by G1YHE; 11, Talk 'Tales from a Town Crier' by Mike Andrews; 18, Talk 'Practical Aerial Construction' by G0API; 25, Barbecue and skittles. Details 01425 653404.

EAST SUSSEX

HASTINGS E & RC - 21, Talk 'Computing with Optics' by Professor O'Mahoney. Details 01424 830454.

SOUTHDOWN ARS - 3/4, NFD; 5, Talk 'QRP - See It, Buy It, Build It' by Chris Rees, G3TUX; July 3, Barbecue; 9, Sussex Mobile Rally. Details 01825 763022.

ESSEX

CHELMSFORD ARS - 6, Constructors Competition; July 4, Talk 'The Industrial and Science Museum' by Dr Geoff Bowles. Details 01245 256654.

COLCHESTER RADIO AMATEURS - 1, Construction evening; 15, Colchester Town Hall visit; 29, Colchester Radio Rally planning evening; July 13, Talk 'Operating QRP' by Dave Penn, G3PEN. Details 01206 383510.

VANGE ARS - 8, RAE quiz night; 15, Receiver demonstration by G4BQF; 22, Back to first principles. Details 01268 552606.

GLOUCESTERSHIRE

GLOUCESTER ARS - 4/5, NFD; 7, NFD 'Inquest'; 10, Special event at Nuclear Electric HQ. Details 01452 421510.

GRAMPIAN

ABERDEEN ARS - 2, Junk sale; 16, Treasure Hunt; 30, VHF Fox hunt; July 7, Junk sale. Details 01569 731177.

GREATER LONDON

ACTON, BRENTFORD & CHISWICK RC - 20, Talk 'Design and Construction' by G8CYE. Details 0181 992 3778.

BROMLEY & DARS - 20, Direction finding hunt with Graham, G4NPD and Alan, G0TLK. Details 0181 777 0420.

COULSDON ATS - 12, Two metre DF hunt; July 10, Quiz night. Details 0181 684 0610.

CRAY VALLEY RS - 1, Surplus equipment sale; 15, Annual DF hunt; July 6, Meridian UHF Talk. Details 0171 739 5057 (office hours only).

CRYSTAL PALACE & DRC - 3/4, NFD Weekend; 17, Talk '100 Years of Radio' by Jon Weller, G0GNA. Details 0181 699 5732 or 01737 552170.

DARENTH VALLEY RS - 14, Talk 'Colour TV - What's it all About'; 28, DF talk; July 12, DF competition. Details 01689 826846.

SILVERTHORN RC - 2, On the air evening; 16, Preparation for the Practical Wireless QRP; 23, Inter-club quiz; 30, Club camp meeting. Details 0181 505 1871.

SOUTHGATE ARC - 8, Talk 'History of Royal Navy Signals' by Ted Ball, G4NLR; 22, ROTA; July 13, Talk 'Hints & Tips from Industry for Homebrew' by George Squires, G7HGS. Details 0181 360 2453.

SURREY RCC - 5, 'Digital Broadcasting' by BBC Research and Development. Details 0181 660 7517.

WIMBLEDON & DARS - 9, On the air; 30, 'How does it work' questions and answers session; July 14, Construction display. Details 01737 351313.

GREATER MANCHESTER

BURY RS - 13, Talk 'Equipment Specifications' by G4KLT; 20, Shack night; 27, Technical forum and QSO level CW class. Details 0161 881 1850.

ECCLES & DARS - 6, Discussion '432MHz Low Power Contest'; July 4, Talk 'Videotape Editing' by G0KLF. Details 0161 773 7899.

SOUTH MANCHESTER RC - 2, Contest preparation; 9, Packet on the air; 16, Home brew winners talk; 23, Midsummer DF and barbecue; 30, Talk on internet. Details 0161 969 1964.

GWYNEDD

DRAGON ARC - 5, Talk 'Uganda' by Ted Evans; 19, Talk 'A Spectrum analyser and 1001 uses for an oscilloscope' by Stewart Rolfe, GW0ETF. Details 01248 600963.

HAMPSHIRE

BASINGSTOKE ARC - 25, 2m Direction finding competition. Details 01256 25517.

HORNDEAN & DARC - 11, Operation of a special event amateur radio station at the Royal Naval Amateur Radio Society Annual Rally; 27, Talk 'Microwave Communications Operating' by Mike Walters, G3JVL. Details 01705 472846.

ITCHEN VALLEY ARC - 9, Talk on EMC by Nigel Gerdes, G7CAW; 23, Treasure hunt. Details 01703 813827.

THREE COUNTIES ARC - 7, Talk 'Direction Finding Antennas' by G0KUF; 21, Talk from a Siskin Electronics representative; July 5, Talk on fibre optics; 8/9, Trip to France. Details 01428 606298.

WINCHESTER ARC - 16, Talk 'Radio Control Within Falconry' by Jim Chick, G4NWJ. Details 01962 860807.

HEREFORD AND WORCESTER

BROMSGROVE & DARC - Meetings each Friday night. Details 01527 570672.

BROMSGROVE ARS - 27, Talk 'How to go about DF Hunting'; July 11, 2 Metres DF hunt. Details 01527 542266.

DROITWICH ARC - 6, Talk 'History of the BBC part two' by Peter Mellors; July 4, Talk 'Creepy Crawlies, Snakes and Things' by Allan Wilkie. Details 01905 778794.

VALE OF EVESHAM RAC - 1, Talk 'Kite Aerials' by Dave Davis. Details 01386 41508.

HERTFORDSHIRE

CHESHUNT & DARC - 3/4, RSGB NFD CW contest weekend; 21, Portable evening on Baas Hill Common. Details 01992 464795.

HARPENDEN ARC - 4, Abbey Tower. Details 01707 372044.

HODDESDON RC - 8, Night on the air; 22, Barbecue. Details 01992 460841.

WELWYN - HATFIELD ARC - 3/4, HF field day; 5, Talk on the RSGB QSL Bureau by John Hall, G3KVA; 19, Fox hunt; July 1/2, VHF field day; 3, A Mystery Tour. Details 01920 462241 (eves) or 0181 982 7298 (day).

HUMBERSIDE

GOOLE R & ES - 2, ARDF practice; 4, ARDF competition; 9, Junk sale; 16, Contest planning; 23, Contest loading night; 30, VHF NFD setting up evening. Details 01405 769968.

GRIMSBY ARS - 3/4, NFD contest; 8, Construction evening; 15, DF hunt; July 6, Treasure hunt. Details 01472 825899.

HORNSEA ARC - 7, Committee meeting; 14, Talk '30 Years of Transceiver Development', by Geoff, G3PWN. Details 01964 562258.

KENT

MAIDSTONE YMCA ARS - 2, Nominations for AGM; 9, AGM; 16, Repair it - practical evening; 23, Operator training. Details 01622 832259.

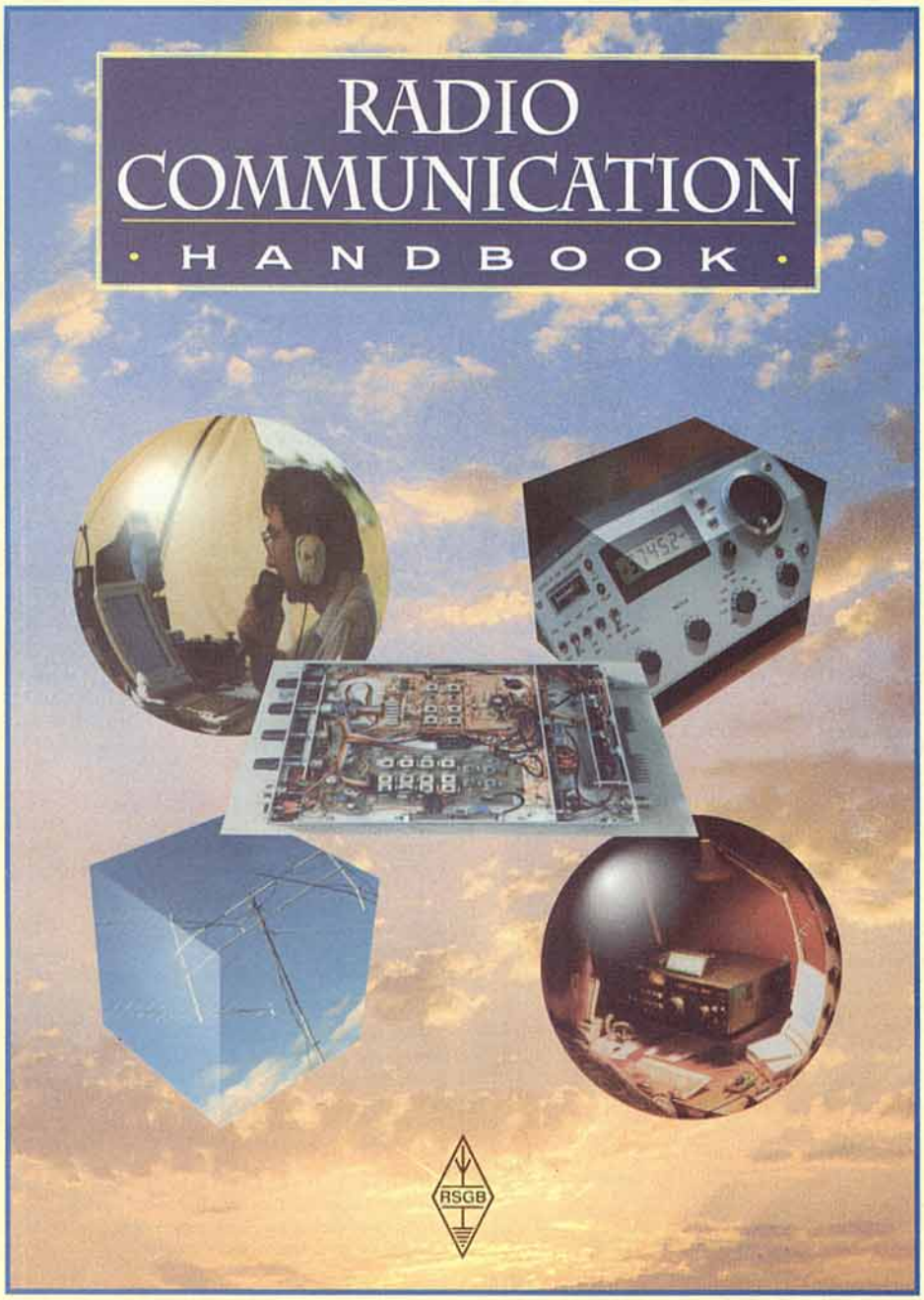
CONTINUES ON P92

CONGRATULATIONS

To the following who our records show as having reached fifty years continuous RSGB membership this month:

Mr T J Green, EI9N
Mr B J Shaw, G3CRJ
Mr J H Richards, G3BPG
Mr G C Newby, G3EBH
Mr J Bell, G3JON
Mr R A Wilson, G4RW
Mr G A H Eccles, G5GC

Radio Communication Handbook



Members' Price: £17.00 +P&P

(See over for postage rates and how to order)

See RadCom, Dec 94, P44 for full details

RSGB's Book Shop — Everything

		NON-MEMBERS	MEMBERS
ANTENNAS			
Antenna Compendium – Vol 1	(ARRL)	£10.25	£8.72
Antenna Compendium – Vol 2	(ARRL)	£10.25	£8.72
Antenna Compendium – Vol 3	(ARRL)	£13.50	£11.78
Antenna Compendium Set Vol 1,2,3	(ARRL)		£23.00
The Antenna Experimenter's Guide	(DDP)	£10.00	£8.50
Antenna Impedance Matching	(ARRL)	£14.99	£12.74
The ARRL Antenna Book 17th Edition	(ARRL)	£17.99	£15.29
All About Cubical Quad Antennas	(BPI)	£13.95	£11.86
All About Vertical Antennas	(BPI)	£9.10	£7.74
Beam Antenna Handbook	(BPI)	£7.50	£6.38
HF Antenna Collection	**(RSGB)**	**£10.99**	**£9.34**
HF Antennas For All Locations	**(RSGB)**	**£13.99**	**£11.89**
Practical Wire Antennas	**(RSGB)**	**£8.50**	**£7.22**
Simple Low Cost Wire Antennas	(BPI)	£9.07	£7.71
W1FB's Antenna Notebook	(ARRL)	£8.10	£6.89
Low Profile Amateur Radio	(ARRL)	£5.99	£5.09
Reflections: Transmission Lines And Antennas	(ARRL)	£14.99	£12.74
Transmission Line Transformers	(ARRL)	£14.99	£12.74
Quad Antenna Handbook	(ARRL)	£11.99	£10.19
Yagi Antenna Design	(ARRL)	£11.30	£9.60
AWARDS			
K1BV DX Awards Directory	(K1BV)	£17.06	£14.50
Islands On The Air Directory (2nd Ed) POST FREE	**(RSGB)**	**£6.90**	**£6.00**
IOTA Anniversary Booklet POST FREE	**(RSGB)**	**£6.90**	**£6.00**
BEGINNERS AND NOVICES			
Amateur Radio For Beginners	**(RSGB)**	**£3.50**	**£3.50**
D-i-Y Radio Magazine Subscription	**(RSGB)**	**£9.00**	**£7.65**
First Steps In Radio	(ARRL)	£5.50	£4.68
How To Pass the Radio Amateur Exam	**(RSGB)**	**£7.99**	**£6.79**
The Novice Licence Student's Notebook	**(RSGB)**	**£5.99**	**£5.09**
Practical Antennas For Novices	**(RSGB)**	**£5.99**	**£5.09**
Radio Amateurs Examination Manual	**(RSGB)**	**£7.99**	**£6.79**
RAE Revision Notes	**(RSGB)**	**£4.99**	**£4.24**
Revision Questions For The Novice RAE	**(RSGB)**	**£5.00**	**£4.25**
Now You're Talking – 2nd Edition	(ARRL)	£13.00	£11.05
Operating An Amateur Radio Station	(ARRL)	£2.50	£2.13
Training For The Novice Licence – Instructor's Manual	**(RSGB)**	**£6.50**	**£5.52**
W1FB's Novice Antenna Notebook	(ARRL)	£7.25	£6.17
Understanding Basic Electronics, 1st Edition	(ARRL)	£12.50	£10.63
CALL BOOKS			
UK Callbook Information/Directory 1995 (See SOFTWARE for disk version)	**(RSGB)**	**SOLD OUT**	
North American Callbook 1995	(RACI)	£20.00	£17.00
International Callbook 1995	(RACI)	£20.00	£17.00
EMC (BREAKTHROUGH)			
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for the Radio Amateur and SWL

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AVAILABILITY. Goods are available over the counter at RSGB Headquarters 9.15am to 5.15pm, Monday to Friday. However, you are strongly advised to confirm availability of goods by telephone before visiting Headquarters.

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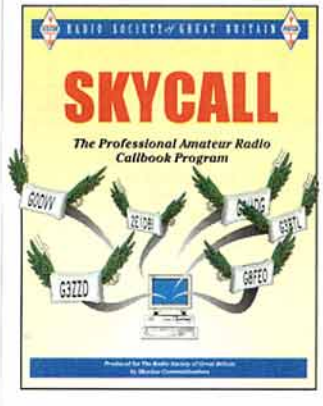

SKYCALL IS the professional amateur radio callbook program for Windows 3.1. Produced for the RSGB by Skyview Communication, SkyCall gives you instant access to details of over 55,000 UK callsigns plus data on hundreds of repeaters and packet radio bulletin boards. See *RadCom*, April 95, page 45 for full information on this exciting new product.

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FOR MANY YEARS until his death last year, Geoff Watts produced his *Prefix - Country - Zone List* which was the definitive guide to identifying those tricky callsigns so often used by special event and contest stations, not to mention the new countries that pop up from time to time.

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CONTINUED FROM P88

LANCASHIRE

PRESTON ARS - 8, 'Maplin Kit' - A construction competition; 22, Talk 'Fox Hunt'; July 6, Fox Hunt. Details 01772 686708.

THORNTON CLEVELEYS ARS - 5, VHF field day planning; 12, Talk 'My Home-brewed Station' by Fred, G4HWK; 19, On the air evening and planning for GB0SSF at Stalmine School; 26, Final preparations for VHF field day. Details 01253 853554.

LEICESTERSHIRE

LEICESTER RS - 5, Talk 'Japanese Morse' by Norman Kendrick, G3CSG; 12, HF / VHF night on the air; 19, Progress meeting; 26, Talk 'The Radio Active Island' by Richard, G3VGW; July 3, Night on the air; 10, Committee meeting and night on the air. Details 0116 2917250.

LINCOLNSHIRE

LINCOLN SHORT WAVE CLUB - 28, Talk 'The Man Who Was Q' by Mrs Fraser-Smith. Details 01427 788356.

LOTHIAN

LOTHIANS RS - 14, AGM; 28, Skittles Night. Details 031 337 7311 (eves) or 031 343 5423 (day).

MERSEYSIDE

LIVERPOOL & DARS - 6, QSL discussion; 13, GX3AHD on the air; Talk 'Soldering Techniques (PL259 etc)' by G3PDC; 27, Surplus Sale. Details 0151 722 1178.

MID-GLAMORGAN

HOOVER (MERTHYR) ARS - The society meets every Monday night. New members and visitors welcome. Details 01443 410964.

MID-GLAMORGAN ARG - 6, RSGB film. Details 01656 733729 or 0656 736954.

NORFOLK

ARC OF FAKENHAM - 6, AGM; July 1/2, GB100 NT - Oxborough Hall special event station. Details 01485 528633.

NORFOLK ARC - 3/4, CW National Field Day; 14, Visit to Norwich Sorting Office; 21, Night on the air; 28, Talk 'From Boys Own Paper to Radcom' by Victor Brand, G3JNB; July 5, Night on the air; 12, DF Hunt. Details 01603 789792.

YARMOUTH RADIO CLUB - 3/4, NFD. Details 01493 721173.

NOTTINGHAMSHIRE

ARC of NOTTINGHAM - 1, Talk 'Radio and Electronic Beams'; 8, Night on the air; 15, Fox Hunt; 22, Visit to J Needles Power Station. Details 0115 950 1733.

MANSFIELD ARS - 12, Talk 'Amateur Radio Satellites' by David Rowan, G4CUO. Details 01623 792243 or 01623 423697.

WORKSOP ARS - 10, Barbecue; 27, Fox Hunt. Details 01909 487741.

OXFORDSHIRE

BANBURY ARC - 21, Talk 'Radio In Aviation' by Chris, G4KNM. Details 01295 253509.

SHROPSHIRE

SALOP ARS - 13, Third Fox Hunt with Les, G7LGK as the fox; 29, NFD Preparation night; July 1/2, NFD; 13, Packet radio with SPUG. Details G7SBD QTHR or @ GB7PMB.

TELFORD & DARS - 2/3, HF NFD at Tasley, Bridgnorth; 14, 144/432MHz hunt; 21, VHF NFD Preparation night; 28, G0GTN in the Aircraft band; July 1/2, Participation in the VHF NFD. Details 01952 588878.

SOMERSET

WEST SOMERSET ARC - 6, Fox hunt with a difference; July 4, Videos followed by a discussion. Details 01984 631470.

YEOVIL ARC - 1, DF Event by G3KSK; 8, Short Wave Listening by G3KSK and G3ICO; 15, Visit to the Royal Signals Museum at Blandford, Dorset; 22, 'A Brains Trust' chaired by G7RGT; 29, Committee meeting. Details 01935 813054.

SOUTH GLAMORGAN

CARDIFF RSGB Group - 12, 'Methods of Radio Investigation' by Steven Biwater and Alan Cleverley of the Radiocommunications Agency. Details 01222 810368.

SOUTH YORKSHIRE

DRONFIELD & DARC - 5, Quiz night; 12, Fox hunt; 19, On the air evening; 26, Fox hunt; July 3, Treasure hunt; 10, Fox hunt. Details 01246 290250.

SHEFFIELD ARC - 6, Raynet meeting; 12, Annual DF hunt for the club trophy; 20, Swimming; 26, Midsummer dinner; July 3, Talk 'DX Hunting' by Don, G4KXW; 4, Raynet meeting; 11, Ten pin bowling. Details 0114 244 6282 or G0JJR @ GB7CWS.

SUFFOLK

FELIXSTOWE & DARS - 18, OPS activity afternoon; 26, Visit to the Fire Brigade Headquarters, Ipswich. July 2, Special event station - Landgard Fort Museum using GB2FX; 8, Special event station - Orwell Park School Open Day; 9, Kite flying, HF operation and picnic. Details 01394 273507.

IPSWICH RC - 7, Experimental on the air night; 18, 2m Fox hunt; 21, Rig test and check evening; 28, CW practice evening; July 5, Contest logging software practice; 12, Barbecue. Details 01473 644522.

SUDBURY & DRA - 6, Talk 'Using Thermionic Valves' by Mike, G4GGC; July 4, Talk 'Operating QRP' by Dave, G3PEN. Details 01787 313212 (before 10pm).

SURREY

SURREY RADIO CONTACT CLUB - 5, Talk, 'Digital Broadcasting' by BBC Research and Development; July 3, Talk 'Acoustic Audio' by Brian Davis, G3OYU. Details 0181 668 7517.

WARWICKSHIRE

MID WARWICKSHIRE ARS - 13, Fox Hunt; 27, Members' technical topics. Details 01926 424465.

STRATFORD Upon AVON & DARS - 12, Night on the air; 26, Top Band fox hunt. Details 01789 740073.

WEST MIDLANDS

RADIO SOCIETY OF BLOXWICH - 2, Visit to CAA Clee Hill Radar Station; 6, Talk 'DXpeditions and Contesting' by Martin, G6ABU; 11, Visit to Elvaston Castle Rally; 20, Preparation for RSGB 432MHz FM Contest; RSGB 432MHz FM contest. Details 01922 683877.

STOURBRIDGE & DARS - 5, Portable on the air night; July 3, Portable on the air night. Details G7HEZ @ GB7PZT or 01384 374354.

WEST SUSSEX

CHICHESTER & DARC - July 4, Open Evening. Details 01243 573541

WORTHING & DARC - 7, Talk 'Ron's Travels in the USA' by G8VEH; 14, Talk 'Playing Aerials' by G3NDJ; 28, G8MSQ Club History. Details 01903 753893.

WEST YORKSHIRE

DENBY DALE & DARS - 7, Rally meeting; 18, DDARS Rally; 21, 'Antenna Clinic' with Dave, G0EVA; July 5, Talk 'Simple and Unusual Aerials' by Gerald, G3SDY. Details 01484 547553.

HALIFAX & DARS - 20, Mag loop antenna, Desmond; July 4, Visit to Menwith Hill. Details 01422 202306.

KEIGHLEY ARS - 1, Night on the air; 8, Treasure hunt; 29, Cameo evening; July 13, Packet on the air. Details 01274 496222.

WAKEFIELD & DRS - 6, 2m Fox hunt; 13, Guinea Pigs by G0ISJ; 20, Night on the air; 27, Annual pitch and putt. Details 0113 282 5519.

WILTSHIRE

TROWBRIDGE & DARC - 7, 144MHz direction finding competition; 21, Planning for Red Cross event. Details 01225 864698 (evenings).

RALLIES AND EVENTS

This is a list of all rallies, hamfests, exhibitions and conventions notified to HQ (as at press date). Items are given in detail for the next three months inclusive and in brief thereafter. Please send detailed information, including contact callsign and telephone numbers direct to HQ and marked 'Rally News - DIARY'.

4 JUNE

SPALDING Amateur Radio and Computer Rally - Springfield Gardens, Spalding. Details G4TWR, 01775 722940.

9-11 JUNE

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Elvaston, Derbyshire (full members only). Information and booking details from G4LWA, QTHR, tel 01494 531755.

11 JUNE

THE 26th ELVASTON CASTLE National Radio Rally - Elvaston Castle Country Park near Derby. Parking, including entrance to the rally site, is £2 - £10 for coaches. More than 150 radio, computer and electronic stands will be on display. Other attractions include a flea market (for private vendors only), a crafts marquee and children's entertainment. Full on-site catering. Details from Ken, G3OCA, 01332 662818. Trade enquiries, Keith, G1ZLQ 01332 662896 after 7pm, please.

THE 6th ANNUAL BELFAST RALLY - The Chimney Corner Hotel, Antrim Road, Glengormley, Belfast. Doors open at 12pm. For details, including information about booking a free stand, contact David Caldwell 01232 471370.

ROYAL NAVAL Amateur Radio Society (RNARS) Annual Mobile Rally - Sports Field,. Event will take place between 10am and 5pm on the sports field, HMS Collingwood, Fareham, Hants Details Clive, G3YTQ on 01329 234143.

17/18 JUNE

BLETCHLEY PARK Amateur Radio and Computer Rally - Bletchley Park, Bletchley, Milton Keynes, Bucks. 10am to 5pm both days. Large trade presence with special interest groups, Morse tests, displays, a working Y station, talk-in and bring & buy. One price admission to rally and museum. Details 0923 893929 (see also pages 49,52 & 53).

18 JUNE

DENBY DALE & DARS Rally - Shelley High School, Skelmanthorpe, Huddersfield, West Yorkshire. Includes a bring and buy sale, Morse tests, refreshments, bar, single-level talk-in on S22 and SU22. Details Kevin, G1FYS on 01484 547553.

NEWBURY Boot Sale - Acland Hall, Cold Ash, Nr Thatcham, Nr Newbury. 9am to 3pm (set up after 8am). Plots £8. No advance bookings. Free admission and parking, Talk-in GB4NBS on S22. Details George 01488 682814.

THE GORDON Rally (North of Scotland AR Convention) - Please note this event has been cancelled.

23 - 25 JUNE

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Tutbury, Staff. Information and booking details from G4LWA QTHR, tel 01494 531755.

23 - 25 JUNE

FRIEDRICHSHAFEN HAMFEST, S Germany - Features 280 exhibitors from 30 countries. Details Wilfred Spreen or Heinz Kamper on 010 49561 949880.

25 JUNE

38th LONGLEAT Amateur Radio Rally - Follow brown tourist signs for 'Longleat House' (not the Safari Park) from the A36. With 150 trade stands, 20 club stands, large bring and buy, free parking, catering and bar on site, camping and caravaning facilities plus an RSGB bookstall and membership services stand. Entrance is £2.50 for adults, £2.00 for OAPs and 50p for children. Details Gordon, G0KGL 0117 940 2950.

2 JULY

The 6th YORK Radio Rally - Tattersall Building, York Racecourse, York. Doors open at 10am. Admission £1.50. Children accompanied with adult free. Ample Free parking. Amateur radio, electronics and computers, Morse tests and repeater groups plus refreshments and a licensed bar. Talk-in on S22. Details Dave, G7FGA 01904 790079.

7 - 9 JULY

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Brooksby Agricultural College, Leics. Details G4LWA QTHR, tel: 01494 531755.

8 JULY

CORNISH Radio Rally and Computer Fair - Penair School, Truro. Doors open at 10.30am. Large hall with trade stands, bring and buy, official Morse test, free parking, talk-in on S22. Information & booking Ken, G0FIC 01209 821073.

9 JULY

SUSSEX Amateur Radio & Computer Fair - Brighton Racecourse, Sussex. Open 10.30am to 4pm. Admission £1.50. Features include trade stands, giant bring and buy, free parking, bar and picnic areas. Talk-in assistance available on S22. Information and booking Ron, G8VEH 01903 763978 or 0273 417756 office hours.

16 JULY

NORFOLK RAYNET BARFORD Rally - Village Hall, Barford, on B1108, Norwith to Watton Road. Open from 10.30am to 3.30pm. With trade stands, raffle, refreshments etc. Free car parking and talk-in on S22. Details 01603 625833 (day) or 01362 820820 (evenings).

RAIBC Romsey Picnic - Broadlands, Romsey. All members, families, friends and supporters welcome. With grand draw, junk sale and refreshments. Talk-in on S22. Details John, G4COM, 01703 693017.

12TH McMICHAEL RALLY - Haymill Youth and Community Centre, Burnham Lane, Slough, near Burnham Railway Station. Doors open at 10.30am. Admission £1.50. Includes car boot sale (no advance bookings) at £7 per pitch on the day. Also talk-in on S22. For trade bookings contact Chris, G0MZN 01734 874870 or Ed, G7PRS 01734 411117. General details from Dave, G3SET on 01628 486554.

22 JULY

AIR FORMATION Open Day - Colerne Airfield. The 12th, 15th and 18th Air Formation Signals Regiments Association will be exhibiting a caravan/awning display about the Bar-None Motorcycle Club as well as the association's activities in the Middle east during 1945 - 47. GB4AFS will be active on various bands. All applications etc to Geoff Baldry on 01225 743240 x5256.

23 JULY

COLCHESTER Radio & Computer Rally - St Helena School, Sheepen Road, Colchester, adjacent to the Colchester Inner bypass Avenue of Remembrance. Doors open 10am - 4pm. Wide range of radio and computer traders, amateur radio car boot sale and bring and buy. Refreshments and licensed bar. RSGB Morse tests on demand but two passport size photographs must be produced. Admission £1.50 with ample free parking space and easy access for wheelchairs. Talk-in on S22. Details Richard, G7BIV, 01376 571239.

2nd HUMBER BRIDGE Amateur Radio Rally - The Exhibition Centre, Freightliner Road, Off Clive Sullivan Way, Hull, East Yorkshire. Opens 11am (10.30am for disabled visitors). Easy access one mile from the bridge with on site parking 700 cars. The event will centre on two large halls with a bring and buy sale plus full disabled access, talk-in, bar and cafe. Details or bookings Roly, G0UKS 01482 837042.

THE OUTDOOR BOAT AND LEISURE SHOW - Powderham Castle, Nr Exeter, Devon. The event will feature a large amateur radio section of new and used equipment. More than 2,000 exhibitor spaces are available on the 25 acre show ground with an additional 25 acres of parking. Details 01626 890243.

28 JULY - 5 AUG

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Lytchett Matravers, Dorset. Details G4LWA QTHR, tel 01494 531755.

30 JULY

RUGBY ATS 7th Annual Amateur Radio Rally - BP Truckstop on A5, three miles east of Rugby, 2.5 miles north west from M1 junction 18. Open from 10am. Admission £1 per car. Talk-in on S22 by GB7RRR. Pitches are £7 pre-booked or £10 on the day. Details 01455 552449. For bookings 01788 824214.

SCARBOROUGH ARS Radio Electronics and Computer Fair - Details Ross, G4ZNZ 01377 257074.

6 AUGUST

RSGB WOBURN Rally - Woburn Abbey, Bedfordshire. Details from Norman Miller, G3MVV, 01277 225563.

EVENTS DIARY

13 AUGUST

38th ANNUAL DERBY Mobile Rally-Details 0332 556875.

FLIGHT REFUELLING ARS Hamfest'95 - Flight Refuelling Sports Ground, Merley, Wimborne, Dorset. Doors open from 10am to 5pm. Includes the usual mix of traders, bring and buy, craft exhibitors, car boot sale and field events. Overnight camping facilities available for Saturday 12 August. Talk-in on S22. Please note new traffic routing and follow signs. Details Richard Hogan, G4VCQ 01202 691021.

18 AUGUST

COCKENZIE & PORT SETON ARC Radio Junk Night - Tables will be provided on a first come first serve basis (no charge for the table). Raffle at approx 8.30pm. Entry fee is £1 for all persons. Refreshments available. All the money raised is to be donated to the British Heart Foundation. Details Bob, GM4UYZ on 01875 811723 or via GB7EDN.

19 - 20 AUGUST

STAFFORD Amateur Radio and Computer Show (incorporating RSGB National Convention) - The County Showground, Stafford. Open from 10am to 5pm on both days. Large trade presence plus special interest groups, Morse tests, talk-in, bring and buy, lectures each day. Other attractions include free parking, bars and catering plus free stands available to radio/computer clubs and societies. Details 01923 893929.

20 AUGUST

6th GREAT EASTERN Rally - The Cattle Market, Hardwick Narrows, Nr Kings Lynn. Opens at 10am (9.45am for the disabled). Features outdoor car boot area, bring and buy sale, talk-in on S22. With a spacious indoor area with national exhibitors. Easy access for the disabled plus free parking and refreshments. Details Ian, G0BMS 01553 765614 or at GB7OPC.

WEST MANCHESTER Radio Clubs 'Red Rose' Rally - Silverwell St. Details Albert, G7RZW 01204 62980.

25 - 28 AUGUST

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Stratford upon Avon, Warwickshire. Details G4LWA QTHR, tel 01494 531755.

27 AUGUST

TORBAY ARS ANNUAL Mobile Rally - Clenon Valley Leisure Centre, Paignton, Devon. Doors open at 10am. With trade stands, bring and buy, special interest displays, used of leisure facilities, restaurant and bar. Family attractions include the beach, boating lake, steam railway and flume water park only four minutes walk away. Details John, G3YCH, QTHR on 01803 842178.

EAST COAST Amateur Radio & Computer Rally - Details 01473 272002.

28 AUGUST

HUNTINGDONSHIRE AMATEUR RADIO SOCIETY Seventh Annual Bank Holiday Monday Rally - St Peter's Road, Huntingdon, Cambridgeshire. Doors open at 10am. Admission is £1. Refreshments available. Features two halls and a car boot sale on hardstanding surface. Details David, G7DIU 01480 431333.

2 SEPTEMBER

ANNUAL WIGHT WIRELESS Rally - National Wireless Museum, Arreton Manor, Newport, IOW. Details Douglas, G3KPO 01983 567665.

3 SEPTEMBER

BRISTOL RADIO RALLY - Details Muriel, G4YZR 01275 834282 (24 hour answerphone.)

18th TELFORD Rally - Details 01952 588878 or 01743 249943. Traders only contact Jim on 01952 684173.

VANGE ARS Rally - Details Stuart, G1VWB 01375 859632.

8 - 10 SEPTEMBER

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Lincoln Hamfest. Details G4LWA, QTHR, tel 01494 531755.

9 / 10 SEPTEMBER

RSGB 1995 International HF Convention - A full Convention Prospectus will be available shortly, which will include an advance booking form. Send and SAE to: Marcia Brimson, RSGB HQ, Lambda House, Cranborne Road, Potters Bar, Hertfordshire EN6 3JE, UK.

10 SEPTEMBER

BARTG Rally - Details Peter Nichol, 38 Mitten Ave., Rubery, Rednal, Birmingham. B45 0JB tel 0121 680 5963.

SOUTHEND & DRS 75th Anniversary Radio & Computer Rally - ***New Venue*** Cliffs Pavilion, Southend-on-Sea. Details Ron, G0UAW on 01702 353676 or fax Martin, G0OQR on 01702 602271.

17 SEPTEMBER

PETERBOROUGH RADIO & ELECTRONICS SOCIETY East of England Rally - Details Vince, G8NGZ on 01733 331211.

23 SEPTEMBER

RADIO AMATEUR TABLE TOP SALE - Details John, G4ILA on 0161 477 6702.

24 SEPTEMBER

HARLOW AR AND COMPUTER SHOW - Details Mike, G7BNF on 01850 487863.

NORTH WAKEFIELD Radio Club Rally - Details John, G4RCG on 01924 362144 or John, G0EVT 01924 825443.

THE THREE COUNTIES Radio Rally, Malvern Worcs - Details & bookings Eddie, G4POZ on 01905 773181.

29 SEPTEMBER-1 OCTOBER

WACRAL 1995 CONFERENCE - Details G4EZU, 124 Darnley Road, Gravesend, DA11 0SN.

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Thurlaston, Leics. (AGM). Details G4LWA QTHR, tel 01494 531755.

1 OCTOBER

THE GREAT LUMLEY Amateur Radio Rally - Details G1JQT on 0207 237927.

8 OCTOBER

COMPUTERCATIONS 95 Computer & Radio Rally - Details 01803 522216.

KIDDERMINSTER & DARS Rally - Details G8JTL on 01384 894019.

13-15 OCTOBER

AR CARAVAN & CAMPING CLUB Rally - Elkington, Nr Welford, Northants. Details G4LWA QTHR, tel 01494 531755.

20/21 OCTOBER

LEICESTER AR Exhibition - Details Frank, G4PDZ on 0116 287 1086.

29 OCTOBER

HORNSEA ARC Rally - Details Duncan, G3TLI on 01964 532588.

4 / 5 NOVEMBER

NORTH WALES Radio/Computer Rally - Details Barry Mee, GW7EXH on 01745 591704.

12 NOVEMBER

THE GREAT NORTHERN Hamfest - Details Ernie, G4LUE on 01386 748958.

MARS-STOCKLAND Radio/Computer Rally - Details Norman, G8BHE on 0121 422 9787.

19 NOVEMBER

BISHOP AUCKLAND RAC Rally - Details Mike Shield 01388 766264.

26 NOVEMBER

BRIDGEND & DARC Radio Rally - Details Mike, GW7NIS on 01656 722199.

WEST MANCHESTER Radio Club's 'Winter' Rally - Details Albert, G7RZW 01204 62980.

3 DECEMBER

THAMES VALLEY Electronics Rally - Details 01494 450504.

VERULAM ARC Rally - Details Ian, G0PAU on 01923 222284.

4 FEBRUARY

LANCASTRIAN Rally - Details Sue Griffin on 01374 290088.

SOUTH ESSEX ARS Radio Rally - Details David, G4UVJ on 01268 697978.

17 MARCH

TIVERTON SOUTH RADIO's 10th Rally - Details 5 Butter Leigh Drive, Tiverton, Devon EX16 4PN.

GB CALLS

The list below shows special event stations licensed for operation during this month. It was taken from the HQ computer on 25 April. These callsigns are valid for use from the date given but the period of operation may vary from 1 to 28 days.

JUNE

1	GB0NTC	National Trust Charlecote
	GB1BAD	Biggleswade & District Scouts
2	GB4WWF	Wakefield Waterways Festival
3	GB2CCG	Cupar Children's Gala
	GB2VW	Volkswagen
4	GB2ECR	Elvaston Castle Rally
7	GB0THF	Torbay Hospital Fair
9	GB0VIS	Victoria Infants School
	GB2ACA	Aircrew Association
10	GB0NE	Nuclear Electric PLC HQ
	GB5SR	STELAR Radio Net
11	GB2SBM	Sailing Barge Museum
	GB6SBM	Sailing Barge Museum
14	GB2TSF	Three Schools Fete
16	GB0TPR	Three Peaks Race
	GB2HWS	Hatfield Woodhouse School
	GB2RAF	Royal Air Force
	GB2WTC	Willenhall Town Carnival
17	GB2BHH	Burton Hill House
	GB2SRS	Stroud Radio Society
	GB6SRS	Stroud Radio Society
18	GB4NBS	Newbury Boot Sale
21	GB2TAM	Tangmere Air Museum
22	GB2RCC	'Radio & Caravan Club'
23	GB0DAS	Dollar Academy Sports/ weekend
	GB0SLB	Saint Lukes Bells
	GB0SMP	St Michael's Penkridge
	GB2WSF	Woodley Summer Fete
	GB4SLB	Saint Lukes Bells
24	GB2SR	STELAR Radio
	GB2SSF	Seagry School Fete
	GB4BPM	Bromley Pageant of Motoring
25	GB4LR	Longleat Rally
28	GB75RS	75 Years - Royal Signals
	GB75RS	75 Years - Royal Signals
30	GB2ATC	Air Training Corps
	GB4WAD	Waddington Air Day

SILENT KEYS

WE REGRET to record the passing of the following radio amateurs:

G0AAO	Mr C A Mills	20.3.95
G0GED	Mr W F Stiling	7.1.95
G0IKM	Mr L C Bromley	
G0MZM	Ms L Wilson	
G2CMH	Mr R T Henley	28.3.95
G2FLW	Mr H H Clarkson	19.10.94
G3ABZ	Mr A H J Warner	11.3.95
G3AQZ	Mr J E Cowley	4.12.94
G3BCS	Mr R G Cousens	21.12.94
G3EMU	Mr I. N. Cline	April 95
G3NSA	Mr J W Hillyer	15.3.95
G3WDZ	Mr F Wooliscroft	
G4BSF	Mr R E Small	January 95
G4FEG	Mr J S Shaw	25.3.95
G4KFX	Mr M J Gist	29.3.95
G4OAM	Mr D P Filer	March 95
G4PVW	Mr J J Booth	January 95
G4VNJ	Mr R Jackson	26.2.95
G7DLQ	Mr G L Burr	22.2.95
G8WR	Mr D L Werschker	12.92
GM3YUO	Mr D D Campbell	12.3.95
GM6JGG	Mr F M Mackie	
GW0FJU	Mr T Blamey	27.3.95
2E0AAF	Mr T Atkinson	25.2.95

The LAST WORD

CONTESTS CONTESTED

I am not a fan of HF contests, but on the principle of live and let live, I suppose one has to put with them. And I readily give away some points if it spreads a little happiness.

In the morning of 25 March [first day of the *CQ* Worldwide WPX Contest - *Ed*] most Europeans were respecting a 14.300MHz limit, but in the afternoon and evening there was a free-for-all over the whole band. I suggest this is quite unacceptable by any standards. So I politely asked one or two of the more amenable stations about the limits. They replied 'yes, I know, but they all do it - ask the others' (a T9 station on 14.310MHz), or, from an XO station on 14.349MHz, 'well I couldn't find a free frequency anywhere else; I don't transmit above 14.350!'. To be fair to the latter, he did offer to QSY, but I didn't take him up on this and he was very polite.

I maintain, along with countless others, but alas not the RSGB, that there are problems like this to be addressed. If there are recommendations, let them be part of the rules. Those of us who dislike the cacophony of "59 - can't hear you" maintain that if the rules are not respected, contestants should be disqualified. I am sure that 90% on the non-WARC HF bands world-wide for 48 hours every so often to the detriment of any other traffic is quite enough space even for the most fanatical of contestants.

Jeremy Boot, G4NJH

. . . On 26 March, yet again I switched on my transceiver to be greeted by the dreaded '*CQ* Contest'. It seems there is some contest or other every weekend monopolising our bands to the exclusion of the great majority of amateurs who simply want to operate normally. I can't count the number of times I've heard "I just switch off and do something else", or words to that effect.

I would be the first to defend the right of any amateur to pursue the facet of the hobby of most interest to him, but it is totally unacceptable for a small minority (and contesters are, pro rata, a small minority) to render the bands unusable by the rest of us. (A bit like having a car rally in your town every weekend and having the choice of taking part or staying off the road!) These contests should be allocated appropriate parts of the band with the remainder available for normal use.

John Gregan, GM4CRV

. . . Perhaps the only long-term solution would be to have contests excluded in bandplanning from a small segment of each phone band. At least they are excluded from the WARC bands, 17 metres was like a breath of fresh air!

Ian Wadman, G4KDB

. . . The WPX SSB contest has made me put pen to paper to complain to you, as I understand you represent the amateurs of Great Britain and members of the RSGB. I am a member and I am British. . . There is no room for the amateur that has only time to come on to the radio at weekends.

I think, as many other amateurs, that contests are getting out of hand. It is impossible to make any contact when the contests are on. I, like a lot of amateurs, feel that you the RSGB have forgotten that there are a lot of us that work in the week, and can only follow our hobby on a weekend. You do not make any mention of amateurs like myself in *RadCom*.

David Randles, EA3ANG

[Chris Burbanks, G3SJJ, RSGB HF Contests Committee Chairman responds: RSGB contests do have frequency limits. These are not merely recommendations, but are part of the rules, and are within the IARU-recommended limits. The contests run by CQ Magazine, including the WPX SSB contest referred to above, are arguably the most popular contests in the world in terms of numbers of participants. They do not have any frequency limits in their rules: CQ Magazine is not a national society and therefore is not bound by these IARU recommendations. If sufficient amateurs wrote to CQ suggesting that they follow the RSGB's lead in incorporating 'contest-free' segments, I am sure they would consider it.

It must be pointed out though that the very reason non-contesters have difficulty in finding a quiet frequency is that many contests, including RSGB ones, do attract very large numbers of participants: it is certainly not a minority of those wanting to use the band at the time, but very much a majority.

However, nearly all contests are single-mode, so either the CW or the SSB part of the band is contest-free even during the major American 48-hour contests, and - as G4KDB points out - there are no contests at all on the three WARC bands, a position which is endorsed by the RSGB HF Contests Committee.]

HEART OF GOLD

May we express our thanks and appreciation to Mick Clowes, G0FOC, who for many years has given Morse tuition to amateurs wishing to gain a class A licence. He has so far assisted over 600 people, with a pass rate of 20 out of 23 so far this term.

Before he had a heart operation he was running four or five groups of trainees at a time. Despite his illness he continued to give tuition, often going straight through from 7.00 till at least 11.00pm on Mondays, Wednesdays and Fridays. He also gave extra tuition on Tuesdays and Thursdays for those approaching their tests. These classes were run from the end of British Summer Time, through the winter, until BST recommenced.

We would like to thank him for his help, his humour, his patience, and also the patience of his wife, Jane, and his children. Mick has put so much back into amateur radio that we all feel he should be highly commended, as he is a shining example to all radio amateurs. Many thanks, Mick!

Alan, G0VSK; Ken, G0VSL, and others too numerous to mention

WHAT'S IN A NAME, AGAIN?

Regarding the use of the term radio amateur (*The Last Word*, May 1995), the word amateur has a relevant dictionary definition and a respectable derivation, though alas, amateurish is not so pleasant. I am not at all keen on 'radio ham' and regret that this term seems to be becoming more common in this country. It is fine in the USA where it does not suffer from the unfortunate flavour inescapable here since the famous, or infamous, but admittedly amusing Tony Hancock sketch.

There was a time when 'radio experimenter' might have been appropriate, but maybe it is now too late for that. We could do a lot worse than retain amateur. Our reputation will depend more upon how we behave than what we call ourselves.

R H Pearson, G4FHU

. . . I am a hi-fi and music fan and serious about it - we are known as 'audiophiles'. Therefore, why not call radio amateurs - 'radiophiles'?

Angie Sitton, G0HGA

SOUND ADVICE

There has been earlier comment about oriental products with more knobs than there is room on the front panel to fit them. Some are spaced so closely that people like myself, whose finger-ends easily cover most of the panel space, cannot operate one button at a time.

'Bells and Whistles' has been used as an apposite description. And this latest addition from Alinco has a button labelled 'Bell' (May 1995 *RadCom*, page 47). The addition of another marked 'Whistle' would completely fulfil that outrageous prophecy!

John Ridd

Please note that the views expressed in *The Last Word* are not necessarily those of the RSGB. We reserve the right to edit letters for publication. All letters are acknowledged and may be passed to the relevant department or committee.

SUPPORT FOR NOVICES

I read the letter from R Pritchard (*The Last Word*, May 1995) with a feeling of disbelief and disgust. Mr Pritchard does not give his callsign, why? Why doesn't he come clean and tell us what the difference is between a Novice licensee and a 'faithful amateur'? Also, Mr Pritchard, how can you talk about furthering the cause of communication 'and to engender collective spirit'? Everything you say goes against the very principles you say you support. We need fresh blood in the amateur fraternity, otherwise there will come a day when we shall all but disappear.

S A Slater, G0PQB

. . .The band plans that he is complaining about are perfectly clear for anybody with even a little bit of education behind them. He says that the band plans give most emphasis to the Novice licences. I have looked at these plans for some time now and have noticed the following: on page 47 in April *RadCom* four plans for the 1.8, 7, 3.5 and 10MHz bands are shown. Out of this there is one small box explaining that the powers shown on the tables do not apply to Novices. That is the only time they are mentioned, except in the plans to show what part or parts of the band the Novices can use. This is hardly giving any emphasis at all, and certainly not 'most emphasis' as R Pritchard is trying to suggest.

I would also like to point out that Novices are radio amateurs as well. If he is trying to further the spirit of communication, he is going the wrong way about it.

C M Bracher, G8WUJ / G4SXR

. . .To deny Novices a significant place within the amateur world would do immense damage to the future of the hobby. Novices have brought new interest and enthusiasm to amateur radio. For many of them, their licence is a major achievement. To seal off our hobby from innovation and new talent will cause death by suffocation.

John Heald, G0UEA

. . . Can anyone give me a rational explanation as to why Novice licence holders, irrespective of their individual ages, sex, class of licence etc seem to be so hated and vilified by various sections of our hobby? I ask because there seems of late to have been a rash of attacks on these very valuable members of our fraternity. Such attacks in my opinion are most unwelcome and totally undeserved.

Most Novice operators have an operating procedure second to none, are rarely impolite and show a growing interest in furthering their knowledge. I know of several Novices who have gone on to take their RAE and have turned out to be superb operators in their own right. Such manners, courtesy and professionalism are sadly lacking amongst some of those that consider themselves to be in a hierarchy of licence holders.

Novices are in no small way great ambassadors for our hobby and as such enhance the reputation of the United Kingdom when heard on the air. In short Novices are legitimate licence-holders who have earned their right to operate in much the same way as we all have. Whilst it's true to say that not every Novice will be perfect in every aspect of their hobby, it's just as true to say that this applies to all categories of licence holders. I for one will always encourage the Novice operator, I suggest that anyone who does the same will be doing our hobby a great service.

James Neale, G7OJZ

QTH NOT R?

In common with most radio amateurs, I assume, I received a letter from the RA / SSL. It referred to certain changes which have or are about to take place, all but one of which I was pleased to endorse. The exception was the further reduction in the published data with regard to locations. The insertion of the first part of the post code where amateurs requested that their full address should not be published, is at least a very rough indication of location. To publish only the call sign, is in my opinion, a pointless exercise. I have already noticed on the air that some locations are only given as 'Sussex' or 'near Brighton'. But at least this is a fair indicator of the path being worked, without giving too much away. It seems to me that the future for the *Call Book* is rather bleak. It could end up as a very slim volume.

I am as aware as the next person for the need for security. However, I think that this trend is unnecessary and misconceived. Unless you are using indoor aerials you are flying a flag of invitation to potential thieves. The above proposal will not put off the determined thief, it is just 'window dressing' in the name of security.

When I was an SWL the *Call Book* was always at my right hand. It seems that the SWL and possibly future amateur will be denied this useful tool. Let's hope that all will see the futility of this exercise.

R J Bee, G3SZS

RSGB – at Your Service

SOME OF THE RSGB'S TEAM OF VOLUNTEER EXPERTS — AVAILABLE TO HELP YOU

Zonal Council members

Zone A (North of England): Peter Sheppard, G4EJP, 89 St Catherines Drive, Leconfield, Beverley, North Humberside HU17 7NY. Tel: 01964 550397.

Zone B (Midlands): David Whalley, G4EIX, 1 Lees Farm Drive, Madeley, Telford, Shropshire TF7 5SU. Tel: 01952 588878.

Zone C (SE England and East Anglia): Neil Lasher, G6HIU, 8 Highwood Grove, Mill Hill, London NW7 3LY. Tel: 0181 201 1578.

Zone D (SW England): Julian Gannaway, G3YGF, Dean Hill Barn, East Dean, Salisbury, Wiltshire SP5 1HJ. Tel: 01794 40008.

Zone E (Wales): E Paul Essery, GW3KFE, 287 Heol-y-Coleg, Vaynor, Newtown, Powys SY16 1AR. Tel: 01686 628958.

Zone F (Northern Ireland): Ian Kyle, GI8AYZ, 1 Portulla Drive, Pond Park Road, Lisburn, Co Antrim BT28 3JS. Tel: 01846 665034.

Zone G (Scotland): Post vacant.

For general advice and details on local clubs, or if you don't know who to contact:

Your **RSGB Liaison Officer** see January and February *At Your Service.*

Specialists

Antenna Planning: Booklet free to members from RSGB HQ. Planning application refused – RSGB Planning Panel, via RSGB HQ. Planning Advisory Committee Chairman – Geoff Bond, G4GJB, QTHR.

Audio Visual Library: Coordinator – David Simmonds, G3JKB, QTHR.

Awards: For contest awards, refer to the appropriate contest committee. For other awards, enquiries and applications go to the: HF Awards Manager – Fred Handscombe, G4BWP; IOTA (Islands on the Air) Awards Manager – Roger Ballister, G3KMA or VHF (and Microwave) Awards Manager – Ian L Cornes, G4OUT. Trophies Manager – David Simmonds, G3JKB.

Band Plans and operating practices: See the *RSGB Call Book* or April 95 *RadCom* for latest bandplans. For policy, contact the appropriate spectrum manager or committee chairman: HF Committee Chairman – David Evans, G3OUF, QTHR; VHF Committee Chairman – Peter Burden, G3UBX, QTHR; Microwave Committee Chairman – Steve Davies, G4KNZ, QTHR; HF Manager – Post vacant; VHF Manager – Dave Butler, G4ASR; Microwave Manager – Mike Dixon, G3PFR.

Beacons: HF Beacon Coordinator – Prof Martin Harrison, G3USF, QTHR. VHF Beacon Coordinator – John Wilson, G3UUT, QTHR. Microwave Beacon Coordinator – Graham Murchie, G4FSG, QTHR.

RSGB Contests: First contact the appropriate contest adjudicator (see the contest rules). For policy, contact the respective Committee Chairman: HF Contest Committee – Chris Burbanks, G3SJJ, QTHR; VHF Contest Committee – David Johnson, G4DHF, QTHR; ARDF (direction finding) Committee – Post vacant.

EMC: Advice on solving breakthrough and other electromagnetic compatibility matters: First contact your local EMC Co-ordinators - see April *At Your Service.* Committee Chairman – Robin Page-Jones, G3JWI, QTHR.

Emergency: Emergency Communications Officer – Greg Reilly-Cooper, G0MAM, PO Box 98, Northwich, Cheshire, CW9 5SZ.

Exhibition & Rally Committee: Chairman – Norman Miller, G3MVV, QTHR.

History: Society Historian – George Jessop, G6JP, 32 North View, Eastcote, Pinner, Middx, HA5 1PE.

IEE: Liaison Officer – Peter Saul, G8EUX, QTHR.

Licensing: LAC Chairman – Julian Gannaway, G3YGF, see Zone D (left).

Membership Liaison: MLC Chairman – Peter Sheppard, G4EJP, see Zone A (left).

Morse: Morse Practice Transmissions Coordinator – David Pratt, G4DMP, 11 Moorleigh Close, Kippax, Leeds L525 7PB. Chief Morse Test Examiner – Roy Clayton, G4SSH, QTHR.

Packet Radio: Datacomms Committee Chairman – Tom Lilley, G1YAA, QTHR.

President: Clive Trotman, GW4YKL, QTHR.

Propagation: Propagation Studies Committee Chairman – Charlie Newton, G2FKZ, QTHR.

QSL Bureau: Outgoing cards – PO Box 1773, Potters Bar, Herts, EN6 3EP. Incoming cards – your QSL submanager (see *RSGB Call Book* or November *RadCom*, p91 for a list). QSL Bureau Liaison Officer – John Hall, G3KVA.

Repeaters: Repeater Management Group Chairman – Geoff Dover, G4AFJ, QTHR.

Spectrum Abuse: Packet – Via Datacomms Committee. Repeaters – Via the Repeater Management group. Other – Via Licensing Advisory Committee. Intruder Watch Coordinator – Chris Cummings, G4BOH.

Technical & Publications: Committee Chairman – Dick Biddulph, G8DPS, QTHR.

Training and Education: Committee Chairman – John Case, GW4HWR, QTHR. Radio Amateur's Examination – George Benbow, G3HB, QTHR. Novice RAE – Hilary Claytonsmith, G4JKS, QTHR. Project YEAR Coordinator – Phil Mayer, G0KKL, QTHR.

The Society has a large number of volunteer experts available to help and advise members on a wide variety of subjects. Each month we will be focusing on a different section of the volunteer workforce, whilst still giving brief details of the main office-holders. See also the Information Directory section of the *RSGB Call Book*.

Senior Novice Licence Instructors

For details of local NRAE courses contact the senior novice licence instructor based in your county.

Co Antrim	GI3YRL, Mr H G Branagh, tel: 019603 67208
Co Armagh	GI4RNC, Mr C R Blezard, tel: 01762 350266
Avon	G4LJO, Mr G J Bennett, tel: 01179 843507
Bedfordshire	G4MEO, Mr B T Elliott, tel: 01767 680043
Berkshire	G0PUB, Mr P R Swynford, tel: 01734 617388
Borders	GM8JFE, Mr T Telfer, tel: 01450 373441
Bucks	G3DCA, Mr W Fitzgerald, tel: 01908 372498
Cambridgeshire	G0FLP, Mr J T Hammond, tel: 01354 56137
Central	GM0LOD, Mr G L Collier, tel: 01259 742126
Channel Islands	GU3WHN, Mr M C Solan, tel: 0181 57552
Cheshire	G3VSY, Mr S E Black, tel: 0161 485 1871
Cleveland	G0IBW, Mr D Jones, tel: 01287 633816
Clwyd	GW1VCN, Mr R Millward, tel: 01492 514926
Cornwall & Isles of Scilly	G3VWK, Mr A H Hammett, tel: 01726 882758
Cumbria	G3WCM, Mr F Chidlow, tel: 01900 605690
Derbyshire	G0IWF, Mr F R Oakton, tel: 01332 761943
Devon	G6ZKQ, Mr P W Thornhill, tel: 01364 43433
Dorset	G0KKL, Mr P W Mayer, tel: 01202 700903
Co Down	GI4TSK, Mr J M Skillen, tel: 01247 872707
Co Durham	G4WUI, Mr J Marr, tel: 0191 3779208
Dumfries & Galloway	GM4BDJ, Mr R B McCartney, tel: 013873 80018
Dyfed	GW4RGI, Mr W R Baker, tel: 01646 620090
East Sussex	G7DME, Mr R Gornall, tel: 01424 444466
Essex	G7NZV, Mr R Easting, tel: 01206 792016
Fife	GM3BQ, Mr K D Horne, tel: 01592 265789
Gloucestershire	G4CMY, Mr A A Mann, tel: 01452 301087
Grampian	GM4BKV, Mr S Sutherland, tel: 01224 691716
Greater London	G4OBE, Mr R F Snary, tel: 0181 360 6555
Greater Manchester	G0OVY, Mr P E Maggs, tel: 0161 2264053
Gwent	GW3NWS, Mr F R Clare, tel: 01633 880146
Gwynedd	GW0FMQ, Mr Ras Rees, tel: 01248 600963
Hampshire	G0VEP, Mr P A Steed, tel: 01705 371677
Hereford & Worcester	G4UXC, Mr M J Butler, tel: 01386 831508
Hertfordshire	G4JOV, Mr J H Maclagan-Wedderburn, tel: 01582 765821
Highland	GM0JOL, Rev J Lincoln, tel: 01641 2208
Humberside	G3TLI, Mr D Heathershaw, tel: 01964 532588
Isle of Man	GD4EIP, Mr C G Baillie-Searle, tel: 01624 801353
Isle of Wight	G3PZB, Mr A Ash, tel: 01983 298731
Jersey	GJ7LJJ, Mr N V T Utting, tel: 01534 72467
Kent	G3JIX, Dr K L Smith, tel: 01304 812723
Lancashire	G3WGU, Mr S Williamson, tel: 01253 53126
Leicestershire	G4WYN, Mr D G Harries, tel: 01530 417307
Lincolnshire	G0RCI, Mr A Gibson, tel: 01476 66701
Lothian	GM4CUX, Mr G R Winchester, tel: 0131 3395092
Merseyside	G0NVF, Mr D G Clifford, tel: 0151 6395922
Mid Glamorgan	GW0PYU, Mr H E J Clarke, tel: 01656 766609
Northants	G0LXX, Mr D R Parker, tel: 01933 664441
Northumberland	G0NEE, Mr M Stott, tel: 01661 832020
North Yorkshire	G4YRS, Mr G A Vallely, tel: 01748 850430
Nottinghamshire	G0LXX, Mr J P Mayfield, tel: 01159 211069
Oxfordshire	G0KNV, Mr R H Crocker, tel: 01865 770616
Powys	GW0JEQ, Mr R T Wicks, Gooseberry Cottage, tel: 0154 781 222
Shropshire	G4EIX, Mr D Whalley, tel: 01952 588878
Somerset	G0PQE, Mr R Gee, tel: 01935 850180
South Glamorgan	GW1UOU, Mr G V Bibby, tel: 01446 711638
South Yorkshire	G0NMJ, Mr J W Denniss, tel: 01302 531011
Strathclyde	GM0HSC, Mr H S Cumming, tel: 0141 6495371
Suffolk	G6MCB, Mr M C Baldry, tel: 01502 573588
Staffordshire	G3UNM, Mr A J Matthews, tel: 01538 722581
Surrey	G7DGW, Mr T Fell, tel: 0181 3997460
Tayside	GM0PTP, Mr R Bennettt, tel: 01382 817206
Tyne & Wear	G0NEE, Mr M Stott, tel: 01661 32020
Warwickshire	G0GNF, Mr G N Frykman, tel: 01926 613669
West Glamorgan	GW0NKH, Mr R A Hearne, tel: 01792 773719
West Midlands	G4WMH, Mr W M Hall, tel: 0121 7050488
West Sussex	G0AFN, Mr P G Howard, tel: 01243 543399
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NB: CHEQUES SHOULD BE MADE PAYABLE TO RSGB.

Copy and remittance to: **Victor Brand Associates, 'West Barn', Low Common, Bunwell, Norwich, Norfolk, NR16 1SY.**

NB. Members' Ads must be sent to "Members' Ads," RSGB Hq.

FOR SALE

G3LLL YAESU PROMOTION Free C.W. & extra SSB filters worth £178 with every FT900 & discount price till June 30th. FT990? see page 85. G3LLL see below...

CLEARANCE. S.H. FT101ZD £339 — FT101E £269 — T599 + R599 Kenwood Twins £275 — IC728 new (List £1089) £895 — FT726 + 2m, 70cm, 6m & sat. unit £899 — G3LLL see below...

NEW P.A. VALVES MAY BURN OUT YOUR RIG! On FT101Mk1-E & FT901/902 it is essential to check certain parts before replacing the P.A. valves. (Mains transformers are £200!) Special offer set P.A. valves + JAP driver £52 post paid + details of what to check! Only if you cut out this ad. (state rig). G3LLL Holdings Amateur Electronics, 45 Johnston St., Blackburn BB2 1EF. 01254 59595. Open Tues, Wed, Fri & Sat. lunch 12-1.30pm but Hols? Phone first.

G4TJB QSL Cards printed to your specification, send large SAE for samples and full product list. Unit 6, Worle Industrial Centre, Coker Road, Worle, Weston-super-Mare, BS22 0BX. Tel/Fax: (01934) 512757.

"RAYNET" YELLOW REFLECTIVE TABARDS with "RAYNET". Medium £10.50, Large £11.00, XLarge £11.50. "RAYNET CONTROLLER" 50p extra.- EPSON PX4+ lap top computer, built-in printer, charger Eprom for packet £46.50 inc pp. Nonreversible battery connectors line/panel mounting (10 pairs/pack) £6.50. Mike Watson G8CPH, Ipswich (01473) 831448.

MOSLEY ANTENNAE — All the famous British Manufactured Antennae, direct from us including spares/replacements. Mustang, Elan, TA-33Jnr etc. Full details shown in our Handbook, price £1.25 refunded upon purchase of Antennae, Mosley Electronics, 196 Norwich Road, New Costessey, Norwich NR5 0EX (Administrative address only).

ANTI-T.V.I. CUSTOM BUILT HF/VHF AERIALS, Trap-dipoles, multibanders, traps, baluns, parts. Reconditioned TX/RX's, Linears ATU's. Data 38p SAE, Aerial Guide £1.50. G2DYM, Uplowman, Devon EX16 7PH. Tel: 013986-215 any time.

THE RIG REVIEW contains details of over 400 rigs (see Product News September). Unravel those small ads, and tell an IC2SRE from an IC2SE, covering 25 years of manufacture and describing each rig's main features and original price. Price £5.00 post free, or on disk at £4.00 from Twrog Press, see below ...

QSL CARDS. Gloss or tinted cards. SAE for samples to Twrog Press, Penybont, Gellilydan, Blaenau Ffestiniog, Gwynedd LL41 4EP.

ALUMINIUM TUBE. Heavy-duty (scaffold) tube approx. dimensions 20' long, 2" dia, 1⅛₄" (4.5mm) wall thickness. 20' and 10' lengths available @ £1.80 + VAT per ft. C.W.O. Rusper Hire (Crawley) 01293 87 1621 office hours only.

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QSL CARDS — low cost, quick delivery, superior designs, quality guaranteed, personal designs our speciality. L.S.A.E. for samples: The Standfast Press, 5 South Drive, Inskip, Preston PR4 0UT.

AMIDON TOROIDS, SAE for price list. "Choke Baluns" Models for G5RV £28.25, Dipole £36.54, Yagi to fit 1.5" or 2" booms £37.15, VHF model, covers 30-250 MHz £18.00, all prices inc P&P or send SAE for full details. Ferromagnetics, P.O. Box 577, Mold, Clwyd, N. Wales CH7 1AH.

QSL, SWL's ECONOMY CARDS. Very low prices, quick delivery, specials a speciality. Sample enquiry to G3ETU, 34 Park Lane Court, Salford, Manchester M7 4LP. Tel: 0161-792 9144.

DIY Z MATCH ATU BFO. Loops. PRE Amps. Field strength meter. SAE G2VF, 39 Parkside Avenue, Southampton SO16 9AF.

LANDWEHR VHF/UHF MASTHEAD PREAMPLIFIERS 2 metre 145mas £147 and 70cm 435ma £152. Post & packing £4. Write or phone for leaflet. Qualitas Radio, 23 Dark Lane, Hollywood, Birmingham B47 5BS, Tel: 0121-430 7267.

ESSEX AMATEUR RADIO SERVICES. New and used amateur equipment bought & sold. PX welcome. All warranted & serviced. 8am till 9pm. Ring Alan — 01268 752522, 4 Northern Avenue, Benfleet, Essex SS7 5SN.

AERIAL WIRES, strong pvc coated £6.50, hard drawn 14swg £14, 16swg £11.50, all per 50 metres post/VAT paid, 30p stamps for full list of cables etc — W. H. Westlake, Clawton, Holsworthy, Devon.

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"ALL RISKS" INSURANCE for portable/mobile/base station amateur radio and ancillary equipment. A service for RSGB members only. Also public liability and equipment insurance for affiliated clubs and societies. Details and leaflets from Jim Stroud, Amateur Radio Insurance Services Ltd, Shepheards Hurst Green Lane, Outwood, Surrey RH1 5QS. Tel: 0134-284-4000. Fax: 0134-284-4554.

COMPUTER SOFTWARE HARDWARE

G4UXD's MORSE SUPA-TUTA DOES EVERYTHING! IBM-PC's, Archimedes, BBC's 100% "QSO" format; 150 tests, attach your key. Reviewed Feb/95 "Novice News". £9.99. SAE details P. Brandon, 1 Woodlands Rd., Chester, CH4 8LB, 01244 683563.

SUPER-DUPER, the PC CONTEST LOGGER. "Highly recommended" — RadCom, September 1993. With printed manual and upgrades for 12 months. HF £25.00, VHF £25.00, both £39.00. Paul O'Kane EI5DI, 36 Coolkill, Sandyford, Dublin 18. (00 353 1295 3668). E-mail okanep@iol.ie. Web Home Page http://www.iol.ie/~okanep/

SHACKLOG4 *the* PC logging system. Real time and post event QSO logging. QSL labels. Database analysis, reports, import, packet terminal etc. Optional IOTA database (G3KMA). Plus lots more!! Still only £27.50!! SASE (+disk for demo copy) for full details. G3PMR, 30 West Street, Gt Gransden, Sandy SG19 3AU. 01767 677913.

JVfax/SSTV, HamComm, PktMon. 9FD or 25FD PC Transceive Interface, Programs, Manuals, Pictures. £28.50. G8SLB (QTHR). 0181-595 0823.

G0LOV/G4LUE UK CALLBOOK for PC. Data April 1995. Database includes amateurs, repeaters, mailboxes, nodes, European repeaters WAB £12.50. £1.50ppi Hamfax, TX/RX FAX, SLOWSCAN, RTTY, MORSE, KIT £21.00 BUILT £25. £1.50ppi. Bailey, 8 Hild Avenue, Cudworth, Barnsley, S/Yorks.

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FLYING FROM GATWICK? Stay at Mill Lodge Guest House. 4 minutes from airport. Transport available. Telephone (0293) 771170.

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DX FROM SPAIN. 2 bedroom villa, 60ft tower and antennas, idyllic position Costa Blanca. 01773 823284.

SCARBOROUGH. 680asl in National Park. Spacious farm cottage, sleeps 6, from £149/week. 01723/870703 ref. A152.

CORNWALL. Luxury caravans. Peaceful farm park. Secluded heated pool. Readers discounts. G4FRJ. Tel: 01579 351122.

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HEATHKIT EDUCATIONAL PRODUCTS U.K. Distributor/Spares and Service Centre. Cedar Electronics, 12 Isbourne Way, Broadway Road, Winchcombe, Cheltenham, GL54 5NS. Tel: (01242) 602402.

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ADVERTISERS INDEX

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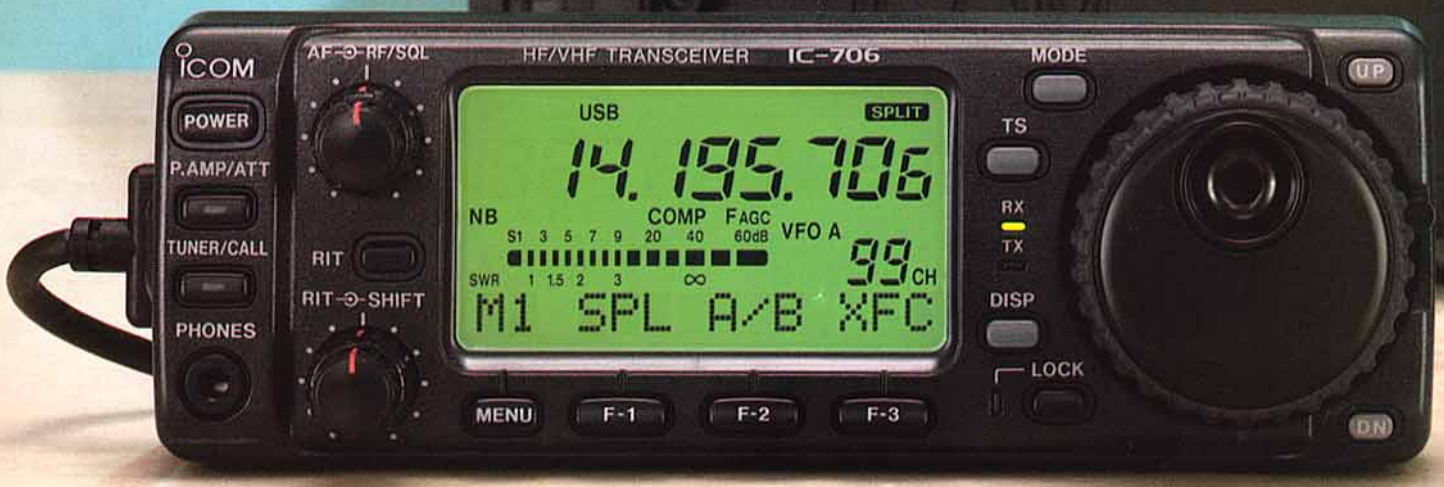

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As a base station, the compact full function FT-900AT includes direct keypad entry for pinpoint accuracy during quick band/frequency changes. Other features you'll like include CW keyer with front panel speed adjustment, speech processor, twin stacking VFOs, IF Shift and Notch. No competitor offers this! Bonuses, such as signal strength, power output, SWR and ALC digital meters, add value to the FT-900AT, and the proven duct-flow cooling system provides excellent long-term transmit power output reliability and frequency stability. For ease of use, Yaesu's exclusive Omni-Glow display enhances viewing in any light condition. And, since the high speed antenna tuner is built-in, it means less clutter in your shack.

The FT-900AT controls mount almost anywhere in your car, truck or camper. 100 Watt RF deck can mount in trunk, or under seat.

Remote front panel control head measures only 2-1/4"H x 9-1/8"W x 1-1/4" D.

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- IF Shift and 30db Notch Filter
- Digital S/RF, SWR & ALC Meters
- Programmable CTCSS Encode w/Repeater Offset
- Direct Digital Synthesis (DDS)
- 100 Memory Channels
- Frequency Range
  RX: 100 kHz-30 MHz
  TX: 160-10 meters
- CW Full Break-in Keying w/ Adjustable Speed
- Fast/Slow AGC Circuit
- Intercept Point Optimization
- Duct Flow Cooling System
- Twin Band Stacking VFOs
- Built-in Noise Blanker
- Built-in Adjustable Speech Processor

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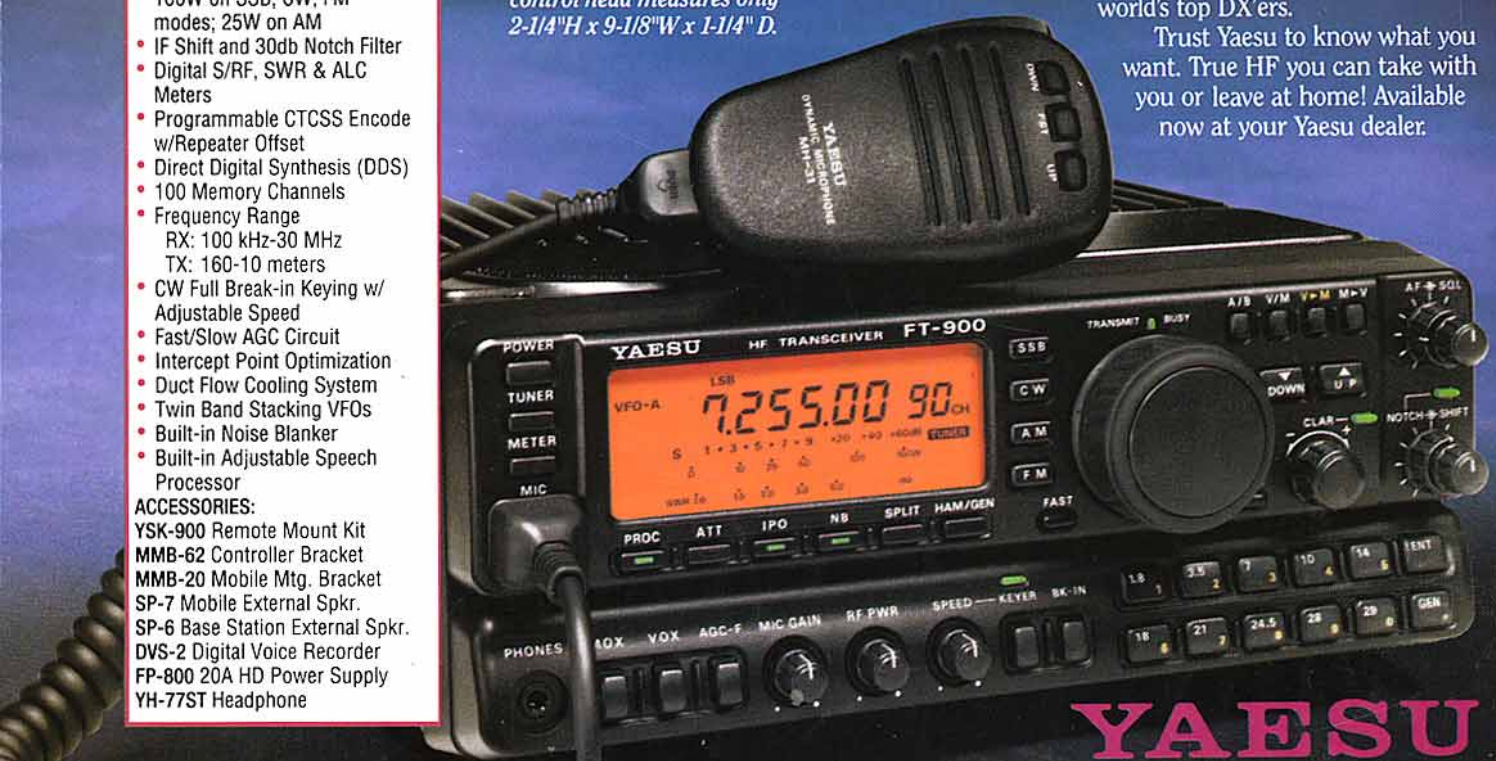
MMB-62 Controller Bracket
MMB-20 Mobile Mtg. Bracket
SP-7 Mobile External Spkr.
SP-6 Base Station External Spkr.
DVS-2 Digital Voice Recorder
FP-800 20A HD Power Supply
YH-77ST Headphone



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