Radio Communication

The Journal of the Radio Society of Great Britain

August 1994

Volume 70 No 8

THE VOICE OF AMATEUR RADIO FOR 81 YEARS

G3UXO Maritime Mobile on Queen Elizabeth 2

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Radio Communication

COVER PICTURE:
The high rise buildings of New York seem massive from the deck of the QE2. The AA&A loop antenna specially chosen for amateur radio operations on the voyage worked very well. See *RadCom's* lead feature on page 14.

NEWS AND REPORTS

TECHNICAL FEATURES

REGULARS

REVIEWS

RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY WHICH REPRESENTS UK RADIO AMATEURS
Founded in 1913 incorporated 1926. Limited by guarantee
Member society of the International Amateur Radio Union

PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG

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:
0707-659015

The RadCom Leader

Good News and More Good News

I AM PLEASED TO announce that, following a review of the Society's financial performance over the past year, Council has decided to maintain the subscription levels at the current rates for the foreseeable future.

Over recent months we have enjoyed some success in attracting new members. This gives us the opportunity to look closely at the care and support that we provide to our long-standing members and affiliated clubs and societies.

As I stated in an earlier *RadCom Leader*, a review of membership categories is under way and it is hoped to introduce, along with these revised categories, a number of incentives designed to encourage continued long-standing membership of the Society at a price to suit all pockets.

These measures, coupled with the introduction of the Direct Debit method of payment and the 'Gold' free trial membership scheme, means that it is now easier to join and maintain your membership of the Society than ever before.

Licence Changes

You will see in this edition of *RadCom* a *Gazette* Notice announcing a number of changes to the Amateur and Amateur (Novice) Licences.

These include some major improvements to our licence facilities which have been achieved after a great deal of negotiation and commitment by both the RA and RSGB over a considerable period of time.

Note that you heard about these changes first from your national society: in *RadCom*, on the *GB2RS* News Service and by way of an information pack made available to packet users, immediately the embargo on this news was lifted.

The RSGB continues to work closely with the RA to bring about such changes which will benefit all UK licensed amateurs and maintain a strong and vibrant Amateur Radio interest in this country.

It is for this reason we need a strong national society working on behalf of all licensed amateurs. Help us to support you by supporting us.

Peter A Kirby, G0TWW
General Manager

NEWS & REPORTS

● DURING FLIGHT Activities Week (13 - 17 Aug) at the RAF Museum, Hendon, the ATC will operate GB4ATC. Details from Radio Project Officer Malcolm Wood, 2E1BFL, on 081 363 0727.

● BRIDLINGTON ARC beat Hornsea ARC in an inter-club quiz with a difference. The forty technical questions were passed between the clubs via amateur television.

● CHARLES LLOYD, G4GKD/M, travelled Europe in June to raise money for the Cancer Dept of Swindon's Princess Margaret Hospital.

● NEW SCOUT Association Specialist Adviser for Amateur Radio is Geoff Dellbridge, G0PMF. He takes over from Paul Bateman, G1ZOV.

● ON 1 JULY, 10m beacon, GB3RAL, moved to a new location. Ident is now "DE GB3RAL QRA IO91IN"; all other parameters are unchanged.

● THE LATEST callsign issued by SSL at 13 July were in the G*UZ*, G*7SL*, 2*0AI* and 2*1DD* series.

Another 3cm First

THE FIRST 10GHz moonbounce contact between two G stations took place on 19 June between G4RFR in Wimborne, Dorset and G3WDG in Rushden, Northants.

1994 AGM

THIS YEAR'S RSGB AGM is in London again. The venue is the Royal Society of Chemistry in New Burlington Place and the date is Saturday, 3 December. Full details will be published in the November *RadCom*.

A RARE Opportunity for Amateurs to Help their Fellow Man.

Charity Status for Emergency Group

FROM 10 MAY, Radio Amateurs Relief Expeditions (RARE) was officially registered as a charity (No: 1037428). This took a year to achieve and was largely due to the efforts of Treasurer Mike Petheram.

RARE, whose expedition to Bosnia was featured in *News & Reports*, Feb 93, coordinates the activities of a number of radio amateurs carrying out relief work outside the UK.

They have provided radio communication for a group of 200 volunteers renovating nine different hospitals, orphanages etc in Romania, with an HF link back to the UK. Ongoing commitments are to Turnu Severin Hospital and a summer camp at Tabara Capriora where members teach English and radio communications (look out for YR0R) to youngsters and staff.

Some of RARE's members are employed on relief work for other agencies. For instance, John Layton, G4AAL, is with OXFAM in Burundi and Mozambique, and Alan Davies, GW3INW, has returned to Bosnia with Marie Stopes International as their Programme Coordinator (see photograph on page 7). Terry Elliott, G0EHX, and his wife Carole are undertaking a Health Clinic project in Bangladesh.

Radio Amateurs Relief Expeditions (RARE) members at their Annual General Meeting at Oldbury Fire Station.

More information on RARE can be obtained from: Don Sunderland, G6FHM, 1 Allfield Cottages, Condover, Shrewsbury SY5 7AP. If you want to meet the officers, there should be RARE stands at the Bolton and Telford rallies this year.

Russian Hospital Renovated

HOWARD KETLEY, G1JGY, was one of 250 volunteers who, on 18 May, flew to St Petersburg, Russia, to renovate the Komso Children's Hospital. A former professional photographer but now unable to work through illness, Howard donated his time and skills to the BBC TV *That's Life* Ann Mackey Russia Appeal to provide a record of the project.

The team found the hospital in unbelievably bad condition, giving the impression of a dingy Victorian workhouse. Over 50 years of decay was removed in one week and donated equipment and materials enabled new operating theatres, intensive care wards, toilets and washing facilities to be installed to a high standard. Staff and the young patients were overwhelmed by the amount of work carried out.

To continue helping institutions in the region, a charitable society Kickin 4 Kidz has been set up and more work is expected to be carried out at the end of August. An appeal for computers (286s or 386s) has been made as they can be easily re-chipped for the Cyrillic alphabet for use by the hospital and a nearby school. Anyone who wishes to help, either financially or with equipment, should contact G1JGY, QTHR; tel 0623 423697.

● MANSFIELD Amateur Radio Society will be using GB4ASH on HF and VHF at the Ashfield Show, Sutton-in-Ashfield on 13/14 August. They will be trying to raise money for the Kickin 4 Kidz appeal.

Licence Changes From 18 July

A *GAZETTE* NOTICE, published on 15 July and reproduced in full on page 24, announced a number of changes to the Amateur and Amateur (Novice) Licences. These are:

Amateur Licence:

- Raising of the 1.8MHz power limits
- Removal of the restrictions on 50MHz
- Additional member countries in CEPT

Amateur and Amateur (Novice Licences)

- Notification required for Unattended operation
- Requirements for Computerised Logs
- Administrative updates

The first three items represent major improvements to our licence facilities, and are the culmination of a considerable commitment by both the RA and RSGB over a period of several years which has enabled these to be achieved. The last three represent additional constraints on our operation, but, given the increasing intensity with which the spectrum is used, these have to be regarded as reasonable and we trust that this facet of modern operation will be accepted by all licensees. There are also a few administrative matters which tie up loose ends.

FULL DETAILS ON PAGE SEVEN

Council Elections

COUNCIL IS THE governing body of the Society and is responsible for the conduct of the Society's business, although a great deal of the work is delegated to sub committees that administer the various technical, administrative and financial aspects of the Society's policy. However, the overall supervision of these committees together with the Headquarters staff and functions lies with the Council.

Council meets, on average, every two months in London. In addition to attending such meetings Council members are expected to deal with individual members' queries promptly in a sympathetic and professional manner as well as representing the Society at various functions and liaison meetings throughout the year. They may also be required to form part of sub committees of Council and are expected to publicly support policies which have been decided by Council and such sub committees. Council members are directors within the meaning of the Companies Acts and will be called upon to make, and justify, decisions which may have significant financial implications for the Society. It follows that being elected to Council requires considerable commitment and is not for the faint hearted or workshy.

The Society is an extremely complex and dynamic organisation which needs Council members that are not only enthusiastic and dedicated to further the wishes of members but have the necessary business and management skills to implement them.

The early indications are that there will be SEVEN vacancies on Council in 1995. FOUR Ordinary Members and THREE Zones – ONE in Zone A (Northumberland, Tyne & Wear, County Durham, Cleveland, North, South & West Yorkshire, North Humberside, Cheshire, Greater Manchester, Merseyside, Lancashire, Isle of Man and Cumbria) ONE in Zone F (Northern Ireland) and ONE in Zone E (Wales).

However, a definitive list of vacancies will appear in September's *RadCom*.

Qualifications for Election

a) A candidate for election must have been a Corporate Member of the Society for at least THREE years at the time of nomination.
b) A candidate for election must submit:
   1 Written consent to accept office if elected,
   2 A declaration of any commercial interest in amateur radio.

Nomination Procedure

a) Each candidate must be nominated by at least ten current Corporate Members. In the case of Zone candidates all nominators *and* the candidate must reside in the Zone concerned.
b) Nominators may nominate one candidate only.
c) Nominations may be made on supplied forms or a plain piece of paper. Nominators should state their address in full and sign the nomination.

Additional Information

a) **Candidates:** To assist the membership in voting, candidates may supply a statement of not more than 100 words covering their experience and qualifications in support of their candidature. The statement should highlight their involvement in amateur radio. Candidates may also supply a personal statement of not more than 100 words stating why he or she wishes to stand for Council and what he or she hopes to achieve if elected. Outrageous, inflammatory or nonsensical claims will, of course, be edited. Council is a team and elected members are expected to serve as part of that corporate body.
(b) **Nominators:** Nominators may find it helpful to supply details of how long they have known a particular candidate and supply any relevant information in support of their nominee.
(c) **Vacancies:** A list of those Council Members who retire and create vacancies at the end of 1994 will be published in the September 1994 issue of *RadCom*. However, those seeking nomination may apply to Headquarters now for the necessary forms to assist with their nomination. Applications should be addressed to '1995 Council Elections', Radio Society of Great Britain, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE.

J C Hall OBE, G3KVA
Company Secretary

Whilst on holiday in Hungary, RSGB's Marketing Coordinator Justine Hodges visited the HQ of the national society Magyar Radioamator Szovetseg (MRASZ). She is pictured here with Laszlo Berzsenyi, HA5EA, IARU Liaison Officer; Imre Gajarski, HA4YD, Secretary and Bela Berzsenyi, HA5EB, President.

New RLOs

THE NEW RSGB Liaison Officer for **Hertfordshire** is John Rudd, G7OCI, 23 Grange Gardens, Ware, Herts SG12 9NE; tel 0920 466639.

The new RLO for **Dorset** is Phil Mayer, G0KKL, 16 Haig Avenue, Canford Cliffs, Poole, Dorset BH13 7AJ; tel 0202 700903.

RLOs hold a wide range of information and they are available to help any RSGB member in their county seeking advice.

New Senior Instructors

NEWLY APPOINTED Senior Novice Instructors are: Donald Parker, G6FJF (Northants); Hugh Cummings, GM0HSC (Strathclyde); Tony Mann, G4CMY (Gloucester), Roger Baker, GW4RGI (Dyfed); Ronald Wicks, GW0JEQ (Powys) and Cliff Blezard, GI4RNC (Armagh). Senior Instructors have lists of Novice courses available in their county. All are QTHR.

Operate in Turkey

TURKEY IS now participating in the CEPT T/R 61-01 agreement. This means that a reciprocal licence is no longer required for UK amateurs to operate temporarily in that country, and vice-versa.

Tournament Winner

DON KIRBY, GW0PLP, was the lucky winner of our draw for free tickets to the 1994 Royal Tournament.

Stolen Gear

FROM BATTLE, E Sussex: Microwave Modules MML144/100-S; FT-757GX S/N 4C060548; FT-7B S/N 0L130138; FT-480R S/N 1C090204; IC-251E S/N 10804332; FC-700 S/N 3C010502; IC2-E S/N 11918372; and desk mics AM-502 and Icom SM5. Information please to Sussex Police on 0424 425000, quoting case 373, 15 June.

From Great Barr, Birmingham: Receiver JRC-NRD535 S/N BR59961. Information please to G H Tallis, RS33128, 57 Sundial Lane, Gt Barr, Birmingham.

From a car in Cookstown, Co Tyrone: Alinco DR112EM S/N 0001941. A £25 reward is offered for information leading to the return of the radio. Contact Harry Oxtoby, GI0JHR, QTHR.

NRAE Report

THE CITY And Guilds report on the June Novice RAE shows an 83% pass rate. Copies are available to members on request from the Amateur Radio Administration Dept at RSGB HQ.

G0MJY Address

COUNCIL MEMBER for Zone B (the Midlands), Dave Gourley, G0MJY, has a new address: 86 Upton Road, Broadwaters, Kidderminster, Worcestershire DY10 2YB; tel 0562 753101.

RadCom Writers

THERE'S STILL time to nominate writers for the RadCom Columnist of the Year and RadCom Feature Writer of the Year. See page 6 last month for full details.

Licence Changes *from page 5*

Raising 1.8MHz Power Limits

THE POWER LEVELS on part of the 1.8MHz band were increased several years ago, but the restrictions on 1810 – 1830kHz had to remain until other services had transferred out.

This process is now complete, and 26dBW is now available across the 1.81 to 1.85MHz subband, bringing us into line with many other countries.

Removing 50MHz Restrictions

THE FACILITIES AVAILABLE at 50MHz have grown slowly but surely since the days when the RSGB first negotiated a limited number of experimental permits. It is gratifying to see that the band has now 'come of age' by the removal of the power and antenna restrictions. The power level is increased to 26dBW in 50 – 51MHz, and the antenna and maritime mobile restrictions are removed over the whole band, 50 – 52MHz.

New CEPT Countries

SEVERAL EASTERN European countries have recently joined the CEPT, namely Albania, Bulgaria, Croatia, Czech Republic, Estonia, Lithuania, Moldova, Romania, Slovenia, Slovakia and the Russian Federation and the Notice updates the list in BR68. In due course, it is hoped that these will soon implement the TR61-01 agreement which allows temporary operation in those countries.

In case there may have been some confusion, the list in BR68 is a complete list of CEPT member countries; not all these have ratified the TR61-01 agreement. The list of countries which you can operate in under the agreement is listed in the License Validation Document. It should be noted that three countries, Israel, Peru and New Zealand, that are not members of CEPT, have also agreed to take part in the TR61-01 agreement.

Unattended Digital Operation

FOLLOWING A number of problems with unattended packet operation, it has become necessary for unattended digital operation to be notified to the RIS in the same manner as other unattended beacon operation under clause 2(4) of the licence. Whilst this may seem restrictive, it is important that stations which malfunction and cause interference can be closed down promptly, particularly when these affect safety of life services. The procedures are much less formal than those for a conventional repeater or beacon on a hilltop site, and require only agreeing suitable close-down arrangements with the local RIS. A list of local RIS offices is included below.

Computerised Logs

AS A RESULT of problems during station inspections, it has been necessary to clarify the way logs are kept on magnetic media to ensure that the RIS can readily read their contents, or obtain copies to take away. The changes require that the licensee must be able to view and provide hard copy of a computer log when at the main address, or provide copies of the magnetic media followed later by hard copy if elsewhere. It is therefore not necessary to take a printer around with the station at all times, but one must be available at the main address.

RIS District Offices

Anyone intending to operate an unattended digital station must now notify their local Radiocommunications Agency office:

South London District (London Boroughs South of the Thames): PO Box 2500, WHYTELEAFE, Surrey CR3 0YL

Leeds District (Humberside, North Yorkshire, West Yorkshire): PO Box 2500, LEEDS LS1 5HX

Northampton District (Bedfordshire, Buckinghamshire, Leicestershire, Northamptonshire): PO Box 2500, NORTHAMPTON NN3 7TU

Nottingham District (Derbyshire, Lincolnshire, Nottinghamshire, South Yorkshire): PO Box 2500, NOTTINGHAM NG8 3SS

Preston District (Cumbria, Greater Manchester, Lancashire): PO Box 2500, NEWTON LE WILLOWS, MERSEYSIDE WA12 0NP

Scotland East District (Borders, Fife, Grampian, Highland, Lothian, Tayside, Orkney & Shetland Isles): PO Box 2500, FALKIRK FK1 1XP

Scotland West District (Strathclyde, Central, Dumfries and Galloway): PO Box 2500, FALKIRK FK1 1XP

Southampton District (Channel Islands, Dorset, Isle of Wight, Hampshire, Wiltshire): PO Box 2500 SOUTHAMPTON SO9 4BF

Teesside District (Cleveland, Co Durham, Northumberland, Tyne and Wear): PO Box 2500, BILLINGHAM TS23 2YT

Warrington District (Cheshire, Clwyd, Gwynedd, Isle of Man, Merseyside): PO Box 2500, NEWTON LE WILLOWS, MERSEYSIDE WA12 0NP

Belfast District (Northern Ireland): PO Box 2500, BELFAST BT5 6RJ

North Birmingham District (Shropshire, Staffordshire, West Midlands): PO Box 2500, BIRMINGHAM B32 1TA

South Birmingham District (Hereford and Worcester, Warwickshire, West Midlands): PO Box 2500, BIRMINGHAM B32 1TA

Bristol District (Avon, Cornwall, Devon, Somerset): PO Box 2500, BRISTOL BS99 7LI

Bury St Edmunds District (Cambridgeshire, Norfolk, Suffolk): PO Box 2500, BURY ST EDMUNDS IP33 2XB

Canterbury District (East Sussex, West Sussex, Kent): PO Box 2500, CANTERBURY CT1 1SY

Cardiff District (Dyfed, Glamorgan, Gwent, Powys, Gloucestershire): PO Box 2500, CARDIFF CF4 4YW

Guildford District (Berkshire, Surrey, Oxfordshire): PO Box 2500, GUILDFORD GU1 2BD

NE London District (Essex, North East London): PO Box 2500, LONDON SE1 8UN

NW London District (Hertfordshire, North West London, Middlesex): PO Box 2500, STANMORE HA7 1BP

Alan Davies, GW3INW, took this picture whilst working with Marie Stopes International in Bihac, in the extreme north-west of Bosnia, which has been under siege for two years. There is no postal service and the telephone exchange has been destroyed by a shell. Queues form outside the shack of T91FNO which uses frequencies just outside the 40m and 80m amateur bands to link Bihac's population with friends and families elsewhere in Bosnia. A sked operates three times a week with T91AAA in Sarajevo when electricity is available in the capital.

TURN TO PAGE 24 FOR FULL *GAZETTE* TEXT

RAE & Morse Courses

● A 30-week **RAE** course aimed at the Dec 95 examination will be run at Lee Valley Leisure Centre, **Edmonton, London N9**, in conjunction with Southgate ARC. Details from the instructor Steve White, G3ZVW, on 081 882 5125.

● Chris Budd, G0LOJ, is tutor on an **RAE** course at Twyford House, Shirehampton, **Bristol**. The course lasts two terms of Monday evenings and starts on 19 September Call Chris on 0454 616267 for details and cost.

● Wirral ARS runs an **RAE** class on Thursday evenings starting September at Ivy Farm, Arrowe Park, **Birkenhead**. Further info from Mr Kendrick, G3CSG, on 051 677 6368.

● The Sony Broadcast Amateur Radio Training Group in **Basingstoke** has an **RAE** course for the Dec 94 or May 95 examinations, Monday evenings from 5 Sep. The cost covers a copy of the *RAE Manual* and the *ARRL Handbook*. Details from Stephen Harding on 0256 483103.

● **North Cheshire** Radio Club will run an **RAE** course on Sunday evenings. Registration is on 11 September at 8pm. Further info from Jill, G0OZJ, on 0625 538057 (day) or 061 485 5036 (evenings/weekends).

● Enrol any day between 9am and 4.20pm for an **RAE** course at West Herts College (**Hemel Hempstead**) which takes place Thursday evenings from 22 Sep. Alternatively call the tutor Brian Hardy, G4BIP, on 0442 66337.

● Flight Refuelling ARS start their next **RAE** course on Tuesday 4 October in **Bournemouth**. Contact Doug, G0TUC, on 0202 570894 for details.

● Classes for **RAE** and **Morse** will be run by the Midland ARS in **Birmingham**. Aimed at beginners, the classes start 21 Sep until May 95. For further details ring the tutor John badger, G4YZO, on 021 353 9326.

● The City of Westminster College, **London W2**, will be running an **RAE** evening course from early September for the May 95 examination. Morse courses, beginners and advanced, should also be available. Contact the Science and Technology Dept at the college on 071 723 8826 for enrolment details.

● Classes for **RAE** (Mondays) and **Morse** (Thursdays) commence 19 and 22 Sep respectively at Wombourne, near **Wolverhampton**. Enrolment is on 12/13 Sep. Call Wombourne Adult Education Centre Principal, Roger Price, on 0902 895198.

● **RAE** theory is taught at North Trafford College, **Stretford, Manchester**, on Monday evenings or Wednesday mornings, and **Morse** on Wednesday afternoons (beginners) or Tuesday evenings (intermediate). Classes on Computing for Radio Amateurs and Electronics Servicing / Construction are also available. Enrolment is 31 Aug and 1/2 Sep. Info from lecturer Mr Beaumont, G3NGD, on 061 872 3731.

● Tutor Rik Whittaker, G4WAU, is running a Tuesday evening RAE course at the Avondale Adult Education Centre, **Stockport**. Enrolment is 13/14 September. Call Rik on 061 427 4730.

● For the May 95 **RAE**, a course will be run at Newstead Woods School, **Orpington** on Thursday evenings from 22 Sep. Enrol by post (at least two weeks before the course starts) to: Bromley Adult Education College, Church Lane, Prince's Plain, Bromley BR2 8LD. Tutor is Alan Betts, G0HIQ, tel 0689 831123.

● The **Mid Sussex** ARS is starting classes for the **RAE**, **NRAE** and **Morse** in September. For details, call John, G0OIO, on 0444 450957.

● **RAE** enrolment night at **Maidstone** YMCA is 9 Sep at 8pm; details from Keith, G4YTU, on 0634 831504. There's also **Morse** tuition every Friday at 8pm; details Gordon, G0IWJ, on 0580 892253. An **NRAE** class is on Wednesdays at 7.30pm; details Martin, G0LCH, on 0622 744545.

● A **Morse** class on Monday evenings and an **RAE** course on Tuesday evenings will definitely be run (no minimum number of students needed) at **Coulsdon**, Surrey, by Robert McEwan Reid, G4GTO, tel 081 660 2532.

● **Barking** Radio and Electronics Society will be running an **RAE** course starting Thursday 21 Sep. Enrolment is on the two preceeding Thursdays. The course fee includes membership of BRES. A **Morse** class is available at no extra cost. Information from Bill Chewter, G0IQK, on 081 478 4758.

● In **Nottinghamshire**, two venues offer evening courses. Starting on 14 Sep is a 30-week **RAE** course on Wednesdays, or a 12-week intensive course starts Thursday 15 September. Also available is a **Morse** class on Wednesdays. These are at Arnold and Carlton College of Further Education in Mapperley. The other venue is West Notts College of Further Education in Mansfield where a 28-week **RAE** course starts 12 September. Details of any of these courses from Alan Lake, G4DVW, on 0602 382509.

● **Kingston** College Radio Club in Surrey offers **RAE** and **NRAE** courses. Enrolment takes place on Monday 5 Sep. Call 081 546 2151 x 2066 for further information.

● **RAE** classes start Wednesday 14 Sep 7 – 9 pm at **Newbury** College. Tutor G3NDS provides radio equipment for hands-on experience. For details, call 0635 37000 quoting course 99018A.

● It is hoped to run another **RAE** class this year at **Buxton** High Peak College on Tuesdays, 7 – 9pm starting 13 Sep. Further details from Clive Smith, G4FZH, tel/fax 0298 85539.

● **Trowbridge** and District ARC offer an **RAE** course starting in September. Details from tutor Chris Parnell, G0HFX, on 0225 764874 (evenings).

● A 25-session **RAE** course will begin on Monday 26 Sep at Reddish Vale Evening Centre, Stockport. A **Morse** course runs concurrently, catering for all levels of ability. Enrolment is on 12, 13 and 15 Sep, 7 – 9pm at the Centre. Details from course tutor Dave Wood, G4UJD, on 061 430 6246, evenings.

● Both daytime and evening **RAE** classes are offered in **Bedfordshire**. On Monday eveings, commencing 26 Sep for 27 weeks, a course is at Redbourne Community College, **Ampthill**. The other is at John Bunyan Community College, **Bedford**, on Thursday afternoons from 29 Sep for 22 weeks. Call the tutor Eric Elsley, G3YUQ, on 0234 768120 for info on either venue.

See *RadCom*, July, page 7, for more courses. Some of the above also run their own examination centres and welcome external students. For details of **Novice RAE** courses near you, contact the Amateur Radio Administration Department at RSGB HQ, on 0707 659015.

D-Day Commemorated

MEMBERS OF The Radio Amateur Invalid and Blind Club operated F/GB0IBC from Normandy on 5/6 June during the 50th Anniversary celebrations. The station was operated on 80m by three former members of the Guards Armoured Division who landed on Gold Beach in 1944: Brigadier Johnny Clinch, G3MJK (RAIBC's Chairman), Ivan Smith, G2BPW and Brigadier Derrick Baynham F/G3DHB who have all kept in touch since the war.

F/GB0IBC was the only British amateur station operating from the Normandy beaches.

To commemorate D-Day, Yeovil Amateur Radio Club ran a special event station and an exhibition of wartime radio equipment at the D-Day Memorabilia Display at Sherborne. The station used an AR88 and a CR100, together with a B2 'Spy transmitter', to have 137 contacts, many of whom had served in the forces during the WWII. The organisers of the Memorabilia Display were delighted with the novelty of the Club's display.

PHOTOGRAPH: G3KPO

Taking part in the D-Day commemoration at Puckpool, IOW were: (l to r) Douglas Byrne, G3KPO (Puckpool Museum curator and RLO for the IOW); Vernon Scambell, G3FWE and Alan Gilding, G3KSH. They are looking at a newly-unveiled plaque in memory of the brave work of the US Coastguard during the D-Day landings when they rescued 1,438 Allied soldiers whose landing craft had been blown up before reaching the beaches.

● THE ARRL Digital Conference is being held 19 – 21 August at Bloomington, Minneapolis.

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TM451E	70cms FM mobile; 35W	£429.95
TM551E	23cm FM mobile	£499.95
TM702E	2m/70cm FM Compact; 25W	£549.95
TM732E	2m/70cm FM Compact	£689.95
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YAESU HF TRANSCEIVERS		
FT1000	All-mode HF transceiver; general coverage dual receive	£3,499.00
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FT990DC	Basic model without FP25 and CW filters	£1,899.00
FT890AT	All mode transceiver general coverage receiver c/c internal auto ATU	£1,499.00
FT890	All mode transceiver general coverage RX	£1,299.00
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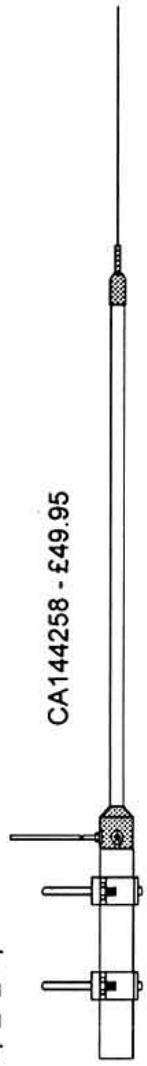
...AND THEY'RE BRITISH MADE !



Two superb new colinear antennas! A 2 x 5/8 for 2m and a 3 x 5/8 for 70 will get you heard on the bands! Ideal for packet or local FM working. Only the highest quality materials are used throughout and the termination is by N-Type socket for low loss. Complete with mounting brackets. Try one today at your local Lowe branch. The 2m version is just £49.95 and the 70cms just £45.95. They are nicely packed in a sturdy box so ideal if you'd prefer to order by mail for just a fiver extra! These antennas are made right here in the UK by -

CHELCOM *Aerials*

- a company well known for their PMR and other specialist antenna systems. Lowe Electronics has been appointed sole distributor for their amateur radio products. Chelcom have some interesting ideas so look out for some more news soon!

Trade and export enquiries welcome for this new range.

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PHF20	20m mobile whip	£19.95
PHF40	40m mobile whip;	£22.95
PHF75	80m mobile whip	£24.95
PHF160	160m mobile whip;	£54.95
AB5	10; 15; 20; 40; 80m mobile antenna	£79.95
PL58	PL259 to 3/8th" thread socket adaptor	£3.95
GM144	2m on glass antenna; 50W	£29.95
GM270	Dual-band on-glass antenna	£0.00
	Plus full range of mobile mounts	

Telecom - VHF / UHF Mobile Antennas *Small range - but so are the prices!*		
ST7200	Dualband mobile -compact size	£26.95
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WA3	Wavemeter - HF	£54.95
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SX1000	1.8 - 1300MHz; 200W	£219.95
SX200	1.8 - 200MHz; 200W	£84.95
SX400	140 - 520MHz; 200W	£99.95
SX600	1.8 - 525MHz; 200W	£159.95
MFJ206	1.8-30 MHz Antenna current probe	£99.95
MFJ207	10-160m SWR analyser	£99.95
MFJ208	142-156 MHz SWR analyser	£99.95
MFJ209	Analogue analyser 1.8-170MHz	£129.95
MFJ249	HF digital SWR analyser + 1.8-170 MHz frequency counter	£229.95
MFJ250X	Dummy load in a can (without oil) 1KW max.	£39.95
MFJ259	SWR Analyser	£0.00
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2810	10Hz - 3GHz; Frequency counter	£199.95
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T100	100W dummy load	£59.95
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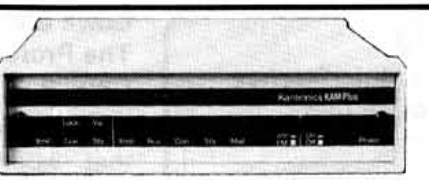

KAMPLUS.....£399.00

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Kantronics' own HF high speed mode

G-TOR is a new mode offering Golay forward error correction coding, Huffman data compression, giving a very fast data throughput rate, and in tests out-performs PACTOR. (Average 23.7cps against 8.64cps)

Probably the most popular multimode data controller on the market. What other unit provides so many features at such good value

Just look what you get for your money.....

True Multimode operation - Packet, PACTOR, NAVTEX/AMTEX, AMTOR, RTTY, CW, ASCII, and of course G-TOR! True dual port operation, log into the DX cluster on VHF and work any of the other available modes on HF.
100K Mailbox, access via Packet, AMTOR, PACTOR and G-TOR
Direct and reverse BBS forwarding.

KPC3-128.....£149.00

The TNC that is taking the packet community by storm. This little beauty is so full of features it's almost unbeleivable.

Direct and reverse BBS forwarding.
-100K Mailbox as standard (Expandable to 500K)
True portability - can be run from an internal PP3 battery
Internal lithium back up battery
Enhanced Mailbox command set

All this from a unit just 19 x 102 x 127 mm (now that's Tiny - unlike some other TNCs!) Only £149.00

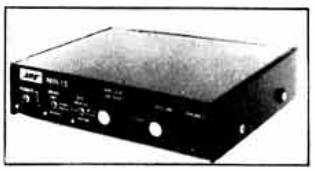
KPC4.....£309.00

The choice of the "Professional Packeteer"

The KPC4 provides true dual port operation from a single TNC unit. Most commands have dual inputs, allowing different parameter settings for each port. The perfect unit for KISS / BPQ systems. Features include:-

Independent callsign settings for each port.
KaNode facility providing a gateway between ports
32K RAM, expandable to 64K

NIR10
Noise / Interference reduction unit



The NIR10 allows reception of difficult to read signals. NIR mode helps to reduce or even eliminate heterodynes, white or ignition noise, RTTY interference and power line noise. PEAK function reduces white noise interference. NOTCH FILTER mode removes multiple heterodynes and acts in just 3 milliseconds! BANDPASS mode has a continuously adjustable centre frequency

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NTR1
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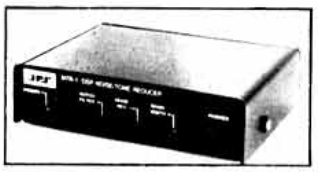

The NTR1 provides wideband operation for AM or FM reception and narrow band operation for SSB, CW or Data reception. State-of-the-art DSP rapidly removes multiple tones.

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All JPS DSP filters require a 12V power supply to run from the mains but it needs to be fairly beefy. Run it from your shack supply or from our dedicated 1 Amp PSU available at £29.95

Lowe Electronics - The Professionals' Choice

It is interesting to note that when companies abroad are looking for distribution of their products, ours is the door they knock on first. Recently one of our competitors wrote to one of our newest suppliers claiming to be *"...the largest independant retailer in Europe ...massive turnover in amateur radio...and shortwave..."* Needless to say our supplier had already done their homework !

Often, amateur radio equipment finds its way into industry and commerce, sometimes for unusual applications. That's why many major industrial companies also knock on the Lowe door first. They know they'll get the right back-up - from technical sales advice before the sale to technical support in the form of expert staff and our widely acclaimed service and spares departments.

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BY3	Iambic paddle; gold	£199.99
ST1	Single lever paddle; black base	£64.95
ST2	Single lever paddle; chrome base	£79.95
ST3	Single lever paddle; gold base	£199.99
	Himound	
HK702	Deluxe key with marble base	£59.95
HK707	Standard key; non-slip base	£36.95
MK704	Twin paddle	£29.95
	Kent	
KENTOSC	Morse practice oscillator	£16.00
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KENTSTD	Kent's standard Morse key	£45.00
	Datong	
D70	Morse tutor	£64.95

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ALSO, IF YOU ARE NOT YET A RADIO AMATEUR, THEN WHY NOT ENROL HERE FOR THE RADIO AMATEURS' EXAMINATION COURSE?

Saturday 10th September '94

Come and see us between 10am & 4pm, savour some new rigs and help celebrate our third year in Birmingham with a glass of Buck's Fizz and some nibbles, you might even get your teeth into a new radio! Again, there will be some EXTRA SPECIAL DISCOUNTS ON OFFER PLUS...

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A.O.R. AR-8000 Wideband Handheld

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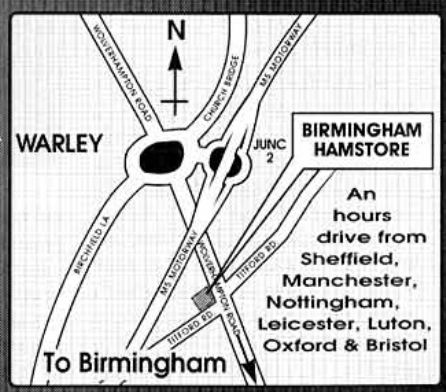
- Video presentations on Amateur Radio.
- Enrol for Radio Amateurs' examination course.
- Assistance with Novice & Improvers morse code.
- Local Radio Club representation.
- Radio Station GB5IT demonstrating modes of operation including RTTY, PACTOR & PACKET.
- Shortwave listening & weather chart reception.
- Operating desks c/w rigs by all the major manufacturers.
- Extensive stocks of new gear.
- Scanning radio displays.
- Mobile radio aerials and accessories.
- Portable radios of all kinds.
- Loads of Radio books.
- Data sheets to mull over, in fact everything for radio hobbyists, be they listeners or transmitters.
- ICOM Marine, Avionic and PMR radios will also be on display.
- HAMSTORES stock AKD, Alinco, AOR, Comet, Cushcraft, Davis, Dee Comm, Diamond, Drake, Icom, JRC, Kent, Kenwood, Lowe, Maldol, Maspro, Microset, MFJ, RSGB books, Serene, Toyo, Yaesu and Yupiteru gear.
- Low deposit, interest-free credit is available on most radio purchases
- Gordon, John and colleagues are all looking forward to greeting you.



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Tel: 0227 741555 Fax: 0227 741742. *N.B. Herne Bay closed for lunch 1300-1400.*

OPENING TIMES: Tuesdays to Fridays: 09:00-17:00 & Saturdays: 09:00-16:00.

THIS MONTH'S LEADING FEATURE

G3UXO/MM On Board the QE2

by Dr Andrew J N Eardley

I HAVE WORKED at sea with the Cunard Line for the past ten years but have been inactive in amateur radio for a somewhat longer period. Whilst I was going to be on board the QE2 during the 1994 World Cruise as a Medical Officer the idea occurred to me of operating Maritime Mobile when the ship circumnavigated the globe. Although limited amateur radio operation from the ship had occurred from time to time, mainly by Phil Williams, G3YPQ, who was formerly a Radio Officer on the vessel, there had been no recent shipboard amateur operations and none recorded during a World Cruise.

Permission Granted

PERMISSION TO establish the station on board was granted by the Master, Captain Robin Woodall, and the approval of the ship's Chief Radio officers, Jim Barlow, G3VOU, and Chris Connerty was readily given. An investment was made in a new transceiver and antenna system for the project, the choice being a Kenwood TS850S-AT for the rig, and the AA & A marine HF Magnetic Loop for the antenna in view of its proven efficiency and compact size.

Unfortunately, due to the pressure of work in the medical department, it was not possible to get the station up and running until early March. After some enquiries and with help from the Radio and Engineering Departments the transceiver was located on the emergency operating bench in the Transmitter Room, where the ship's three HF sets and their associated antenna tuners are remotely controlled from the ship's Radio Room. This was an ideal site with a flat deck-head above on which the Magnetic Loop antenna could be mounted some 30ft forward of the ship's funnel.

QSL card used by Phil Williams, G3YPQ, on the QE2 in 1982.

I'm On the Air at Last

G3UXO/MM EVENTUALLY went on the air on 8 March after sailing from Singapore. Despite irregular, at times infrequent and often brief, operating periods due to job pressures, the station rapidly became known on the 15 and 20 metre bands and many enjoyable QSOs were made. The antenna proved particularly effective despite its small size and, during the seven weeks operation of the station on board QE2, contacts were made world-wide notwithstanding the poor HF propagation conditions frequently encountered.

A number of 'eyeball' QSOs were made during the cruise. QE2 made a maiden visit to the island of St Helena on 29 March and ZD7SAS took the launch trip out to the ship for a brief meeting. Ivor Lee, G0SBR, and his wife Mary travelled from Cape Town to Southampton and Owen Gander, W4/GU0ALD, was worked

The loop antenna provided by AA & A. In the background can be seen the high rise buildings of New York.

The tiny magnetic loop antenna was sited forward of the ship's funnel. It can be seen in this photograph if you look closely. [The dome in the foreground presumably houses the radar antenna - *Ed*]

from Pine Island, Florida, on 20 metres on 14 April and boarded in Port Everglades a few days later for the trip back to Southampton. Notable radio QSOs included ZD9BV from Tristan da Cunha who called the station on 1 April after hearing about it from the St Helena amateurs; the Antarctic Survey Station, VP8CKB, on South Georgia; the Camel Trophy Expedition, G4SMC/LU in Argentina; and the VK6CJI DXpedition to Cheyne Island off the West coast of Australia. As the station became known on the air the inevitable 'pile ups' on frequency began to occur, especially among Stateside and UK amateurs, presumably the packet DX Cluster information system was operating overtime.

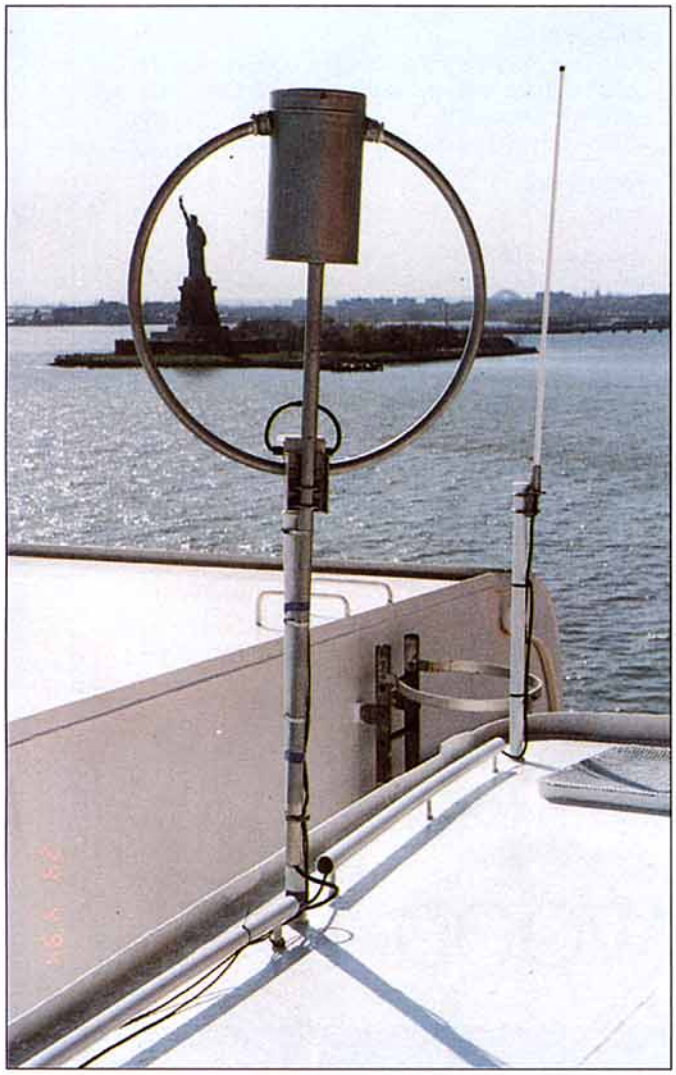
In all 338 QSOs were logged between 8 March and 28 April – this being a fraction of the number that could have been made had it been possible to get the station up and running earlier and if a little more time had been available for operating.

Nevertheless the venture was most enjoyable. It proved excellent relaxation from the rigours of the busy and stressful medical job on board the QE2 and, if the comments on air are anything to go by, it gave a large number of people pleasure in working the last of the great superliners and the opportunity to collect an unusual QSL card.

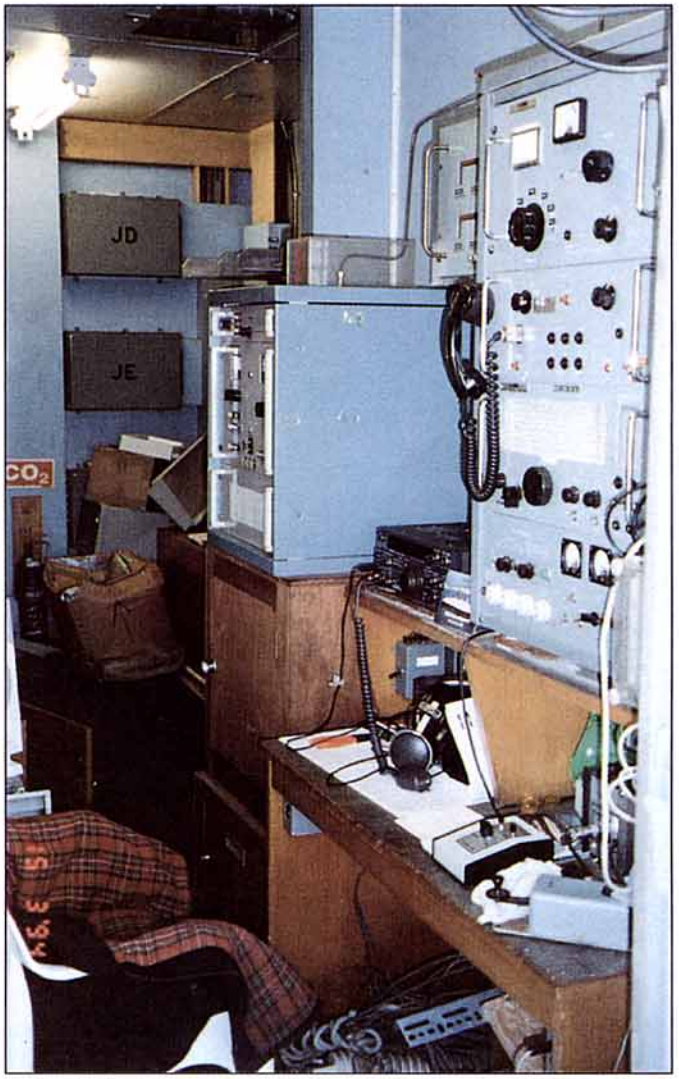
Will Activate Again

ALTHOUGH THE STATION was temporarily off the air during my leave, it was planned to recommence operation on my return for the D-Day Commemoration cruise on 3 June, and to continue during my periods of duty on board during the remainder of 1994. As before, contacts with British stations will be looked for and will be particularly welcome. The antenna has been modified by the manufacturer to incorporate automated tuning with the use of a stepper motor which it is hoped will greatly ease and speed up the retuning process.

Plans for the QE2 1995 World Cruise station (again with appropriate QSL cards for the occasion) are already in hand, and it is hoped that by employing remotely controlled equipment the operation of the station may be possible from the comfort of my cabin on board which would also greatly extend the hours of operation of the station.



The Statue of Liberty was neatly framed by the antenna on our departure from New York harbour.



The G3UXO/MM shack - a corner of the Transmitter Room. The ship's transmitters and antennas are controlled remotely from the Radio Room.

RSGB 1994 International HF & IOTA Convention

...and IOTA's 30th Birthday Party!

Beaumont Conference Centre Old Windsor, Berkshire, UK

7, 8 & 9 OCTOBER 1994

PROGRAMME

Friday 7 October

EVENING

IOTA's 30th Birthday Party

Saturday 8 October

DAY

Transceivers – G3SJX

IOTA Director's Address – G3KMA

First 100 countries – G0HSD

ZD9SXW DXpedition – G3SXW

IOTA Policy Q&A

Phased Arrays for 80 and 40m –G3PJT

VK9MM DXpedition– G3WGV

Practical LF Antennas – W1XP

Holiday Operations from Islands – K5MK

3Y0PI DXpedition – ON6TT

Computers in the Shack – G3XTT

Antenna Circus – G3WLM

EVENING

DX Dinner

Sunday 9 October

DAY

Data Modes (Subject to confirmation)

Contest College – G3SJJ

RSGB and Other Awards

Computers in the Shack – G3XTT

LF Propagation – G4DBN

3Y0PI DXpedition – ON6TT

Cluster Workshop – G4PDQ

Antenna Planning Clinic – GW4ZXG

EVENING

Supper in Olde English Pub for overseas visitors

Other Activities

Ladies' coach to Windsor for shopping and sightseeing, Ladies' cruise on the Thames, Clinics, Software demonstrations, DX Quiz, group meetings, Young Amateur of the Year presentation, GB1OTA station, RSGB bookstand, Morse tests, Raffle for TS-50S HF Transceiver.

PACKAGES TO SUIT ALL NEEDS

FOUR ALL INCLUSIVE Convention packages are available this year.

Package A: £135

Two-day package for one person. This includes two nights of accommodation on Friday 7 and Saturday 8 October, breakfast and lunch on the Saturday and Sunday, the IOTA Birthday party on Friday evening and the Saturday DX Dinner.

Package B: £195

Two-day package, as for A but for two people.

Package C: £72

One-day package for one person. This includes accommodation on the night of Saturday 8 October, the DX Dinner on the Saturday evening and breakfast on the Sunday.

Package D: £102

One-day package, as for C but for two people.

FULL DETAILS of these packages can be found on the booking form which is available from G3NUG (see below).

WIN A KENWOOD TS-50S HF TRANSCEIVER

Trio-Kenwood UK Ltd have donated this valuable prize for the Convention Raffle. Tickets will be on sale only at the HF Convention.

The convention is sponsored by:

MARTIN LYNCH G4HKS
THE AMATEUR RADIO EXCHANGE CENTRE

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Telephone/fax +44 442 62929.

Radio Society of Great Britain
Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE

HF NEWS

JOHN ALLAWAY G3FKM
10 Knightlow Road, Birmingham B17 8QB

ONCE AGAIN I have to report the death of an outstanding character from the world of DX. This time Stu Meyer, W2GHK, who was associated with the 'DXpedition of the Month' organisation for many years and was a member of the *CQ* DX Hall of Fame.

Howard, G2HFD, visited Iris Hayes, ZS2AA, in 1980 and has kept in touch with her since then. She has recently been the subject of an article in the South African press following her appearance at the AGM of the South African Radio League in Port Elizabeth where she was the guest of honour and gave the keynote address. On the air since 1937 and the first ZS lady operator she is now 90 years young and still goes on the air four or five times a week!

The National Capitol DX Association ran a competition amongst its members to see who could contact most of the 250 DXCC active countries which are eligible for field checking for initial DXCC applications. A plaque was awarded to those who worked 200 or more – and eleven qualified! They were N4MM (237), K6IR (227), N3II (222), W3UJ (216), WA3DVO (215), N4YKD (215), W3GG (208), W3GOH (206), WC4B (201), WE6H (200) and N3TO (200). Special congratulations to Kenneth Miller, K6IR, who is a member of the RSGB.

SEANET '94

PLEASE NOTE THAT Sangat Singh, 9M2SS, now has a different address. Please write to him as Secretary, Organising Committee SEAnet '94, 111 Jalan Teresik Lapan, 59100 Kuala Lumpur, Malaysia. He now has a dedicated fax number which is +60 3 253 7373.

DX NEWS

ARRL HAS ANNOUNCED that the number of unprocessed DXCC applications at 1 June was 447 (49,835 QSLs). During the month 530 applications (46,155 QSLs) were received. For the first five months of 1994 applications were up by 30% and the number of cards up by 40% compared with the same period last year. May's increase was dramatic – 530 applications received compared with 239 in May 1993. In 1991 the DXCC Desk received about 9,000 QSLs a week – now it is receiving 14,400! The following HF operations have now been accepted for DXCC credit from the date shown: 3D2KR (25.2.94), 3D2LA (25.2.94), 3Y0PI (29.1.94), 5R8KH (21.10.83), 9N1BD (25.8.93), 9U5DX (8.10.93), A25/WD8NMV (15.3.93), ET3RA (22.11.92), S21ZW (26.10.93), TU4EI (22.9.93), VP2EDK (23.9.93), XF4CI (15.12.93), XU9M (3.3.93), XU9R (3.3.93, ZF2CF (1.3.93) and ZF2QA (21.1.91). A *DXAC News Release* dated 14 June, also from ARRL, said that the DX Advisory Committee had voted 15 to 1 against reinstating Aldabra to the DXCC list. It also gave news of another ballot – this one apparently to approve "call area calling guidelines". It says: "The DXAC guidelines call on DX stations to operate in a manner perceived to be fair and balanced to all areas, and to work portable stations in the specific call area they are listening for". Maybe not all of us outside the United States are as enthusiastic about the 'call area technique' as interpreted by some who use it anyway.

Radio amateurs in **Belgium** may replace their normal prefix with 'OS' during the period 1 September to 31 December 1994. This is to celebrate the liberation of Belgium. Belarus is now split into districts – EU/EW 1 = Minsk City, 2 = Minsk Region, 3 = Brest Region, 4 = Grodno Region, 5 = (not used yet), 6 = Vitebsk Region, 7 = Mogilev Region, 8 = Gomel Region, 9 = (not used yet), and 0 = visiting amateurs. A group of Finnish and Russian amateurs will be on the air from **Malyj-Vysotskij Island** during the weekend of 30 – 31 July using the callsign R1MVI. ARRSM, the national society of **San Marino**, advises that according to their PTT the callsign T71BT has not been issued and that anyone using that call is not licensed.

Amateurs in **Monaco** will be using a special prefix on 3 September to celebrate the 50th anniversary of the liberation of their country on 3 September 1944. This will only be effective for the one day when the number may be changed to 50 – for instance 3A2ARM will become 3A50ARM. LA4LN and LB3RC will be on **Svalbard** on a scientific expedition between 1 and 20 August and will be on the air as JW4LN and LB3RC/JW on all bands 1.8 to 28MHz (including WARC) using CW, SSB, and digital modes.

According to *The Long Island DX Bulletin* members of the West Island Amateur Radio Club of Montreal will be visiting **St Paul Is** from about 12 to 16 August depending on the weather. They will operate as CY9CWI and concentrate on 1.8, 3.6, and 7MHz. If equipment is available they will use RTTY and satellite communication. Watch 1.830 – 1.850, 3.505 – 3.515, 3.780 – 3.800, 7.040 – 7.060, 10.110, 14.040, 14.195, 18.080, 18.120, 21.040, 21.320, 24.940, 28.120 and 28.495MHz. The same news source says that N0TG, WA4DAN, KW2P, and AA4VK are also hoping to operate from **St Paul Is** between 19 and 25 September on 1.8 to 28MHz CW and SSB. They will probably sign their own calls/CY9. V31PA, in **Belize**, should be on the bands a little longer. He appears to favour 14.150MHz between 2030 and 2200. If you are looking for Zone 2 the *RSGB DX News Sheet* says that VE8/VE2BQB will remain at Frobisher Bay until November. *DXpress* says that NE8Z was expecting to be operating from a lot of North American islands (which count for IOTA) during this summer. Part of this will already have happened. By now he should be visiting various Canadian islands in Ontario for the Canadian Islands Award. Exact dates were unknown but his callsign may be NE8Z/XK3/M. If in the USA he could appear as NE8Z/1M3 or NE8Z/3. The OH-KY-IN ARS intends to activate **Assateague Is** (NA-139) with K8SCH/4 between 16 and 18 September. It will be a round-the-clock operation on SSB on 3.5 to 28MHz.

According to *The Long Island DX Bulletin* A35RK, on **Tonga**, is

BAND REPORTS

This time I have to thank G2HKU, G3s EVE, GVV, GW4KGR, G4OBK, G0MHC and the UK DX Packet Cluster via G4PDQ. The stations listed were worked/heard between mid-May and mid-June. As usual callsigns printed in italics were those of stations transmitting on CW:

10MHz
0000 *J8/AHOG, JY8OX, PJ5/K3UOC, 8P9GU.*
0200 *HK0ER.*
0500 *FO5BI, TL8NG, VK3MR, ZL3GQ.*
1600 VR2HB.
1700 *JT7FAA, S79CK/C, 9M8FC.*
2000 *A71BH, EY8AM, S92SS, TR8XX, TU4SR, 9J2SZ, 9Q5EXV.*
2100 *JY8JH, KP2J, PY0TUP, S92SS, TY1IJ, 4K8F.*
2200 *K0SN/CY9, P49T, PJ7/AH0G, 5T5JC.*

14MHz
0700 AH8A, *FO5DV*, KH3AF, KH6FKG, KL7XD, VR6YL.
0800 ET3JR, FO0MIZ, *JU7DX*, SV2ASP/A, *T32AF*, 5W1GC.
0900 *FO5OU*, KH8BB, NL7ZH.
1400 BV5CR, HZ1TA, JA, *VQ9RB.*
1500 A92FR, ET3SID, *FO0MIZ/A*, HL1PDY, SU2MT, *VQ9MZ*, YK1AO, 9M8BL.
1600 BV4MU, JT1BG, S21A, *V85KX*, XU0HW, YI1RJ, 9G1SD.
1700 A61AC, BV5CM, V63SD, *YI9CW, ZX0F*, 9N1AA.
1800 *JU7DX*, S0RASD, TZ6VV, ZD7CTO, 3XY0A, 7Q7UN.
1900 A71AC, HS0/G4UAV, J55UAB, ZF2SQ/ZF8.
2000 NH2G, PY0TUP, TZ6FIC, VP8CPY, 5X1F.
2100 A61AN, WA6HXE (Utah), *XU0HW*, 5Z4PL.
2200 FY5FJ, S92LB, TY1MR, VK2, ZL4BX.

18MHz
0800 NL7ZH, *VK9NS, XU0HW, 3D2QB*, 9G1SD, 9U/F5FHI.
1000 *C21/ZL1AMO*, NL7RK, T30NJ, V63JC, V73C, VK9NS.
1200 *JU7DX*, KH0AC, PJ8AD, 3X0DEX.
1500 *A71CW, KL7HF, S21ZG*, TY1IJ, *VR2GC*, XU0HW, *5R8AL.*
1600 *HI/DL5PV, KL7HF, S92SS*, TL8MS, TR8CA, 5R8KH.
1700 C53HG, *S21ZZ, TR8XX, XU0HW*, ZD9BV, *9M2AX.*
1800 *PY0TUP, TU4SR, ZD9BV*, 9G1WJ.
1900 *KL7H/W6*, ZD7WRG, 3XY0A, 9V1YX.

21MHz
0800 C91AI, FR5BT, 9M2XC, 9U/F5FHI.
1100 HS0/G3NOM, *KL7Y*, P29VR, V51BG, VS6CT, XU0HW.
1300 D68LC, FH5ET, FT5XJ, HS0ZAZ, TT8PS, 9V1ZB.
1400 J55UAB, S21B, 5R8DS, 9N1AA.
1600 A71EA, D2EGH, D3X, D44BS, S79KMB, TJ1AC, 9M6JC.
1700 CE0ZIS, S0RASD, ST0K, SU1SK, TL8KM, VP8CPU.
1900 S92YL, 3X0YU, 5T5MS, 5X1F.
2100 S92SS, ZD7DP, 3XY0A, *3G1X.*

1994 WARC BANDS TABLE

	10MHz	18MHz	24MHz	Total
G4OBK	107	163	107	377
EA5GQI	-	108	66	176
EA5DQE	-	92	49	141
G0MHC	40	64	36	140
G3ING	62	46	15	123
G0MHC	37	58	26	121
G3KKJ	17	53	39	109
GJ4GG	31	46	32	109
G4CMZ	31	16	1	48
G0TMZ	23	24	1	48
G4FVK	17	13	9	39
G3IAR	26	11	1	38

often to be found on 14MHz CW around 0400 and again on RTTY near 14.087MHz between 0100 and 0300. Last month's reference to **Scarborough Reef** has been swiftly followed up by action. The 'First Scarborough DXpedition' was launched on 19 June by the China Radio Sports Federation together with JA1BK and OH2BH. It was hoped that BZ1HAM, DL5VJ, DU1OLG, DU1RAA, JF1IST, KJ4VH, OH2BH, OH2MAK, and 9V1YW would operate during the following weekend as BS7H.

The previously mentioned visit to **Yemen** by N4GCK had to be cancelled. Amateurs in Japan now have an additional area of the 3.5MHz band namely 3.747 –3.754MHz. They have this area plus 3.791 – 3.805MHz. The recent political changes in the Middle East raise interesting possibilities. Possible operations from the Gaza Strip and/or Jericho raise the prospect that Palestine may be restored to the DXCC list. *RSGB DX News Sheet* reports on amateur radio in **Nepal** according to a message sent out by packet radio by 9N1AA. There are three resident licensees – Suresh Raj Uprety, 9N1HA, Ram Bahadur, 9N1RB, and Satish Krishna Kharel himself, 9N1AA, who all passed their examinations and Morse test and were licensed on 10 June 1993. Licences will be issued to visiting amateurs who are fully licensed elsewhere but only on the occasion of national celebrations and only for a maximum of 120 days. Those interested are advised to write to Nepal Amateur Radio League, PO Box 4292, Kathmandu, Nepal. *DXpress* reports that Jim Smith, VK9NS, is waiting for a reply from the authorities in **Bhutan** concerning another visit. It is not known whether he will be A51JS again or would be issued with another call.

GW0FJT was due to start a six month stay on **Ascension Is** as ZD8OK beginning on 1 August. *DXpress* says that GM4KLO, who acts as QSL manager for VP8HAL reports that he is receiving cards for contacts which appear to have taken place with a pirate station. Logs only come out from the base twice a year and the next ship will not leave until December. D2/HB9AMO may still be in **Angola**. S79MD was expected to leave the **Seychelles Is** in the middle of July. DK3LQ is in **Senegal** for several years and has been using the callsign DL3LQ/6W1. Rafik, F5CQ (and formerly FT5XA), will be starting a two year stay in **Mayotte** this month. His callsign was not known at the time of writing. *RSGB DX News Sheet* says that EL2FD has left Liberia and will probably be taking up a new appointment in the **Ivory Coast**.

AUSTRALES AND MARQUESAS IS

THESE TWO ISLAND groups located in the central Pacific were activated by JA1BK and NX1L recently. JA1BK operated from the Austral Is between 28 and 30 May as FO0MIZ and both operated from Nuku Hiva in the Marquesas Is as FO0MIZ and FO0AKI between 1 and 4 June from where FO0MIZ made 2050 contacts and FO0AKI 2950. JA1BK returned to Tahiti and NX1L went to the Austral Is where he made 2780 QSOs between 7 and 10 June. A grand total of 5280 contacts from Australes and 5000 from the Marquesas. A petition for DXCC status is being prepared by NX1L and will be submitted to the DX Advisory Committee soon. Nao and Kam justify their application partly by pointing out that the Marquesas group is separated by more than 225 miles of open water from the main part of French Polynesia, and should meet point 2a of the Countries List – similar to the cases of Rotuma (3D2) and British Phoenix Is (T31) (or Point 2b). The Australes Group is separated by more than 500 miles of open water from the Marquesas Group and by more than 225 miles from the main part of French Polynesia. Therefore it should meet Point 2b as do Conway Reef (3D2) and Banaba Is (T33). There are three resident amateurs on the Marquesas – FO5DS, FO5LZ, and FO5MK. There was activity from Australes by FO0CW/A and FO0EXV/A in March/April 1989 and FO3BM lived there around 1990.

AWARDS

PRINCIPALITY OF MONACO AWARD (PMA)

The Association des Radio-Amateurs de Monaco offers this award to those who have heard or worked at least three resident stations in Monaco since 1 January 1980. Send QSLs, copy of logbook, or list of QSOs certified by national awards manager or two other licensed amateurs, together with 10 IRCs or US$6.00 to C Passet, 3A2LF, 7 rue de la Turbie, MC 98000, Monaco.

WASEC

The Worked All Small European Countries (WASEC) Award. Class 1 is all eight countries, Class 2 is three countries plus Monaco. The countries are Andorra, Liechtenstein, Luxembourg, Malta, SMOM, Monaco, San Marino, and Vatican City. Conditions are as listed under the previous award.

QTH CORNER

BS7H	via W6CF.
CY9CWI	WIARC, PO Box 884, Pont-Claire/Dorval, Quebec H9R 4Z6, Canada.
N0TG/CY9	etc via N0TG, 640 Rolling Hills Drive, Waxahachie, TX 75165, USA.
FO0AKI	Nao Akiyama, NX1L, PO Box 310855, Newington, CT 06131-0855, USA.
FO0MIZ	Nao Mashita, JA1HGY, 8-2-4 Akasaka, Minato, Tokyo 107, Japan.
JY8ED	G3SED, 31A Southdown Rd, Horndean, Portsmouth PO8 0ET.
JY8JH	G0JHC, 43 Moorhay Drive, Penwortham, Preston PR1 0SS.
JY8OX	G3KOX, 7 Lanercost Close, Welwyn, Herts AL6 0RW.
JY8VA	DL7AV, Johanne-Fichte-Str 11/13, D-80805 Munchen, Germany.
JY8ZC	G4CCZ, Westwood, Faris Lane, Woodham, Surrey KT15 3DJ.
SU2MT	PO Box 1616, Alexandria, Egypt.
V31PA	via G6MDM, 4 Dereham Rd, Pudding Norton, Fakenham, Norfolk NR21 7NA.
YW0RCV	via Radio Club Venezolano, PO Box 2285, Caracas 1010-A, Venezuela. (Please write 'YW0RCV' on the envelope.)
9V1XQ	(new) G4PKP, J Jones, Jason Photo, 24 Mathew St, Liverpool L2 6RE.

CONTESTS

EUROPEAN DX (CW)

0000 13 August – 2400 14 August.

3.5 to 28MHz obeying IARU Region 1 band plans and avoiding the use of 3.550 – 3.800 and 14.075 – 14.350MHz. No WARC bands. Only 30 hour operation allowed and the rest periods may be taken in up to three parts and clearly marked in the log. Single and multi-operator multi-band, multi-operator multi-transmitter and listener sections.

Exchange RST plus serial number from 001. Work non-Europeans only. The rules of this contest are quite detailed and if you are thinking of entering seriously I strongly recommend asking me for a copy of the rules! (SASE please).

YO DX CONTEST

2000 6 August – 1600 7 August

(The rules of this contest had not been received at the time of going to press)

LZ CONTEST

1200 3 September – 1200 4 September

CW only. 3.5 to 28MHz observing IARU Region 1 band plans. Bands may be changed after 10 minutes. Single operator single and multiband, multi-operator multi-band and listener sections. Exchange RST and ITU zone. Six points for contact with LZ, three with other continents, and one with own continent. Listeners have two points for logging two callsigns and two numbers, one for only one. Multiplier is the number of ITU zones on each band.

Logs must reach BFRA, PO Box 830, Sofia, Bulgaria, not more than 30 days after the contest. I can supply copies of rules (SASE please).

Louis Bucci, F6GFL, who you may have met in the past as FB8ZZ, FQ8HW, 5R8AN, TT8AG, or even as a pirate 'XW8HI'!

RESULTS

The results of the 1993 QRP Summer Contest show G4WQW 12th in the VLP class with 4050 points, G4XNP was 13th with 3072, and G3NNK 17th with 2037. In the QRP section G4UOL came 4th with 35866 points, G0ADH 30744 (8th), G3DNF 27434 (12th), G3FNM 11773 (16th), G4ZME 3770 (49th), GM4BQF 3410 (51st), G4WGR 1113 (70th), and G3DOT 264 (88th). In the Medium Power class G0JQN came 5th with 34440 points and G3JRY 12th with 6360.

In the 1993 International WW Naval Contest Class B (CW, all band, single operator) GM4SID came 7th with 218125 points. Other UK scores were G0KKG – 113176, G4MVA – 101460, G3MRC – 95116, G3AWR – 75970, G4PTE – 21378, G0SCY – 8181, and G3WP – 3672. GB4RN came top of the special callsign category with 274096 points.

continued on page 20 ▶

HF F-LAYER PROPAGATION PREDICTIONS FOR AUGUST 1994

The time is represented vertically at two-hour intervals GMT 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 000001111122 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	.....	.....	....1...21.	...12321254.	..1556556883	5355444457798	8642222225 78	+3.....24+
MALTA	.....	.....1..	....111..32.	...12322265.	1..566656895	7456555567799	9874222235 88	++4.....25+
GIBRALTAR	.....	.....	.....11.	....111..34.	...1554337 83	6226655557798	9875432235 89	++52.....25+
ICELAND	.....	.....	.....	.....11.	....1322246 2	3.1445555687	7665432334 67	5+52.....34
** ASIA								
OSAKA	.....	.....	.....	....1111....	...233232.21	....2111236 3	241	.....2.
HONGKONG	.....	.....	....11.1...	...1222232..	..1133335632	1...11.12575	253	.....2.
BANGKOK	.....	.....	...1121111..	...2232233 1.	..1123335663	2....1.13587	1.....266	33
SINGAPORE	.....	.....	...1121111..	...2333232 1.	..1123335 65.	3....1.13575	1.....266	34
NEW DELHI	.....	.....	...1121122..	...2233245 1.	1.2223335752	52.....13587	51.....267	2.....34
TEHERAN	.....	.....1..12..	...1222135 2.	..1334335751	2143223357 85	7431...13588	731.....267	4.....35
COLOMBO	.....	.....1..1...	...123213...	..1234335 11.	..1223335462	52.....12588	51.....267	2.....35
BAHRAIN	.....	.....11.12..	...2232245 2.	..1334446752	3143223357 86	853....12589	841.....267	5.....35
CYPRUS	.....	.....111.132.	...3343347 51	..1556556883	4256555678 98	9764333346 89	8731...11478	+4.....4+
ADEN	.....	.....111122..	...2233355 11	..1334446733	5243122357 87	863....12589	851.....267	52.....35
** OCEANIA								
SUVA/S	.....	.....	.....	.....111.11.	...22222.541	..2421112 43.	...2.....21.	.....
SUVA/L	.....	.....	.....2.	...1.....52	11151.....63	..252....331	...2.....21.	.....
WELLINGTON/S	.....	.....	.....	.....1.	..1331 11..41	..2421111152	..12.....22.	.....
WELLINGTON/L	.....	.....	1	1.....2	2213.....35	22351.....42	..12.....12.	.....
SYDNEY/S	.....	.....	....11.....	...222.....	..1543111 1.1	1.1321.12433	...1.....251	.....2.
SYDNEY/L	.....	.....	2	1.....4	31.1.....26	11132.....63	...1.....141	.....2.
PERTH	.....	.....1.....	...1231.....	..13442.....	1.2354211..	31..21.1244.	2.....263	33
HONOLULU	.....	.....	.....	....1...11.	...112..2421	..2421..23..	..12.....	.....
** AFRICA								
SEYCHELLES	.....	....11112...	...2234352..	..1334546 51.	..3222335752	543....12588	841.....267	52.....35
MAURITIUS	.....11..	....112123..	...2244456 3.	...3345578 61	1.3323335786	6131...12588	841.....267	52.....35
NAIROBI	.....1112..	....112235..	...2234467 1.	...4334578 41	3.3422235786	8452....12588	873.....267	+5.....35
HARARE	.....11231.	....1123452.	...2234568 61	1..4445578 83	6.3532235798	9563....2589	884.....267	+52.....35
CAPETOWN	.....111...	....112321..	...1334554..	...3545566 2.	...6533357 6.	32.52...2586	8742.....267	++2.....35
LAGOS	.....1241.	....1.23463.	...1324568 7.	1..2534578 82	6316422257 96	9855 1...2589	8852.....257	5+2.....25
ASCENSION Is	.....142.	....1..1364.	....3212587 1	....5423689 3	3...5322379 8	85.121..1479	8812.....157	++3.....24
DAKAR	.....32.	....1.11254.	....3223477 1	1..1533458 93	5314532236 88	9865 3....379	8862.....157	5+3.....24
LAS PALMAS	.....11.	.....23.	....3322267 1	1..1555548 84	5214766667 98	9866533335 89	8974211112 68	++4.....3+
** S. AMERICA								
Sth SHETLAND	.....	.....1121..	.....34441.	.....45674.	1335773	411.11..2467	7652.....236	5+3.....3
FALKLAND Is	.....22.	.....11144.	.....23477.	1445782	1....3335676	7543 11..2358	8862.....25	5+3.....2
R DE JANEIRO	.....22.	.....1144.	2233671	1....4444784	531..4322578	9861 21...258	8862.....27	5+3.....4
BUENOS AIRES	.....12.	.....1134.	2232571	1....4344684	5313.4333468	9865.1...147	8862.....15	5+3.....2
LIMA	.....1.	.....2.	11242	1...1.232354	52.1323322 36	8844 31...14	6862.....2	4+3.....
BOGOTA	.....	.....2.	....111.142	1....2221254	52..2332113 6	8743 31.....4	6862.....1	3+3.....
** N. AMERICA								
BARBADOS	.....1.	.....2.	1111252	1....3222365	62.1243212 57	8744 31...26	7862.....3	5+3.....
JAMAICA	.....	.....1.	.....1.131	1.....221244	51..2221135	7733 11.....3	5852.....1	2+3.....
BERMUDA	.....	.....	.....1.121	1....1221244	51..3221246	7632 11.....14	6852.....2	3+3.....
NEW YORK	.....	.....	11	1111123	4....2222235	6531 11.....13	4752.....1	.52.....
MEXICO	.....	.....	11	1111132	3.....222123	4532 1.....1	1652.....	.32.....
MONTREAL	.....	.....	11	1111123	3....2222245	6531 11.....14	4752.....1	.42.....
DENVER	.....	.....	.....	.....	2....1112113	3332....11..1	1452.....	..2.....
LOS ANGELES	.....	.....	.....	1	1.....12112	2233....12...	.352.....	..2.....
VANCOUVER	.....	.....	.....	.....	1.....1111	2233 11.121.1	.252.....	..2.....
FAIRBANKS	.....	.....	.....	.....	...2111111111	1124 2111 2211	..12.....	.....

The provisional mean sunspot number for June 1994 issued by the Sunspot Data Centre, Brussels was 28.1. The maximum daily sunspot number was 63 on 11 June and the minimum was 0 on 1, 2, 3, 4, 5, June. The predicted smoothed sunspot numbers for August, September and October, are respectively: (classical method) 27, 25, 24 (±6); (SIDC adjusted values) 23, 21, 20 (±5).

HF NEWS

continued from page 18

HOWDY DAYS

1400 7 September to 0200 9 September

This one is restricted to lady operators anywhere in the world. I can supply copies of the rules (SASE please).

KCJ CONTEST

1200 20 August – 1200 21 August

CW only. Single-operator multiband only. Exchange RST plus continent code. JAs give prefecture/district code. One point per QSO, multipliers are the 60 prefectures worked on each band. Send logs to reach Yasuo Taneda, JA1DD, 3-9-2-102 Gyoda-cho, Funabashi, Chiba 273, Japan, to arrive by 30 September 1994. I have copies of the rules (SASE please).

STRAIGHT KEY PARTY

1300 – 1600 3 September

CW only using straight keys only. 7.010–7.040MHz. Call 'CQ HTP'. Class A – 10W input maximum, B – 100W, C – 300W, and D – listener. Exchange RST/serial number/class/age (ladies give 'XX').

Points – A with A = 9, A with B = 7, A with C = 5, B with B = 4, B with C = 3, C with C = 2. Send logs before 30 September to F W Fabri, DF1OY, Wolkerweg 11, D-81375 Munchen, Germany. Copies of rules available (SASE please).

PROPAGATION

SMITHY'S REVIEW THIS month goes as follows: "The present upward trend in geomagnetic activity is well illustrated by the fact that May was the fourth successive month in which the monthly average of the geomagnetic Ap index was over 20. In fact the smoothed curve shows a shallow trough in mid-1993 and a slow rise thereafter.

"Whether this will continue remains to be seen but even-numbered cycles tend to show different patterns from odd-numbered ones and if the present cycle follows the same pattern as Cycles 18 and 20 the rise could continue for a year or more. At the same time the level of solar activity continues to be low.

"The provisional daily sunspot number was zero on a number of days at the end of May and beginning of June with the daily flux down to 68 sfu which is only just above 'rock bottom', while the 27-day average, falling for the past 150 days, had sunk to 78 sfu.

"By mid-June there were some signs of improvement in band conditions with even a little F2 DX on 28MHz but for much of the time Es provided most of the activity".

THANKS

TO EVERYONE WHO contributed in any way and particularly to the authors of *DXpress* (PA3FQA), the *Lynx DX Bulletin* (EA2KL), the *Long Island DX Bulletin* (VP2ML), and *RSGB DX News Sheet* (G4DYO).

You will notice that the author of the *Long Island DX Bulletin* is no longer J Harvey McCoy, W2IYX. Sadly, he passed away on 16 April. Chod Harris, VP2ML, who has been producing *The DX Bulletin* for many years with great success has taken over and will continue to publish it.

Please send everything for the **October** issue to reach me no later than **18 August**.

665 countries worked! From left Dave Hammond, WC4B; Ken Miller, K6IR; and ARRL Director John Kanode, N4MM (see text).

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

SPORADIC-E propagation on 144MHz was not noted during the 'traditional' first two weeks in June. However, later in the month it produced what is believed to be the first contact on the band between Britain and Algeria. Periods of enhanced tropospheric propagation were also reported and there were transatlantic openings on 50MHz.

PUBLICATIONS

THE LATEST issue of *DUBUS Magazine* is 2/1994. In the technical reports section there are articles on DL6WU Yagis by Rainer Bertelsmeier, DJ9BV, and a 30W linear amplifier by Harke Smits, PA0HRK. He uses two Mitsubishi M57762 modules combined in parallel. The EME News section contains Part 1 of a detailed Active Station List for 432MHz by DL7APV. 21 British stations are included. The UK agent for *DUBUS* is Roger Blackwell, G4PMK (QTHR).

The May edition of *The VHF-UHF DXer* includes a piece on the DJ9BV Noise Figure Meter. (A reprint of the original 1990 *DUBUS* articles is in *DUBUS Technik III*). Sam Jewell, G4DDK, describes his experiences in building this meter, for which a PCB is available from DF7VX. Contact editor/publisher Dave Hardy, G8ROU (QTHR), for subscription details to *The DXer*.

FIRSTS

DURING THE *Practical Wireless* 144MHz QRP Contest on 19 June Dave Hewitt, G8ZRE, operating as GW8ZRE/P, five miles north of Llangollen (IO83JA), worked 7X2CS (JM16SP) at 1111UTC. The distance (QRB) is 1,894km and Dave was only running 3W to a 2-ele HB9CV antenna just 2m AGL for this first GW-7X QSO. Costas Fimerellis, SV1DH, sent a copy of a QSL from Dave Price, GW4CQT (GWT), confirming a 2m Es QSO at 1700UTC on 10 July 1978. This was the first GW-SV contact, presumably double-hop Es.

Darrell Mawhinney, GI4KSO (ex-GI8JPG DWN), sent a list of claimed 2m firsts from Ulster; these are in calls, date, time and mode order. GI4OPH-C30BBX 2/7/86 0600 (MS); GI4OPH-I0SNY/EA9 7/7/83 1847 (Es); GI4OPH-HB0/HB9QQ 11/8/86 1900 (MS); GI4OPH-HV2VO 6/6/86 0300 (MS); GI4GID-OH0JN 4/1/80 0300 (MS); GI4OPH-OH0NC/OJ0 6/8/87 0600 (MS); GI4OPH-T70A 30/6/86 0500 (MS). GI4OPH-TF3LJ 29/5/86 0500 (MS); GI4OPH-UC2FCD 26/10/85 1434 (T); GI4OPH-UP2BKH 11/5/83 1734 (A); GI4OPH-UQ2GMD 11/5/83 1717 (A); GI4OPH-UR1RXM 4/11/86 1715 (MS); GI4KSO-UZ2FWA 20/2/92 1809 (A); GI4KSO-VE7BQH 5/2/93 0530 (EME) and GI4OPH-YO2IS 11/6/85 1726 (MS). Darrell commented on the difficulty of compiling such information. Many who may have claims are no longer active (QRV).

PROPAGATION

IN THE MAY issue of the *Six and Ten Reporting Club's* report, editor Ray Cracknell, G2AHU (HWR), describes the differences in the SECS and SIDC sunspot numbers (SSN) and how they are derived. Using the Brussels SIDC data, the mean SSN for May, was 18.2, while the 2.8GHz solar flux, based on the Ottawa figures from the Penticton Observatory (VE7), was 79.8.

There were 16 geomagnetically disturbed days in May; 1-11, 24, 25 and 28-31, thus Es propagation was upset or inhibited. Es was good on 14-17, 21, 22 and 31 May. On the night of 1/2 May, W2CAP/1 and W3IWU reported transatlantic Auroral-E signals from Euro-TV on 48 and 49MHz, but no 6m QSOs took place. Subscription details of this publication from Ian Brotherton, G2BDV (QTHR): his packet route is G2BDV@GB7BNM.#45.GBR.EU.

SOFTWARE

ANDY TALBOT, G4JNT (HPH), sent me a disk containing some of his excellent PC software covering contest scoring with extensive site database, locator, distance, propagation, etc, programs. He asked me to distribute it to anyone genuinely interested. The unzipped files total 1.1Mb, so an HD 3.5in or 5.25in disk is required. Send it to me with return SASE and I'll copy. I am frequently asked if I have, or know of, any logging software for CP/M machines, such as the Amstrad PCW series. Sorry, I can't help. Does anyone know of any?

MOONBOUNCE

I HAVE NOW copied Doug McArthur's, VK3UM, EME-Planner (v7.02 Oct 93) and Auto Track (v6.00 Feb 94) software for dozens of readers. If you'd like a copy, send me a formatted IBM 1.44Mb 3.5in disk with suitable SASE. If you state your station latitude and longitude in deg/min/secs I'll default the .DAT files to your QTH. If you don't have a 3.5in drive, I could split the files onto two 5.25in disks, minimum format 720k.

In his *432 and Above EME News* for June, editor Allen Katz, K2UYH, writes: "More technical material is desperately needed. E-mail works FB." His E-mail address via the Internet is: a.katz@ieee.org. If you are a newcomer to EME, there is a net on 14,345kHz every Saturday and Sunday from 1500UTC. North American net control stations are KD4LT and K5JL, while DL4EBY at DK0TU handles traffic in Europe.

ACTIVITY

Conditions in the May sked weekend were pretty poor on 70cm with very troublesome libration fading. Even so, many new stations were QRV. Stuart Jones, GW3XYW (IO71), operated on 70cm and on the 14th, completed with LA8LF (JO59) 449/559; I6QGA (JN63) 449/549; EA6/DF5JJ (JM19) 559/559; ZS6AXT (KG33) 549/569; OZ4MM 559/559; KB2AH (FN20) 559/559; AA6WI 559/559; HB9BBD 449/539 and WA4NJP (EM84) 449/559. On the 15th, he added HB9BHU 449/449 and I6PNN (JN72) 449/449.

Activity on 23cm continues to grow. In the 11/12 June sked weekend, GW3XYW completed with I6PNN 439/449; ZS6AXT 559/569; KB2AH 43/52 and AA6WI 549/439 on the 11th. Next day Stu made some repeat contacts plus OH2AXS 559/559; IK3COJ 449/449; DL0SHF 559/559; AA4TJ (FM08) 339/559 and OE9XXI (JN47) 55/55.

John Regnault, G4SWX, (JO02) operated on 2m in June. On the 11th, W5UN was 429 and EA6VQ 'O'. He heard very little from SV5/DL5MAE. At 0745 next morning the SV5 was heard only and SM5FRH was 529 at 0809. Monday the 13th was fairly lively with F3VS 429 at 1934. At 2012 W9QXP (DM44AR) was 'O'; he runs 700W output to four 19-ele Yagis and was John's initial number 249. The 15th brought W5UN 439, I5JUX 'O' but GJ4AFF/P was not completed at 2100. Next evening W9XQP was 'O' at 2120, likewise IK1MTZ (JN35) at 1923 on the 18th. Next afternoon, IK2DDR was 'O' at 1630.

The July sked weekend was brought forward to the 23/24, so the 30/31 one is cancelled. So the next sked weekend is now 3/4 September, when Sun noise is likely to be a problem. The offset is just -24°, even though the sky temperatures at 144 and 432MHz are only 210/15° respectively. The declination is +10° and the signal degradation 0.9dB.

50MHZ

ONE OF THE highlights of the month was the UK Six Metre Group's operation from Jordan. Nearly 2,000 QSOs were made with stations in 49 countries and four continents. Best reported DX from the Internet appears to have been with WD4KDP (FM15MM) on 9 June, a QRB of 9,774km.

NEWS

From 9 to 14 August, LA5TFA and LA0BY will be QRV on MS from JP89KB and JP98AW. LA5TFA/P will call CQ on 50.190MHz daily 2000-2200 and 0800-1000UTC. He will transmit first for one minute on SSB or slow CW with frequent breaks. You can contact Stefan Heck, LA0BY, by telephone on +47 77692171, fax on +47 77692360 or via the Internet to stefan@eiscat.no.

Ted Collins, G4UPS (DVN), reports that the ZB2VHF beacon was QRV again from 19 June. Beacons WA1OJB and TF3SIX were heard on 25 June. For the Es season, SZ2DF is a special beacon on Crete (KM25) on 50.521MHz running 1kW to a big antenna array beaming at 330°. Continuous carrier only with no ID!

A new station from Belarus is EW7IM (KO52). From Ukraine, UB1O (KN47), US7CQ (ex-UB4CQ in KN59), UT0MN, UU8JJ (KN74), UY5ZZ (KN68), UX1MF (KN98) and UX0FF (KN45) are new stations. ER5OK (ex-UO5OK in KN46) is the only station known to be active in Moldova.

REGION 1 ACTIVITY

The 4/5 June contest weekend was pretty awful. Darrell Moody, G0HVQ (GLR), wrote: "Operated with GX1AYM/P in the UKSMG contest and G1FYC/P in the RSGB contest. Spent twelve hours on a freezing hilltop with no Sporadic-E. G1FYC's car broke down on the way home and finally made it into bed as the Sun was coming up on Sunday morning. Total loss of interest in 6m for several days!"

The great majority of QSOs in June were with stations in European countries via Es, which mode occurred almost every day. It would need several pages to chronicle everything of interest worked by many contributors, so here are the main highlights. There was an Es opening to southern Spain in the IARU 6m contest around 0750 on 5 June, but it didn't last long.

JY7SIX was worked by scores of British stations. Other eastern Mediterranean and Middle East stations worked were SV5TS, SV7CO (KN20), SV8CS (KM07), SV8QG (KM39), SV9ANK (KM25), 4X4IF (KM72), 9K2USA and 9K2ZR. CIS stations contacted included ER5OK, EU1AA (KO33), EU6MS, EW1AA, RA3TO and RA3YO (KO73), RA3TES (LO15), R3VHF (LO16), UU8JJ and UX0FF. If you are baffled by these newish prefixes, please refer to HF News, page 18, in the June *RadCom*.

Nearer home, many have been working HB9s in the daytime now that some of them can operate legally without causing TVI. IA5F (JN52) on Formiche Is, EU28, was one for IOTA buffs, while only G4UPS mentioned working HV4NAC (JN61), operated by I0CUT, on 9 June.

SPECIAL OPENINGS

Probably the most welcome June events were three transatlantic openings. The first was on the 15th from about 2230 when VE9AA was copied in SW England. K0SN/CY9, VE1YX and VE1PZ were also worked and the opening reached eastern England, but G0HVQ didn't hear anything in Gloucester; it lasted about 30min.

The event on the 19th was better and started around 1930. QSOs were reported by Ken Osborne, G4IGO (SOM), G4UPS and Ela Martyr, G6HKM (ESX). Between them they worked FP5EK (GN16), VE1PZ (FN85), VE1RAA (FN84), VE3KKL (FN25), WB2ELB (FN03) and K8MFO (EN90). Others heard included VE3FIT, WA1s AGL, AYS and OUB, K1JRW, K1TOL, W2CNS, WA3TBG, NW3C, K8TOZ and XL1YX. It ended around 2015.

The best opening was on the 25th, starting around 1630 and lasting till 2300. G0HVQ, G4IGO, G4UPS, G6HKM and Geoff Brown, GJ4ICD, all did well in this one and WB4NFS/VP9 (FM72) on Bermuda was in demand. In Jersey W5HUQ (EM90) was S9++ for an hour. The squares on offer included EL87-89, EL95-98, EM90, EN90, FN31, 32, 41 and 42.

Quite an exciting month on 6m. Thanks to John Hoban, G0EVT (YSW), Peter Antliff, G0SOO (SRY), Terry Chaplin, G1UGH (SFK), Paul O'Brien, G3DNR (KNT), Phil Catterall, G4OBK (YSN), John Hill, G7CLY (HBS), G8ZRE (CHS), Nigel Utting, GJ7LJJ, Ron Adams, GM4ILS (GRN) and Paul Baker, GW6VZW (GWT), who also sent interesting reports.

70MHZ

IAN CORNES, G4OUT (SFD), made 15 contacts in the CW contest on 12 June, best DX being GJ4ZUK/P at 393km. Although beacon GB3ANG was S3-6, no GMs were heard, nor any EI, GD and GI stations. As usual there was deep fading on the longer distance signals. John Baker, GW3MHW, heard beacon 5B4CY on 70.113MHz at 1752 on 18 June at S2. Recent QSOs were with G3IKR, G3APY, G3CJ, GW4HBK, GW4ALG, G0CHJ, G4RQI, G4SEU, G3YJX, G3UKV, GJ4VXE/P and GW4LXO. S53VV (JN65) has copied John's beacons and EI4RF.

144MHZ

TROPO

Alec Trustler, G0FIG (SXW), worked DL, F and HB9 stations in JN06, 25, 29, 35, 38 and 47 on 31 May; on June 4/5 Fs in IN94, JN04, 14, 26 and 36; LX2DX (JN29) on the 18th; EA1s in IN73 and HB9s in JN36/37 on the 22nd and 23rd, and more EA1s in IN62/

63 on the 26th. Andy Wyspianski, G1AWF (LDN), worked GM7DKX/P (IO66) on 12 June, SM6MPA (JO67) next evening and EB1BZZ (IN62) on the 26th for new squares.

Peter Burt, G3NBQ (LNH), found good tropo to EI on 12/13 June working EI8BEB (IO54) and EI4EY (IO52). Conditions were good to DL, EA, F, ON and PA on the 27th but he missed EA8ACW. GM8LFB (IO88) and GM0HTT (IO89) are frequently heard.

G4SWX worked OZs and DL in JO44-46, 55, 64 and 65 in the 7 June Scandinavian Activity Contest. The evening of the 12th was Polish night with 13 SPs worked plus lots of DLs. SMs and OZ in JO55, 57, 67 and 68 were contacted next evening.

Edward Allely, GW0PZT (GDD), had QSOs with EB1GJP (IN53) and EB1DNK (IN63) on 10 June. The path was open again on the 17th but no activity. The 23rd brought EA1NV (IN73) and F5FNY/P (JN36) before an electrical storm forced a closedown at Pwllheli. But the highlight was on the 26th starting with EA1s in IN53, 62 and 63, then from 1130, *for the next six hours*, he enjoyed tropo ducting to the Canaries. Stations worked were EB8BTV, EB8ALZ and EB8BEB, all in IL18; they peaked S9, but most of the time were S1-5.

Joe Ludlow, GW3ZTH, was out portable at IO81FP on the 11th and worked 24 stations in 18 squares, best DX being GM4JJJ (IO86) and DJ6LV (JO31). Next day conditions were marginally better with 26 stations in 17 squares contacted, best being F6CCH (IN96). On the 23rd he made 48 QSOs in 2.5 hours with seven HB9s in the log. The majority of contacts were into JN25, 36-38.

The 26th was: 'A day to remember' starting with EB1EVP (IN62) from the home QTH at 0738. An afternoon foray to another local site, 900ft ASL, brought more EA1s then he was called by EB8BTV and EB8BEB. Later he contacted EA8BHN, EB8ALZ and EA8BCJ, all in IL18. Next day conditions favoured the east; -/P operation from IO81FP resulted in 83 stations in 19 squares, best DX being DK8LV (JO54).

John Bradford, GW4ZQV (GWT), made contacts into EA1 on the 10th, to OZ on the 14th and with F5ADT (IN94) on the 23rd. Pierre is always QRV 0530-063UTC, beaming to Britain. Although he worked northern Spain on the 26th, no EA8s were heard in Pontypool.

SPORADIC-E

The first significant event was on 18 June. G4IGO worked I0, 5 and 8 in JN53, 61 and 70, 1803-1829. GW0PZT heard TK/IK1AZV/P at 1650 for 3min. Later Edward worked IK3WUX (JN65), IC8CQF (JN70) and IK0BZY (JN61). Lyn Leach, GW8JLY (GNS), worked Italians in JN44, 61 and 70 between 1657 and 1831 and GW4ZQV had similar success, 1700-1900.

The next opening was on the 20th when GI4KSO worked DB5ML (JN58) and EB5IFI (IM99). Jim Rabbitts, GM8LFB (HLD), opened his innings at 1705 with IK0SMG (JN61); subsequent QSOs were with HB9FAP (JM46), EA7ALL (IM87) and EA1BFZ (IN81) at 1821. GW0PZT only managed HA3UU (JN96) at 1708 and EA1BFZ (IN81) at 1820. For G3NBQ it was a frustrating event with just EAs worked. Peter reports that GM0HTT worked EA7ALL (IM87), a QRB of 2,370km.

The third event was on the 22nd and started just before 1800. G0FIG worked EA1s and CTs in IN50, 52, 60-62. CT4KQ (IN60) and CT1WW (IN61) were new squares for G1UGH. G3NBQ did better in this one with EAs and CTs contacted. G4IGO's best DX was CN8ST (IM64). Other long-haul DX for Ken were EA4YY (IN70), EA4LY (IN80) and EA7WM (IM67) between 1928 and 2034.

G4SWX worked 16 Iberians, 1811-2004 including EA5ABE (IM99) and EA7ALL. CT1WW (IN61) was parked on 144.300MHz, which didn't help. G6HKM wrote it was mayhem with lots more stations heard than worked. New squares for EIa were CT1WW, CT4KQ, CT1s FAK and CLR (IN50) and EA3TI (JN11). From DWN, GI4KSO worked EA1, 4, 5 and 7. GM8LFB's successes were EA3DQY (JN12), EA3TI, EA3LY and EB1FPV (IN70) between 1815 and 2030.

GW0PZT worked three EA3s in a 10min opening from about 180°. The MUF came back up again by 1925 when he worked EA1, 4, 5 and 7 till 2035.

At GW3ZTH/P the QRM was horrendous, starting at 1807 with EA3TI. Joe missed CN8HB who called him on 144.290MHz, because EA7AEN called him instead. At 1944 he was called by EA8EL, but couldn't get the locator. GW8JLY noted the two openings in the second of which Lyn worked seven new squares and EA9AI (IM75) for a new country. Also in the second phase, GW4ZQV worked EA1, 4 and CT between 1930 and 2030.

There was another opening on the 24th to the Mediterranean when G4IGO worked IS0s, 9Hs and IT9 in JM49, 75 and 68, 1752-1822. G4SWX also got EA9AI, five EA7s and four IS0s. John didn't hear 7X2DS who was being worked by PAs and DLs. In spite of severe thunderstorm static, G6HKM managed a few IS0s and EA7GIR (IM76). Not a bad month for Es, even if a little disappointing to begin with.

LOCATOR SQUARES TABLE
STARTING DATE: 1-1-1979

Callsign	50MHz	70MHz	144MHz	430MHz	1.3GHz	Total
GJ4ICD	624	1	264	121	68	1078
G4IGO	565	–	250	–	–	815
G0JHC	520	–	48	–	–	568
GW4LXO	475	34	261	109	48	927
G6HKM	475	–	248	118	62	903
G6HCV	468	–	250	–	–	718
G3IMV	447	15	514	125	52	1153
GW6VZW	395	–	143	6	–	544
GU7DHI	363	–	111	5	–	479
G4TIF	339	28	209	112	–	688
G0HVQ	328	–	71	–	–	399
G0EVT	251	12	261	65	1	590
G1SWH	245	33	179	63	9	529
G1UGH	239	–	124	–	–	363
G8LHT	225	20	210	95	20	570
G4DEZ	223	–	255	74	62	614
G4MUT	200	26	159	97	34	516
G0FIG	200	–	198	62	11	471
G4SSO	191	–	279	100	–	570
G4RGK	183	–	328	203	67	781
G8XTJ	182	–	126	–	–	308
G8TOK	154	25	131	50	3	363
G0ISW	147	–	64	20	–	231
G0CUZ	139	–	389	80	–	608
G0GMB	106	–	225	108	–	439
G7CLY	98	–	60	2	–	160
GI1CET	97	–	67	6	–	170
GJ7LJJ	93	–	52	–	–	145
G1JDU	93	–	39	–	–	132
G4OBK	83	–	1	–	–	84
G1AWF	57	–	166	3	–	226
G3FIJ	57	24	83	27	3	194
G7LIJ	24	–	171	–	–	195
G3UOL	9	–	47	–	–	56
G4SWX	–	–	404	–	–	404
GW8JLY	–	–	284	36	–	320
G0EHV	–	35	191	82	–	308
G6RAF	–	–	160	114	–	274
G4YTL	–	43	182	38	–	263
G3FPK	–	–	246	–	–	246
GW4FRX	–	–	236	–	–	236
GW0PZT	–	–	181	–	–	181
G6ODT	–	3	62	66	–	131
G4OUT	–	22	103	–	–	125
GM0GDL	–	–	122	–	–	122
GU4HUY	–	–	84	–	–	84
G0HIK	–	–	52	–	–	52

No satellite, repeater or packet radio QSOs. If no updates received for a year entries will be deleted. Band of the Month is 50MHz. Next deadline is 25 August.

432MHZ UP

G6HKM FOUND activity on 23cm on 27 June, working PE1JBK and PA0HEJ (JO22), PA0LMD, PE1PMR and ON7WP (JO21), GW6ZUQ (IO81) and F6CBH (JN19) for a new square. G6ODT is concentrating on 70cm at present and notes increased activity, including novice licensees.

Not many FM QSOs on 70cm are reported but John Percival, G7DDU (NOR), mentions one on 12 June with GW3WSU (IO81IK) over a distance of 205km. Both were running 25W to vertical colinear antennas. There is no reason why long distances shouldn't be worked on FM, especially when there is a bit of a lift on. Too many operators seem to look upon FM as a purley local mode for cross-town QSOs.

FINALE

THE COPY deadline for **October** is **25 August** and for **November**, **22 September**. The combined fax/telephone answering machine is on 081 763 9457, my CompuServe ID is 70630,603, the Internet route is 70630.603@compuserve.com and the BT Gold mailbox is now 87:CQQ083.

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Ⓐ Mini Precision Drill

12V d.c. drill with precision keyed chuck for greater accuracy. Twin bearing drive shaft for smooth running. Fan cooled motor. Complete with chuck key.

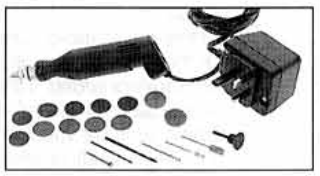
stock no.	price each 1-2	3-9
W182-578	£35.74	£33.00

Ⓑ Variable Speed Transformer

230-240V a.c., suitable for use with RS mini-tools. Features variable speed control and re-settable cut-off safety facility. Provides sufficient power for continuous work at varying speeds.

stock no.	price each 1-2	3-9
W182-691	£35.74	£33.00

High Speed Drill Kit



Includes RS high speed mini-drill W182-584, a plug-in 230-240V a.c. mains transformer and 20 accessories for drilling, grinding, routing and shaping.

stock no.	price each 1-2	3-9
W182-663	£31.26	£28.50

Drilling/Cutting Kit

Consists of: 7 cutting wheels, 4 grinding wheels, 2 mandrels, 6 PCB drills and 6 routing tools.

stock no.	price each 1-2	3-9
W182-736	£13.40	£12.30

Polishing/Cleaning Brushes

Steel or brass brushes in either pencil, wheel or cup profiles. Supplied in bags of 3.

Drive Shaft Diameter 2.4mm Nominal

	stock no.	price each 1-2	3-9
steel brushes pencil (3)	W182-770	£3.30	£3.02
steel brushes wheel (3)	W182-786	£3.30	£3.02
steel brushes cup (3)	W182-792	£3.30	£3.02
brass brushes pencil (3)	W182-809	£3.30	£3.02
brass brushes wheel (3)	W182-815	£3.30	£3.02
brass brushes cup (3)	W182-821	£3.30	£3.02

Cutting Wheels

Six carborundum 22mm diameter cutting wheels for use with RS mandrels W182-865.

stock no.	price each 1-2	3-9
W182-871	£2.86	£2.60

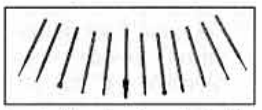
Buffing Kit

Consists of a 22mm felt wheel and a 22mm wool wheel with fixed mandrels, and a pot of buffing/polishing paste.

Drive Shaft Diameter 2.4mm Nominal.

stock no.	price each 1-2	3-9
W182-837	£4.02	£3.65

Cutting Kit



12-piece set of fine and medium cutting tools for use on plastics, wood, etc.

stock no.	price each 1-2	3-9
W182-758	£13.40	£12.30

Drill Accessories

RS p.c.b. drill accessories for cutting, cleaning and finishing many workshop materials. The kit consists of a 16mm dia. saw and mandrel, a felt polisher (hard), and a reamer (arrowhead). Shank dia. 2.4mm.

stock no.	price each 1-4	5-24
W543-967	£7.85	£7.10

Engraving Kit

Simple-to-use, complete with a lightweight pen-style engraver, plug-in 230-240V a.c. transformer, 1 diamond engraving bit and 2 grinding stones. Plastic stencil for security marking on plastics and metals. Handy carrying case.

Engraving pen is also available separately with a diamond bit for use with RS tool transformers W182-691 and W182-708. Spare round head 1.8mm diameter. Diamond bits are also available separately.

	stock no.	price each 1-2	3-9
engraving kit	W182-679	£24.12	£22.00
engraving pen	W182-685	£14.28	£13.00
diamond bit	W182-859	£4.46	£4.10

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Licence Changes: *Gazette* Notice

See pages 5 and 7 for explanatory and background notes

Notice of Variation of Amateur Radio Licence (A) and (B)

Department of Trade and Industry

Wireless Telegraphy Act 1949

THE SECRETARY of State hereby gives notice pursuant to subsection 1(4) of the Wireless Telegraphy Act 1949 to holders of the Amateur Radio Licence (A) or (B) ("the Licence") that, from 18 July 1994, each Licence shall be varied as follows:

1. In this Notice "the Booklet" means the Terms, Provisions and Limitations Booklet BR68, the terms of which form part of the Licence.
2. As and from the date hereof the Licence shall be read and construed as if:-
   (1) in sub-clause 1(3) of the Booklet the words "of the Radio Regulations" were inserted between "Resolution 640" and "of the International Telecommunication Union";
   (2) in sub-clause 2(4)(c) of the Booklet the words "notified in accordance with subclause 7(3)(b)" were deleted;
   (3) in sub-clause 2(5) of the Booklet the words "or of digital communications" were inserted between "of a beacon" and "unless he", the words "(within 5 km)" were deleted between "of the location" and ", period of operation", the words "of the beacon" were deleted between "shut down procedures" and "to the Manager", the words "of the beacon" were deleted between "commencement of operation" and ", prohibit the unattended" and the words "of the beacon" were deleted between "Unattended Operation" and "or allow";
   (4) sub-clause 6(2) of the Booklet were deleted and replaced by "The Log shall be written in a book or maintained on a magnetic tape, disc or other electronic storage medium. If the Log is maintained on an electronic storage medium the means to view the Log and produce a hard copy shall be kept readily available at the Main Station Address.";
   (5) at the end of sub-clause 6(4) of the Booklet, the following words were added "If the Log is maintained on an electronic storage medium the Licensee shall provide the person authorised by the Secretary of State with either a hard copy of the Log or the original Log or a duplicate copy thereof on the medium on which it is kept to take away together with a hard copy as soon as reasonably practicable thereafter, if requested to do so.";
   (6) in sub-clauses 10(4) and 11(1)(f) of the Booklet the figure "144" were deleted and replaced by "30";
   (7) in column 4 of the Schedule to the Booklet BR68 the maximum power level of "15dBW" for the frequency band 1.810-1.830 MHz were deleted and replaced by "26dBW";
   (8) in column 4 of the Schedule to the Booklet the maximum power level of "20dBW erp" for the frequency band 50.00-51.00 MHz were deleted and replaced by "26dBW" and in column 2 against this frequency band the words "Antennas limited to 20 metres above ground level. No maritime mobile operation." were deleted;
   (9) in column 4 of the Schedule to the Booklet the maximum power level of "20dBW erp" for the frequency band 51.00-52.00 MHz were deleted and replaced by "20dBW" and in column 2 against this frequency band the words "inside or" were inserted between "other services" and "outside" and the words "Antennas limited to 20 metres above ground level. No maritime mobile operation." were deleted;
   (10) in Note (x) (d) to the Booklet the words "CCIR (International Radio Consultative Committee)" were deleted and replaced by "Radiocommunication Sector of the ITU"; and
   (11) in Note (y) to the Booklet the list of CEPT member countries were deleted and replaced by the following:

"Albania	A1
Austria	A
Belgium	B
Bosnia and Herzegovina	BH
Bulgaria	BG
Croatia	HR
Cyprus	CY
Czech Republic	CZ
Denmark	DK
Estonia	EST
Finland	FI
France	F
Germany	D
Greece	GR
Hungary	H
Iceland	IS
Ireland	IRL
Italy	I
Latvia	
Liechtenstein	FL
Lithuania	LT
Luxembourg	L
Malta	M
Moldova	MLD
Monaco	MC
Netherlands	NL
Norway	N
Poland	PL
Portugal	P
Romania	RO
Russian Federation	
San Marino	RSM
Slovakia	SK
Slovenia	SLO
Spain	E
Sweden	S
Switzerland	CH
Turkey	TR
United Kingdom of Great Britain and Northern Ireland	GB
Vatican City	SCV"

On behalf of the Secretary of State for Trade and Industry

6th July 1994.

Notice of Variation of Amateur Radio (Novice) Licence (A) and (B)

Department of Trade and Industry

Wireless Telegraphy Act 1949

The Secretary of State hereby gives notice pursuant to sub-section 1(4) of the Wireless Telegraphy Act 1949 to holders of the Amateur Radio (Novice) Licence (A) or (B) ("the Licence") that, from 18 July 1994, each Licence shall be varied as follows:

1. In this Notice "the Booklet" means the Terms, Provisions and Limitations Booklet BR68a/N, the terms of which form part of the Licence.
2. As and from the date hereof the Licence shall be read and construed as if:-
   (1) in sub-clause 2(4) (c) of the Booklet the words "notified in accordance with subclause 7(3)(b)" were deleted;
   (2) in sub-clause 2(5) of the Booklet the words "or of digital communications" were inserted between "of a beacon" and "unless he", the words "(within 5 km)" were deleted between "of the location" and ", period of operation", the words "of the beacon" were deleted between "shut down procedures" and "to the Manager", the words "of the beacon" were deleted between "commencement of operation" and ", prohibit the unattended" and the words "of the beacon" were deleted between "Unattended Operation" and "or allow";
   (3) sub-clause 6(2) of the Booklet were deleted and replaced by "The Log shall be written in a book or maintained on a magnetic tape, disc or other electronic storage medium. If the Log is maintained on an electronic storage medium the means to view the Log and produce a hard copy shall be kept readily available at the Main station Address.";
   (3) at the end of sub-clause 6(4) of the Booklet, the following words were added "If the Log is maintained on an electronic storage medium the Licensee shall provide the person authorised by the Secretary of State with either a hard copy of the Log or the original Log or a duplicate copy thereof on the medium on which it is kept to take away together with a hard copy as soon as reasonably practicable thereafter, if requested to do so."; and
   (4) in Note (x) (d) to the Booklet the words "CCIR (International Radio Consultative Committee)" were deleted and replaced by "Radiocommunication Sector of the ITU".

On behalf of the Secretary of State for Trade and Industry

6th July 1994.

IARU

JOHN ALLAWAY, G3FKM
and
TIM HUGHES, G3GVV

WE ARE grateful to readers who responded to our request for comments on this column. Fortunately all were favourable, and we will endeavour to incorporate some of the positive suggestions which were made as well as trying to answer your questions! Please continue to write.

It is with great pleasure that we note that Dick Baldwin, W1RU, and Michael Owen, VK3KI, have been re-elected as President and Vice-President respectively of the IARU. Their continuing leadership is of great value to all of us.

We also note with pleasure that Mr Shozo Hara, JA1AN, will continue to serve as President of JARL. Attending all IARU and many ITU Conferences, he has made a great contribution to the well-being of amateur radio services world-wide.

NEW MEMBERS

THE SIZE, AND consequently the influence, of the International Amateur Radio Union continues to increase.

Voting is at present taking place by Member Societies on the admission of Soyuz Radiolyubitele Rosii (SRR). This organisation has about 4,000 members and its President is Valery Agabekov, UA6HZ. Voting on the applications from SRR and the Iraqi Radio Amateur Radio Club will be completed on 11 September 1994.

An application for membership received from the Belarus Federation of Radiosport and Radioamateurs has been forwarded by Region 1 to the International Secretariat for voting by the other societies. We reported earlier on an application from another society in Belarus. However, there have been some problems between these two possible candidate societies in Belarus but fortunately they are now working together. The application received from the Belarus Amateur Radio Union has now been withdrawn.

Welcome to the Ukrainian Amateur Radio League which has recently been elected to membership. A membership enquiry has recently arrived from Turkmenistan.

ITU

AN AMBITIOUS meeting schedule of the International Telecommunication Union (ITU) has kept IARU representatives busy. The ITU began preparations for World Radiocommunication Conferences in 1995 and 1997.

The IARU has participated recently in the work of Task Group 12/4 which deals with sharing between services operating in the 1 to 3GHz range; Task Group 8/2 which deals with wind profiler radars in the vicinity of 50, 400 and 1000MHz; Working Party 8A dealing with mobile and amateur services; the first ITU Radiocommunication assembly; WRC-93 which set the agenda for WRC-97; and the Volunteer Group of Experts (VGE) which is attempting to simplify the international Radio Regulations.

IARU was represented at meetings of the VGE by the vice chairman of Region 1 Wojciech Nietyksza, SP5FM. The ITU has also created Task Group 8/3 and it was due to meet in late July where Frank Butler, W4RH, will be representing the IARU. It has now been decided that WRC-95 will take place in Geneva after all and not in Moscow as originally envisaged.

An indication of the very good relationship between IARU and the ITU was demonstrated recently. SP5FM was invited to give a lecture to the ITU Regional Seminar on Developments in Spectrum Management which took place in Poland in early July. There were expected to be about 200 participants attending from 51 invited administrations, many of them frequency managers who deal with day-to-day matters involving the amateur services. Wojciech was able to show how effectively the amateur services achieve effective band planning, the problems dealt with by the IARUMS, and our willingness to work even more closely with organisations like CEPT and the ITU.

CEPT MATTERS

THE CEPT Detailed Spectrum Investigation Phase II (DSI-2) has now concluded and IARU Region 1 has made extensive input. Copies of the document submitted have been sent to all Region 1 Societies.

The *European Radiocommunications Office Newsletter No 14* announced that a document 'Implementation of T/R Recommendations and ERC decisions' will be updated each September and will be available to amateur associations. The newsletter lists 22 countries which had accepted the provisions of T/R 61-01 by 15 April 1994, and says that at present additional bilateral agreements are necessary with Greece (except for EEA countries) and Turkey. Two non-CEPT countries – Israel and New Zealand – had also implemented the Recommendation and Peru was expected to become the third (in fact it has and was added to the list on 1 June 1994).

The same item appeared in *ITU Newsletter 5/94* and also referred to recent revision of CEPT T/R 61-02 which is the Harmonised Amateur Radio Examination Certificate (HAREC). This is a certificate issued by an administration to show that an individual has passed an examination of an accepted international CEPT standard; this can be used in other participating countries as the equivalent of a pass in their own qualifying examination. Now – as in the case of T/R 61-01 – non-CEPT administrations may join in.

The QSL card from SU1STAR – the IARU station located at Africa Telecom '94 in Cairo.

These are some of the unseen, but very valuable, benefits to radio amateurs gained by the work of IARU volunteers! Some more very interesting news is that it has been decided to form the CEPT Amateur Radio Society (CARS) for current or former CEPT employees. This will probably be located in Copenhagen.

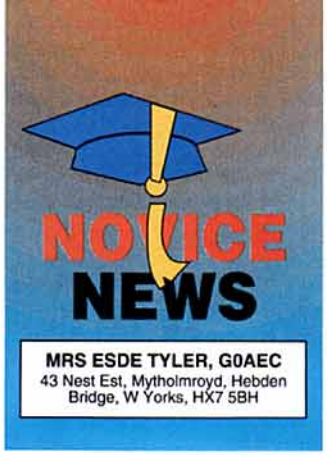
OTHER MATTERS

THE IARU Administrative Council has appointed an ad hoc satellite Committee to canvass the opinion of various individuals and organisations involved in the amateur satellite service. The chairman is VE3CDM, and the other members are VK3KI, VK3ADW, and ZS5AKV – they will produce their report by early September. VE3CDM and ZS5AKV were due to attend the AMSAT-UK Symposium in Guildford in July to receive input and have in-depth discussions.

At the De Haan Conference in September 1993 it was decided to form an External Relations Committee in order to advise the Region 1 Executive Committee on inter-governmental organisations such as the ITU, CEPT, PATU etc. Its first meeting was due to take place at the end of July. Members of this group are experts in their fields and often have (or are) professionally involved.

The ninth IARU Region 3 Conference will be held in Singapore during the first week of September. The RSGB will be represented by G3GVV and Malcolm Appleby, G3ZNU, Chairman and Vice Chairman of the IARU Committee. G3FKM will be attending as a member of the IARU Administrative Council. Our Society has submitted a number of papers dealing with VHF, UHF, Microwaves, VLF, Administration, and the Monitoring System. A report of the conference will appear in *RadCom* in due course.

Left; Miss Gul-E-Yasmin, AP5WPS, Pincipal of Wahid Public School; Mr Yunus Chaudhry, AP2MYC, Secretary of the Pakistan Amateur Radio Society, and G3FKM, on a recent visit to RSGB HQ.



MRS ESDE TYLER, G0AEC
43 Nest Est, Mytholmroyd, Hebden Bridge, W Yorks, HX7 5BH

HAVING READ the April and June editions of *RadCom* from cover to cover, you will realise that STELAR stands for Science and Technology through Educational Links with Amateur Radio.

The aim is to encourage more participation in the hobby within schools. To that end, a course 'educating the educators' was run during the Easter holidays when fifteen teachers undertook an intensive course prior to taking the RAE exam in May. The Chairman of STELAR Richard Horton, G3XWH, was also at the RSGB's Regional meeting in Brighouse where he promised that I would be put on the mailing list when *AMRED* (Amateur Radio in Education) – the magazine of the STELAR Group was published. I have now received a copy, and a very interesting and well-produced booklet it is.

During the 'Kidlink' project a list was compiled of radioactive schools who participated and I sent this list to Richard as STELAR's aims are similar but much wider.

If your school is interested in becoming affiliated to STELAR but has not yet done so, then Richard would like to hear from you. Around seventy schools have already contacted him but there are probably many more. Affiliation will bring you an up-to-date register of like-minded schools. Perhaps greater communication between schools could arise from this – which must be good news. Anyone interested should contact Richard Horton, G3XWH, Harrogate Ladies' College, Clarence Drive, Harrogate, North Yorkshire HG1 2QG.

JERSEY NOVICES

LAST YEAR SAW some Novice activity in Jersey when Warwick School held their fourth Amateur Radio Camp there.

Now, home-grown Novices are putting 2J1 callsigns on the air. Three adults – Jenny, 2J1CWG; Chris, 2J1CWH and Colin, 2J1CWR – and 14-year old Rachael, 2J1CVX, were successful when they sat the March exam. With a re-sit having already taken place and a new course planned to start in September, there should soon be several more. Congratulations to those Novices and their Instructors – Nigel, GJ7LJJ; Syd, GJ0JSY; Chris, GJ7AOG and Peter, GJ8PVL, and my thanks to Nigel for sending me the information.

QRS NETS

IN APRIL'S *RadCom*, I mentioned the Royal Naval Amateur Radio Society's QRS net on Monday afternoons. The frequency for this has now been changed to accommodate any Novices who would like to join in. The new frequency is 3.575MHz. Chris and Norrie would like to hear you.

The Royal Signals Amateur Radio Society also runs a slow Morse net (12WPM) on Mondays, Wednesdays and Fridays at 1600 (local time) on 3.565MHz for about one-and-a-half hours.

Mike, G0SWY, who gave the information controls the net, ably assisted by Selwyn, G3JRY. Mike adds that when conditions have been favourable Novices have joined in and they would welcome more; he is happy to work at your speed to give you the practice you need.

Both letters add that any listeners' reports will be welcome and QSLs sent if requested. With this sort of help, you could soon be on your way to joining in with greater confidence.

GIVING CREDIT

PERHAPS IT IS because they have a little more time to spare that older amateurs are working so hard to help Novices. Or perhaps it is because they are keen to introduce others to the pleasure they have found in the hobby. I asked readers to tell me about such people and received a reply from Derek, G3YHG.

Geoff, G3ADJ, is in his mid-seventies but finds no reason to retire. For three years from 1989, he worked hard to keep the Arborfield Radio Club, G3IHH, in existence (club officials will understand his problems) and built it into a thriving club with a secure future by his hard work and persistence.

Then, two and a half years ago, he also turned his attention to Novice training. With Novice licences for Erika, Sue, Madelaine (his wife) and Kim – now G7OQT – plus John who has passed the RAE and is learning Morse, he still has no intention of settling in his rocking chair. Two more Novice students are under instruction at present.

Fortunately, there are many like Geoff within the hobby – how else could the Novice scheme work? – and although they do not look for fame, it is nice to be appreciated. I have run training courses and know first-hand the effort and commitment needed. To all Instructors, on behalf of all Novices – Thank you.

PROFILES

Don, GW0PLP, proudly sent in the following information about his son, Leroy, and I am not surprised. Leroy is apparently working backwards. First, he passed the 12WPM Morse test then studied for the RAE with the intention of passing that the following year. Nothing unusual there, but wait – as he was only twelve, he would still not be able to hold a licence. He is now considering aiming for the Novice A licence so that he can work under his own callsign within Novice limitations, or under supervision on all bands. Very well done so far, Leroy. Keep it up, I wish you well.

Gail, G0GRK, has to fight off two other members of her household to reach the mic, husband Mick, G0GKL, and now son Tristan, 2E1ASF, who was ten just three weeks before the exam. But that isn't all. Father, Ron, took the same course and exam as Tristan and holds the callsign 2E1ASE. Ron had abandoned the RAE course years ago and had been a contented SWL until the bug bit again. Doug, G4ERA, of Hastings Electronic and Radio Club ran the course. As there are two radio amateur cousins in Germany – Hans, DC7GF, and Christian, DH7AFB – when the family get together there will be six radio amateurs, all related, under one roof!

Roy, 2E0ABD, was elected and James, 2E1AFA, was co-opted on to the committee of the Mid Sussex ARS. This does not mean that they deal solely with Novice matters, they are *fully* involved. Trained by John, G0OIO, Roy and James – plus fourteen others – are all very enthusiastic and keenly took part in the VHF National Field Day contest. Thanks to Chairman Eric, G3RXJ, for that snippet.

Ray, 2E1AQB, wrote to say that he and Eric, 2E1ASP, are serving on the Huntingdon ARS Committee. Ray describes himself as a 'mature' Novice. The beauty of the Novice course is that it caters for all, regardless of age. Without some background knowledge many older potential amateurs are dubious about tackling the full RAE. The Novice course provides that knowledge and many then feel confident enough to go further.

The involvement of Novices at Special Event Stations has been mentioned before – with appreciation by the amateurs running them. Roy, G4SSH, sent further proof of the contribution they can make.

To celebrate the 40th Anniversary of the North York Moors National Park, the Scarborough Special Event Group mounted GB40NY during the weekend 12-13 September, when 750 contacts in more than fifty countries were made. The idea was to raise public awareness of this area of natural beauty, and a special QSL card was issued.

Kevin, G0NUP, supervised the main HF station ably assisted by Andrew, 2E1AUZ, and Philip, 2E0ABI. If you want to speak to some Novices refer to the lists of Rallies and Special Event stations in *RadCom* [see page 91 – *Ed*] and contact them.

It is always nice to watch someone else working hard! The picture shows four Novices doing just that - but they seem to be enjoying it. Tom, G0JFN, is closely supervising the soldering skills of two young hopefuls while two more are discussing the finer points of a technical problem.

Contest Exchange

ANDY COOK, G4PIQ
Fishers Farm, Colchester Road, Tendring, Essex, CO16 9AA.
G4PIQ @ GB7MXM.#36.GBR.EU

SEVERAL YEARS AGO a well known author wrote: "When shall we three meet again, In thunder, lightning or in rain; when the hurly burly's done, when the battle's lost and won". However, just this week, it seems to be very appropriate since I am taking some time off from VHF NFD preparations to write the column this month! Thunder, lightning and hurly burly seem all too inseparable from VHF Field Day, and I guess we all hope for a bit of good battle. There are some more blood-thirsty quotations from the same play which may also seem appropriate on some occasions – perhaps "Is this a dagger I see before me?" as someone tries to pinch your frequency!

COMPUTER LOGGING

THIS SEEMS to have been a popular subject in the past few months, and we shall dedicate much more space to it in 1994. Firstly, a plea from the Contests Committees – would those of you who have logs available on disk (in IBM-PC compatible format) for AFS contests (both HF and 70cm) or for the LF Cumulatives please submit the entries on disk (paper copies too for the 70cm event please). Your logs will not be scrutinised any more carefully than those coming in on paper since all significant logs will be entered onto computer for checking.

After some of my previous comments on how you keep the adjudicator on your side by making his life easier with electronic log submission, I received a letter from one station saying that he would not send in his logs to contests any more since he didn't have access or any desire to use a computer and had no wish to irritate the adjudicator – this was clearly not what was intended! All that we are saying is that, if you are using an IBM-PC compatible computer in your logging process as a matter of course, then please help the adjudicator by submitting your entry on disk. Paper entries will always be warmly welcomed from those of you who can't/don't want to use a computer, and it is very important that we continue to receive the support of the vast body of non-automated contesters! As a paperless contest convert however, I shall be taking every opportunity to convince you of the joys and benefits of computer assisted contesting!

AUGUST CONTESTS

AUGUST'S UK HF contests are dominated by RoPoCo (Rotating Postcodes) which is a fun Sunday morning 80m CW version of Chinese Whispers, where the exchange is the post-code which was sent to you by your previous QSO partner. This contest requires accuracy more than flat out speed, and receiving a garbled version of your own post-code is always amusing. On an international front there is also the WAE (Worked All Europe) CW leg which usually brings lots of activity.

At VHF, the 432MHz fixed contest brings an opportunity to have a play from home or the club station on that band, and the first of the popular 2m CW cumulatives is right at the end of the month. The cumulative contests in general are a nice concept, particularly for anyone with a fixed station (although the more dedicated do go out portable) and who may have problems dedicating a complete weekend to a contest. There are five evening events in each set of cumulatives which run about every two weeks across Monday through Friday. Only the best three from five count for the final score, and the scores are normalised so it doesn't matter if you can't make a session, even if you miss one with good propagation.

SET REALISTIC GOALS

I HAVE SAID before that a good way of gaining maximum enjoyment out of contests is to set yourself some realistic goals and go for them. But that word, realistic, is very important – don't expect to beat P40V in CQWW with 100W and a G5RV. Success against your own measures can fire you to improve your station so that you will do better in next year's event – and in doing this you get ever closer to those people at the top. However, don't expect these leaders to stand still either – they set their own targets to give them a challenge, and I maintain that it is when you stop improving that you start losing.

FEEDBACK REQUIRED

THE HFCC IS particularly keen to get some feedback from you on the new proposals for the 1.8MHz and 28MHz contests mentioned last month. They take careful note of comments written on the log sheets, but many logs arrive without comments, and we suspect that these statements do not always fully reflect the scope of people's feelings. Like most aspects of amateur radio, and indeed life outside radio, many of the most strongly voiced opinions come from a minority of people, and there is a silent majority from whom we hear very little. It's fair to say that you have to give a lot of weight to the more apparent opinions since these also tend to come from the most committed people.

However, it is also important that the committees understand the full spectrum of people's feelings on important issues. In spite of the fact that it would be a most useful aid to weak signal contesting, telepathy is not yet an entrance requirement for contest committee membership! So, if you have an opinion on an aspect of contesting, write and let the relevant committee know. Obviously you cannot expect your viewpoint to always be taken – if we all had the same opinions life would be dreadfully dull – but you can be sure that your view will be discussed and taken into account.

There is one particular body of people about whose opinions we know far too little. These are the people who have a vague notion that contesting might be interesting, but really don't know what to do next. I've tried to address the first steps people can take through this column, but you can never hit everyone through one route first time round. If you fall into this category, then drop me or one of the committees a line – if you pass it to me I will try and cover the points in a later *Contest Exchange* – unfortunately time constraints mean that I'm unable to guarantee answering queries directly.

HF CONVENTION

IF YOU are interested in finding out a little more about some of the techniques used by the more successful contesters a good opportunity should arise at the HF Convention on 7/9 October next. The HFCC is organising a contest college which proposes to cover a number of subjects including computer logging and good antennas for the inter-G contests.

If you put up a big antenna system, you have to be prepared for a little more maintenance than average! Here's what was left of G4WFR's 8 x 9 elements for 2m after the head-unit came off the tower in the Easter storms.

QSL

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

PLEASE NOTE that Mr J M Bruce, GI4SJB, has now given up the position of Sub-Manager for the GI Class B series and Mr A Barr, GI7FFF, is the new Sub-Manager for *both* the GI Class A and GI Class B series.

Peter Chadwick, G3RZP, whose wife is a long-suffering QSL Bureau Sub-Manager, tells me that it is all very well numbering envelopes and putting 'last' on one but having to sort envelopes as well as cards merely adds to the workload. Peter says they prefer to send envelopes in any order and put 'last' on themselves. So G4BAA to BZZ calls please note!

Peter also makes the valid point that if you don't get many cards via the bureau then it's pointless sending six envelopes with 19p stamps on them. By the time they have been used up the postage rates will have gone up! It is best to use stamps designated '1st' or '2nd class' because they will never go out of date.

I took a trip down memory lane in June and joined about 300 others to celebrate a unique occasion - the largest gathering of professional wireless operators in this country. It was probably the last reunion of Air Signallers and Air Electronic Officers trained at Number 1 Air Signallers School, RAF Swanton Morley, between 1947 and 1957. I graduated from there in 1953 and have fond memories of the place and the professionalism it stood for. The station is to close down next year as part of the defence cuts and so an era will end.

To commemorate the event the Norfolk RAFARS Group set up a special event station, using the callsign GB1ASS, so I took my Vibroplex key along with me and worked a few QSOs. The QSL card produced for the occasion is shown on this page, and the Air Signallers prayer is printed on the back of the card. It reads: "In days of old, when W/Ops were bold, and sidebands not invented, the word would pass by pounding brass, and all were well contented. Amen".

Tony Timme, G3CWW, has written me to ask whether, following the break-up of the Soviet Union, it is still worth collecting cards for Oblasts. I must confess I don't know but if anyone out there does please let me know.

Please remember that if you have any misgivings about the service provided by the Society's Central Bureau, or have suggestions as to how that service can be improved please let me know. I answer *all* letters by return and will be happy to try and help reconcile any problems.

QSL CARDS

OE1WHC TELLS me that the QSL collection housed at POB 11, A-1111 Vienna, Austria, is the world's largest with some 500,000 cards. The collection would welcome donations of cards from club stations, special event calls, uncollected cards from QSL Sub Managers (now there's a rich source!), DXpeditions and individuals. In fact they will take any type of QSL cards from anyone willing to donate them! They store them, index them and keep extensive archives which are made available for research and exhibitions. More details available from the 'QSL Collection' via packet OE1WHC @ OE1XAB AUT.EU. They would be delighted to hear from you.

I am very often asked how soon to expect acknowledgements after sending out QSL cards. I normally consider that twelve months is not unusual but Paul Pasquet, G4RRA, one of our QSL Club Managers, has sent me a card just received by him for distribution that underlines the fact that patience is a virtue. It is for a QSO between KA1NA in the Philippines and G5CU (sadly, now a silent key). The QSO took place on 14 November 1933!

QSL BUREAUX

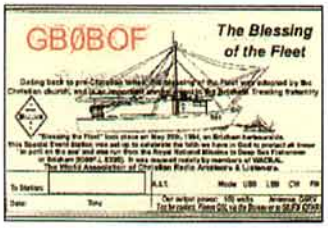
I HAVE RECENTLY received a long letter from the President of the Krenkel Central Radio Club in Moscow (CRC). Basically, it says that, despite the disintegration of the USSR administratively speaking, the majority of radio amateurs "are under the CRC" (whatever that means!) and goes on to say that the CRC is still very much in business. The President says PO Box 88 is still going strong and dealing with cards to all radio amateurs "irrespective of whether they are CRC members or not". I'm bound to say that we at the Bureau haven't seen much evidence of PO Box 88's activity just lately, with just a trickle of cards getting through to us. We get the odd parcel but nothing approaching the number of cards we received prior to the break-up. So it's all a little confusing really. Watch this space for any more developments. You may rest assured that if we get cards in we sort them and send them out. I can happily report that there is no backlog of cards, incoming or outgoing, at the RSGB Bureau.

Continuing the 'QSL bureaux of the world' series, the Dutch national bureau is situated at Arnhem and I am grateful to F v d Kraan for telling me all about it. The bureau handles about 1,000,000 cards per year utilising a staff of seven, working a mixture of part-time and full-time. Most of the staff are disabled. The QSLs are sorted manually into boxes that will hold about 400 cards. For QSL purposes The Netherlands is divided into 50 regions with each region having a QSL sub-manager who receives a parcel of cards from the central bureau in Arnhem every six weeks.

The biggest problem for the Dutch QSL bureau is finding somewhere to send cards destined for countries with no QSL bureau. This is a recurring message from all national bureaux and underlines the necessity for cards to bear explicit 'routeing' information on them. It really does help your cards get to the right place if a route is marked clearly on the card. The bureaux have more than enough to do without trying to play Poirot!

The attractive Hearts of Oak Award which is sponsored by the Royal Naval (Ulster) Amateur Radio Club.

This QSL card for a QSO between KA1NA and G5CU took 61 years to arrive - where has it been?



Derek Chivers, G3XNX, sent this card commemorating the pre-Christian ceremony of the blessing of the Fleet. The special event station, GB0BOF, operated from Brixham by members of WACRAL.

The special QSL card issued to commemorate the reunion of Air Signallers and Air Electronic Officers from Number 1 Air Signallers School.

AWARDS

ALEX MILLER, GI4SFV, reports that the Royal Naval (Ulster) Amateur Radio Club is sponsoring the 'Hearts of Oak' award, a copy of which is shown on this page. Requirements are ten QSOs with RNARS members, three of which must be with committee members of the RNUARC. Club call is GI0URN and the committee members' calls are GI4XFR, GI3NQH, GI4SFV, GI3XHL, GI4CUV and GI0PCU. Contacts can be on any mode, any band or mixed but only once per band, and is open to any licensed amateur or SWL. Cost is £2 or 5 IRCs and all contacts from 15 June 1993 are valid. Further details from Alex at 21 Marmont Drive, Belfast BT4 2GT.

SWL NEWS

BOB TREACHER BRS 32525
93 Elibank Road, Eltham, London SE9 1QJ

CONDITIONS IN general during the early part of June meant that listeners had a tough time locating some DX interesting enough to report on. The bands were in extremely poor shape; 21, 24 and 28MHz were devoid of signals during most of the day, but 21MHz provided some African DX between 1500–1700 UTC on some days. 24 and 28MHz gave some strong European signals via Sporadic E, but it was very much a case of being in the right place at the right time.

Looking at 18 and 14MHz – again, conditions were quite poor. There was DX on both bands, but the best time to have monitored the bands was later in the day. Indeed, 18MHz provided PY0TUP, VP8GAV, 9G1WJ and 9Q5CM between 1700-2000 UTC.

Looking briefly at happenings of the period, the Italian (ARI) contest produced lots of activity and a good number of Italian Provinces were heard; the CQ-M contest seemed poorly supported but many new prefixes were on offer for prefix chasers. This was also the case on 17 May when the EG prefix was used for ITU Day. Stations active included EG8ITU (QSL via EA8BGY) and EG9ITU (EA9TQ).

FIRST FIRTH WEEKEND

THIS INTERESTING weekend will soon be upon us – remember last year when many northern lighthouses were active. This year, the activity will centre on activity from Scottish Firths. Once again, eleven stations will be active from 0700 UTC on Saturday 27 August to 1800 UTC on Sunday 28 August. The stations to look for are shown in **Table 1**.

AWARDS

There will be two awards this year (The Basic Award was featured in the May *SWL* column). The Basic Award is available for hearing seven (UK) or four (outside the UK) stations. The Merit Award will be awarded to any SWL hearing ten of the stations (this award will feature a gold rosette with ribbons). The best band for hearing the stations will probably be 7MHz.

To claim the awards simply send a log extract with £2 or 5 IRCs to First Firth Weekend, PO Box 36, Prestwick KA9 1AL. I hope that the activity prompts many award claims – last year over 250 were received. Good luck.

50MHZ ACTIVITY

EACH YEAR I TRY to tempt more listeners on to this fascinating band, but my exaltations always seem to fall on deaf ears. It does not take much cash to get onto the band; all you will need is a receiver that covers 28MHz, a 28 – 50MHz converter (see *RadCom* April '93 p29) and a simple wire dipole approximately 9.5ft in length.

During the Sporadic-E season, this equipment will enable you to hear stations all around Europe, and the Near East, Africa, the States and Canada when the band is open. Branching out onto 50MHz would mean that you would not simply rely on trusty 14MHz to provide your listening interest.

For those who already devote much of their summer listening time to this band, the season to date has provided some interesting DX.

5T5JC was heard, mainly during morning hours; the UK Six Metre Group DXpedition to Jordan – JY7SIX – was heard between 0530-1930 UTC. OD5SK, EA8ACW, CN8ST and 9K2USA were also heard. Several double hop openings 'across the pond' occurred and during the one on 15 June, the K0SN/CY9 DXpedition was heard at 2232 UTC – really good DX for 50MHz!

European activity was interesting, however, and 14, 15, 17, 18 and 19 June saw Sporadic-E conditions around much of Europe. Some of the more interesting contacts were CT1DVV (IN50), SP9SDF (JO90), SV1EN (KM18), T70A (JN63), EH6SA/P (JM19), SV9ANK (KM25), SM/OH2BFN/M (JO69), IA5F (EU028 – JN52).

Mick, BRS31976, provided some interesting comments. He felt the 14th had been the best day for Es conditions as he bagged three new countries (JY, T7 and SV9).

He did not find conditions too good on the 15th, remarking: "rail strike day. I drove to work early and left by 1430. Was home at 1600. Needless to say, the band was dead!"

144MHZ

THE FIRST Sporadic-E event of the year monitored by British listeners occurred on the evening of 22 June. David Whitaker, BRS25429, copied many CT and EA stations, but the prize catches were copying CN8ST and CN8HB for a new country and two new squares.

Here in London, no CN8s were heard, but CT1FAK (IN50) and EA4EHI (IM68) were new squares. The opening lasted about 40 minutes.

WHITE ROSE LF CONTEST

A FURTHER 37 listeners took part in this event. Logs were received from 10 countries. The winner of the SSB section was another Belgian SWL, George de Baets, ONL3647, while the CW prize went to Veit Pelinski, DE1VSP.

In the SSB section, David Whitaker was fourth, while six other British listeners, including yours truly, finished in the first ten. Robert Small entered the CW section of this one and came home in second spot. Two British amateurs provided check logs. It is good to see our licensed colleagues joining in an SWL event – long may it continue!

Entrants (and the adjudicators) of both events had trouble with the new Russian prefixes. Some entrants even amended contest logging programs only to find that some stations were using their old prefix allocations! Another difficulty was the logging of stations using the TA1 prefix being counted as Asia. For information, stations using TA2 can correctly be logged as being 'Asian'. Again, the results are given in full. Hopefully, these events next year will attract a total of over 100 entries. Have a 'go' yourself – the rules of both events are quite simple.

CALLSIGN	LOCATION
GB2FC	Firth of Clyde
GB2FF	Firth of Forth
GB2FL	Firth of Lorn
GB2FM	Moray Firth
GB2FT	Firth of Tay
GB2FW	Wide Firth
GB2BF	Beauly Firth
GB2CF	Cromarty Firth
GB2DF	Dornoch Firth
GB2PF	Pentland Firth
GB2SF	Solway Firth

Table 1: Lighthouse stations operating for the First Firth Weekend 27 – 28 August.

FINALE

AS THE COLUMN is now prepared on a PC, the deadline for contributions is later. The next two copy dates, for **October** and **November** columns are, therefore, **17 August** and **14 September** respectively.

WHITE ROSE ARS SWL LOWER FREQUENCY BANDS CONTEST

			40m	80m	160m	Total Points
SSB Section						
1	Geo de Baets	ONL 3647	22631	13500	–	36,131
2	Antero Haarala	OH2 612	5214	15163	630	21,007
3	Jozef Marcincak	OM3 0001	6720	10763	1368	18,851
4	David Whitaker	G–10058	2464	14136	1440	18,040
5	Frank Cokayne	BRS 94781	1220	15390	990	17,600
6	John Martin	G–SWL	7872	8944	168	16,984
7	Paul Crankshaw	GM–SWL	4824	8640	1320	14,784
8	Bob Treacher	BRS 32525	5495	6357	230	12,082
9	Paul Davies	BRS 95258	893	12220	60	13,173
10	Norman Henbrey	G–11195	1896	7788	817	10,501
11	Lambert Wijshake	NL–10175	5365	4932	190	10,487
12	J–J Yerganian	ONL 383	2856	6149	–	9,005
13	Reg Akhurst	G–11303	2565	5436	686	8,687
14	Heinz Tank	DE7TXL	1638	5440	–	7,078
15	Olaf Reinhold	DE20LI	–	6160	160	6,320
16	Ari Riikonen	OH5 202	162	5220	–	5,382
17	Arthur Miller	G–5218	810	4340	–	5,150
18	Mark Nogent	F–11734	2940	1264	6	4,210
19	Kenneth Burnell	G–20048	338	3520	99	3,957
20	George Hudson	G–20312	325	2652	341	3,318
21	Elmar Dilihardt	DE3BOR	816	2139	128	3,083
22	Sylwester Dulewski	SP9–4696KA	–	2080	–	2,080
23	I F Thorpe	G–16741	276	1632	–	1,908
24	Morice Stephane	F–10255	901	559	4	1,464
25	Ray Pyman	BRS 1257	198	1140	4	1,342
26	Bernard Wauthier	ONL–4505	408	273	–	681
27	Claire Treacher	G–SWL	66	126	–	192
28	Wolfgang Lohnert	OE–20272	24	160	–	184
29	Sacha Wagner	DL–SWL	98	18	5	121
30	Joan Treacher	BRS 62088	75	6	–	81
31	Martin Bendorf	DL–SWL	44	30	5	79
CW Section						
1	Veit Pelinski	DE1 VSP	12650	2828	120	15,598
2	Robert Small	BRS 8841	6578	1809	1250	9,637
3	Andre Schweitzer	F–SWL	6040	1188	1083	8,311
4	Gerd Schulter	DE1UCS	2910	1863	560	5,333
5	J Michel Berrier	F–SWL	544	504	88	1,136
6	Jari Rantapelkonen	OH3–007	153	153	405	711

Table 2: Results of the White Rose ARS SWL Low Frequency Bands Contest.

Novice Note Book

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

THE SUMMER IS THE TIME to be building and checking antennas. This simple circuit will enable you to do that. If the feedpoint of the antenna is the same as the coax cable feeding it then maximum power will be transferred to the antenna. So for 50Ω coax the feedpoint of the antenna should be 50Ω. It is often very difficult to achieve this so an Antenna System Tuning Unit (ASTU otherwise known as ATU or AMU) is used between the transmitter and the antenna.

THE ANTENNA BRIDGE

WHAT THIS CIRCUIT does is to show when the ASTU is correctly adjusted. If you look at the circuit in **Fig 1** you will see that R1, R2 and R3 are the same value - 50Ω. If R_x is also 50Ω and some RF power is fed from the transmitter, the RF voltage at the junction of R1/R2 and R3/R4 will be equal and no current will flow through R4. This circuit is referred to as a Wheatstone bridge and with no current flowing through R4 the bridge is known as 'balanced'.

When the ASTU is properly adjusted to match 50Ω, electrically it looks like a 50Ω resistor, so if we replace R_x with an ASTU the meter will indicate zero when the ASTU is correctly adjusted.

In Fig 1, R1, 2, 3 and the ASTU form the four 'arms' of the bridge. The transmitter is fed across the bridge and the detector is between points A and B and consists of R4, D1, C1, R5 and the meter. This is the simplest circuit but has the disadvantage of the meter being at half the RF potential of the transmitter due to being connected to the junction of the voltage divider formed by R1 and R2. But what if we connect the meter negative terminal to C instead of A. The detector is still reading the RF between points A and B but the DC current through the meter has to flow through R2 to point A to complete the circuit. This current will have no effect on the bridge and when in perfect balance there is no current anyway! This will form a perfectly functional circuit but a few refinements are well worth the effort in the long run.

The final circuit is given in **Fig 2**. This circuit, as I remember, existed before I was licensed in the early sixties . . . proof of a reliable design! D1, 2 and C1, 2 form a voltage doubler detector circuit, R4 has two functions, firstly to act as an RF filter using C2 and C3 for decoupling and secondly to limit the maximum current that can flow through the meter. R5 is used to adjust the meter to FSD (full scale deflection) when the ASTU is detuned and full Tx power applied, as the ASTU is brought to resonance the reading will reduce to zero.

Why do we not see this circuit more often? Well, it has some drawbacks. Due to the difficulty of maintaining capacitive balance as the frequency increases it is really only suitable for HF use. Also the circuit has to be switched out of the antenna line after tuning up otherwise the Tx signal will be attenuated and harmonics will be generated by the diodes; these must not be radiated. In addition to this the resistors must all be low inductance types and R1, 2 and 3 must be capable of dissipating the Tx output power. In its favour its cost is very low and is easily constructed on the back of the 'in/out' switch and is ideal for the Novice/QRP power levels.

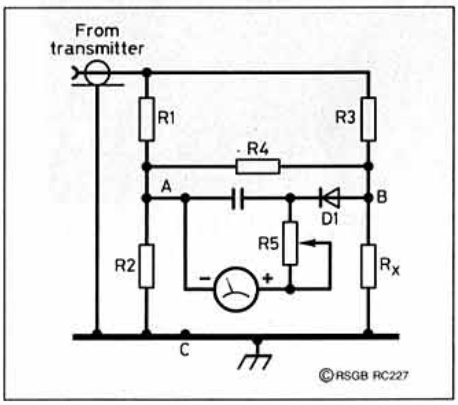


Fig 1: Theoretical circuit of the antenna bridge

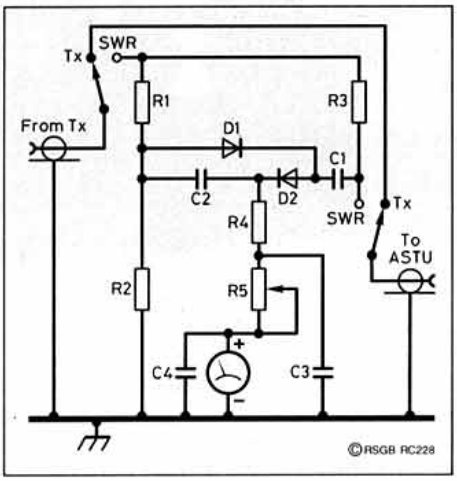


Fig 2: Practical circuit of the antenna bridge

COMPONENTS LIST

Resistors

R1, R2, R3	30R 2W carbon
R4	2k2
R5	37k preset pot

Capacitors

C1, C2, C3, C4	0.1µF disk ceramic

Semiconductors

D1, D2	OA91 or equivalent

Additional Items

Meter	100µA FSD
Switch	two-pole two-way

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RADCOM TECHNICAL FEATURE

Evaluation of the G2AJV Toroidal Antenna

By *RadCom* Technical Editor, Peter Dodd, G3LDO

THE TOROID ANTENNA, proposed by Roger Jennison, G2AJV, seemed so radical that a model was built to examine its viability before the article [1] was published. Since then there has been much interest (and scepticism) regarding these antennas so the tests were extended. This article is a description of construction and tests on the first prototype and subsequent models of these toroid antennas.

The theory of how toroid antennas work is discussed further in [1] and on this month's *The Last Word* pages.

You may question the emphasis on mobile versions of this antenna, considering the complex structure of the toroid. The reason is that I have a mobile HF rig in the car and I work away from home during the week. Additionally my bedsitting room is an eminently impractical place for experimenting with these HF antennas (small as they are).

Although this mobile experimental work has been very successful it does not imply that I consider that the antenna configurations described are necessarily the best solution for amateur mobile operation.

Initially I made a single loop toroid for 14MHz band, as shown in part one of [1]. This model was unsuccessful, possibly due to poor construction [see Note 1]. I discussed the problem with Roger Jennison, and he suggested that an end-fed double toroid, similar to the one he had proposed for mobile VHF operation, would be less critical.

I then tried the double toroid VHF antenna as described in [1]. It was fixed to my car using a mag-mount but the SWR was too high to be of any use. I then tried several models and at the third attempt found one with an acceptable SWR. This tiny antenna did work and bandwidth was relatively wide. Signal strength readings from repeaters in range of Potters Bar varied between 0.5 and 2 S points down on a quarter wave vertical. I had difficulty defining why the final model had a greater measure of success than the two previous ones.

I felt that an HF double toroid would allow me to investigate the matching problem because the physical parameters of a larger structure could be measured more easily.

In all, I made three HF versions of the Double Toroid Antenna.

- The Mk1 (14MHz) was used to investigate the double toroid feasibility.
- The Mk2 (14MHz) was built specifically for obtaining data on the original design.

- The Mk3 (21MHz) was built to investigate construction methods different from the Mk1 and Mk2.

THE MARK 1 TOROID

A DIAGRAM OF the Mk1 14MHz toroid mobile antenna is shown in **Fig 1**. It was constructed from hard-drawn 16SWG antenna wire, supported in a cylindrical cage made from *white* plastic garden fencing, using plastic tie-wraps. The construction of the complete antenna is shown in **Photo 1**. The structure was mounted on a metal plate, which in turn was fixed to a four footed magmount (see 'Antenna Mounting' later).

The toroids were constructed separately and joined together when installed in the plastic support. Each toroid was constructed by winding approximately a quarter wavelength of wire on a two-inch diameter plastic former, then removing it from the former and looping the coil into a toroid. The ends of the toroid were held together with ceramic insulators made from old air-spaced capacitors with most of the metal parts removed. Each toroid was adjusted so that it was 8in (200mm) in diameter, by tensioning it to the plastic frame using the plastic tie-wraps. Note that the direction of winding for the top toriod is opposite to the bottom one.

Initially, the lowest SWR at resonance was around 5:1 and no amount of playing around with its physical dimensions made much difference to this SWR figure. Preliminary impedance measurements indicated a feed impedance of around 5Ω at resonance. Additionally, I had not put enough turns on the toroids (28 turns) and the resonant frequency was about 500kHz too high.

I built capacitors from tin lids and fixed them to the ceramic insulators across the toroids, to bring the antenna into resonance into the 14MHz amateur band. I later found that only one capacitor was required, across the lower toroid as shown in **Fig 1**.

To match the antenna to the feeder I used a well tried technique for matching low impedance antennas; I built a shunt feed arrangement and aimed for the correct impedance by tapping up the coil. The inductive reactance of the shunt feed was neutralised with a series 100pF capacitor.

Now, at last, things started happening and strong signals where heard on the mobile transceiver when this antenna was connected to it. The antenna proved easy to load and the first short skip QSO reports ranged from 5/5 to 5/9. My first SSB DX contact was a reply to my CQ, from VK6ADP in Perth. Although

I stayed with Bert Weller, WD8KBW, during a visit to the USA. It transpired that Bert had worked with James Corum, K1AON, the holder of a the patent on the toroid antenna. We arranged a meeting at the Dayton Hamvention and talked antennas for a couple of hours. From left to right: K1AON, G3LDO, WD8KBW.

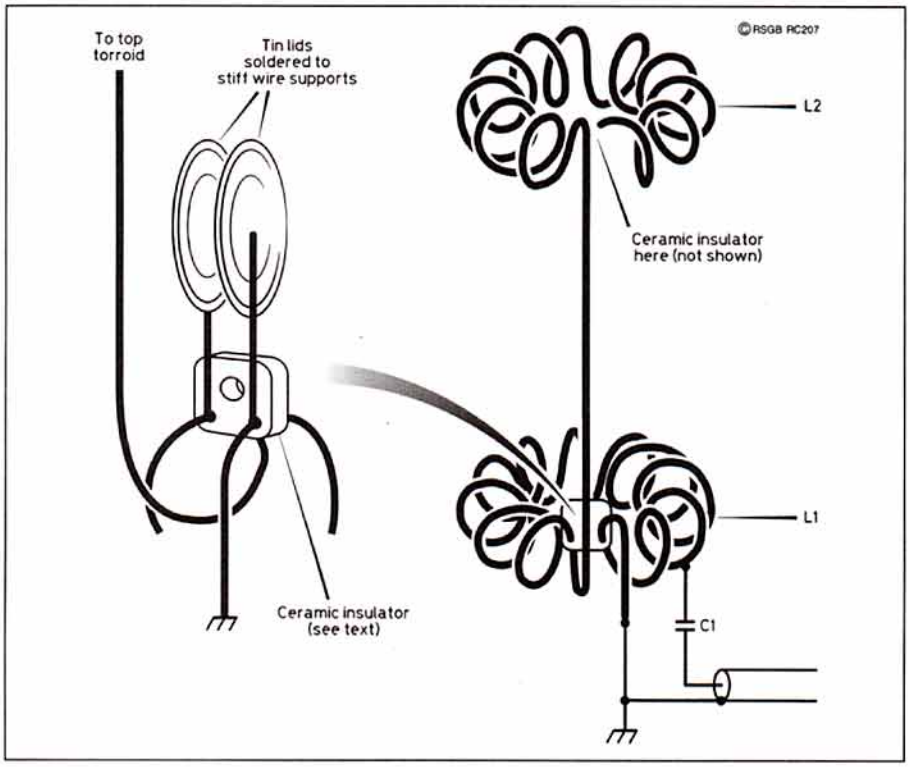


Fig 1: Mk 1 double toroid antenna using shunt feed and parallel capacitor tuning.

my signal report was only 5/1 the band was quiet and we were able to chat for around ten minutes.

The measured SWR bandwidth of this antenna was found to be rather narrow (see **Fig 2**) and I felt that this was due to the capacity across the lower toroid. In a further conversation with G2AJV he suggested the capacity would reduce the efficiency of the antenna and that I should persevere with the series fed arrangement. He also said that matching could be improved by going for a lower resonant frequency of the antenna by adding a couple of turns to each of the toroids and end feeding via a variable series capacitor. On the question of coarse tuning the resonance of the double toroid, G2AJV suggested scraping some of the insulation off the outside loop of two adjacent turns of the toroids and tinning with solder. A shorting link could then be added to increase the resonant frequency without, apparently, affecting the performance of the antenna.

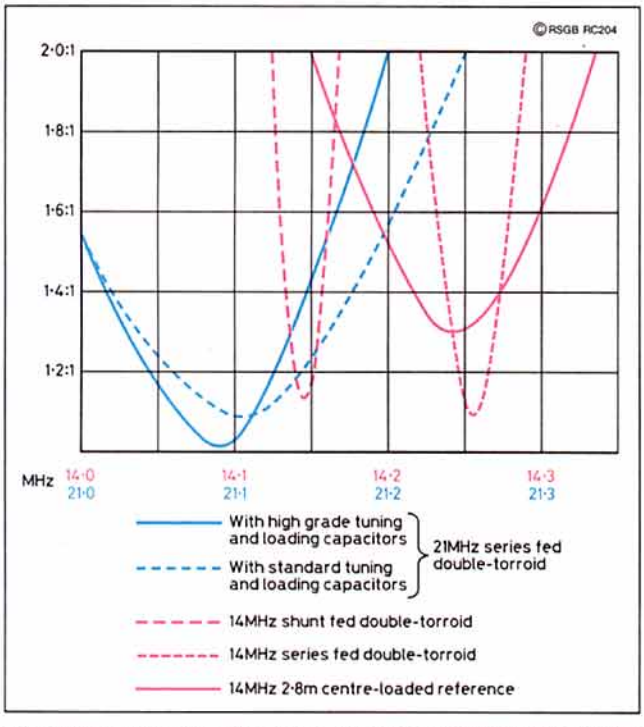


Fig 2: SWR curves of the Mks 1, 2 and 3 antennas together with a 14MHz reference antenna.

THE MARK 2 TOROID

I THEN BUILT the Mk2 double toroid antenna as shown in **Photo 2**. Because this antenna was designed for obtaining data it was constructed so that most parameters, such as the distance between the toroids and the inductance of the toroids were variable. Each toroid was constructed from 30 turns of 16SWG enamelled insulated wire [Note 2] and the construction of the antenna was almost the same as for the Mk 1. The diameter of the Mk2 toroids was 6in (150mm), smaller than the Mk1. The reason was that the Mk 1 elements were made from uninsulated copper wire and it was important that the adjacent coil loops did not touch. Two sections of a plastic terminal block were used to support the ends of the toroids.

I connected the antenna to the coax exactly as shown in [1]. As with the Mk1 version it would not load. The reason for the high SWR at resonance became plain when I made an impedance plot. The feed impedance was found to be around 5Ω at resonance as shown in **Fig 3**.

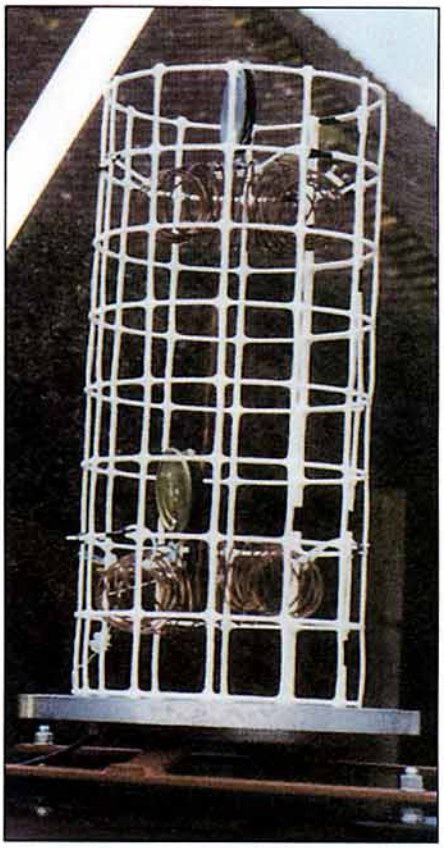


Photo 1: Mk 1 shunt fed antenna (14MHz) fixed to a four-footed mag-mount.

A series variable capacitance was added as suggested by G2AJV. This did alter loading slightly although it affected the resonant frequency far more.

I decided to try a shunt capacitor – a method sometimes used to match a conventional loaded mobile whip antenna. With this

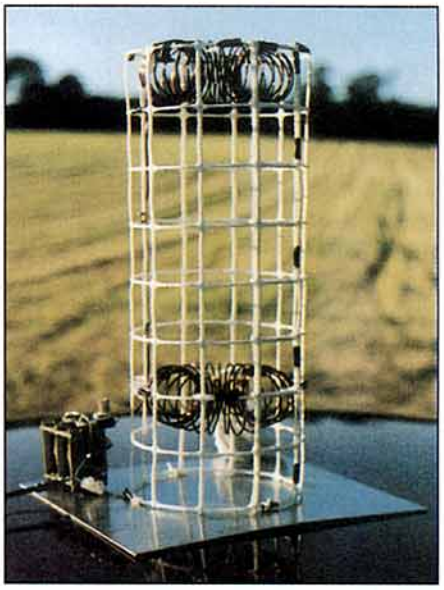


Photo 2: Mk 2 series fed antenna (14MHz) using home made mobile roof mount. The clamping magnets not shown.

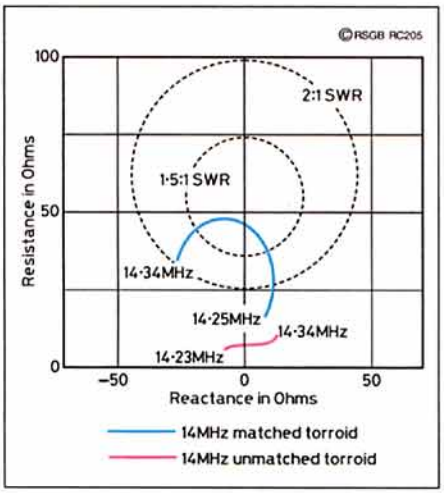


Fig 3: Impedance signatures of the series fed double toroid, with and without capacitor matching and tuning capacitors.

matching arrangement the antenna is made than an electrical quarter wavelength to increase the radiation resistance.

With the series 50pf variable capacitor C1 the impedance is around 5 + J24Ω. A shunt 1000pf varible capacitor C2 can then be used to bring the impedance close to 50 J0Ω.

The final matching and tuning arrangement is shown in **Fig 4**. The series capacitor (fine tuning) and parallel loading capacitors are variable, enabling the antenna resonance and the matching to be adjusted and set quite easily. The impedance plot of the matched 14MHz double toroid antenna is shown in Fig 3 [see Note 3]. This is confirmed by the SWR plot of the series tuned double toroid shown in Fig 2.

The base of this antenna and the method of connecting it to the car is described under 'Antenna Mounting'.

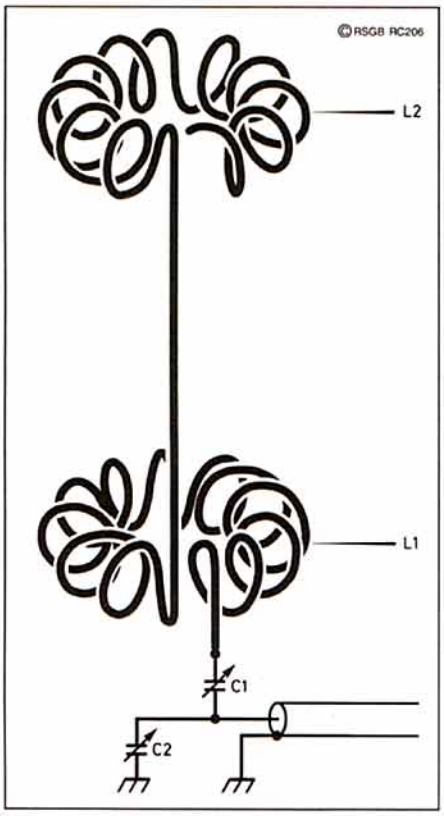


Fig 4: Mk 2 double toroid antenna using series feed, shunt capacitor matching and series tuning.

MK 3 TOROID

THE Mk3 WAS USED to investigate construction using different materials and conductor diameters and to see what effect this would have on antenna performance. At the local scrap yard I searched for suitable copper tubing but was out of luck. However, I found among the scrap electrical cable some material called Pyro, mineral insulated electrical wire. This material has an outer copper tubing sheath with inner conductor wire(s) in magnesium oxide. It is easy to bend and shape and seemed a promising material for the toroid antenna. It comes in various diameters and I used 3mm for the Mk3 double toroid for 21MHz. Pyro turned out to be excellent material for winding coils. Because the copper tube sheath is filled with oxide material it can be bent into shapes having a small radius without the tube kinking.

The Mk 3 toroid was constructed for 21MHz, rather than 14MHz, by accident rather than design. I only had enough pyro material to make a 21MHz model!

This antenna is shown in **Photo 3**. The coils of the toroid are self-supporting with a resonant frequency of around 20MHz. Fixed silver mica capacitors were used for the series tuning and parallel loading capacitors; their values, 18pF and a 150pF respectively. These values were extrapolated from the experimental work on the Mk2 antenna. This 21MHz antenna worked straight away; it was resonant at 21.2MHz and the SWR was less than 1.7:1.

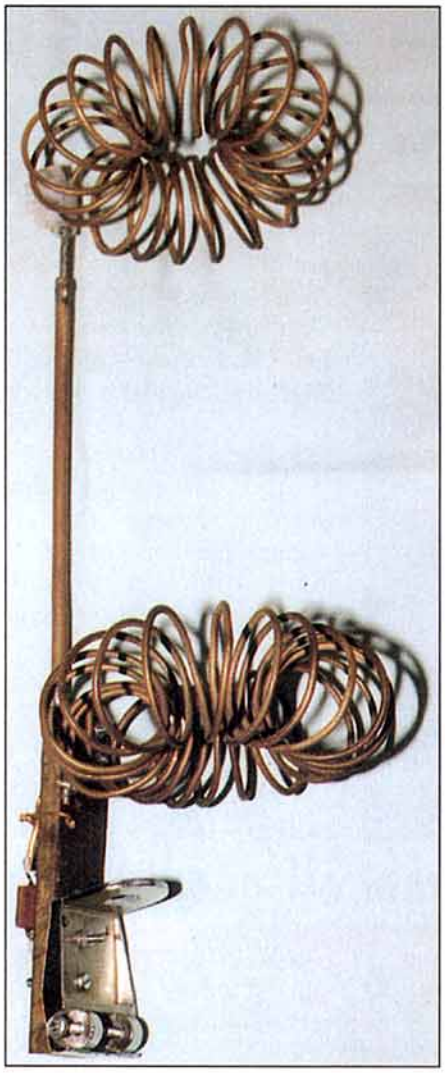


Photo 3: Mk 3 self-supporting structure (21MHz) fixed to a gutter mount.

As can be seen in Fig 2 the bandwidth of this tiny antenna seemed suspiciously wide, implying losses. I assumed that it was being caused by the relatively lossy tuning and matching fixed capacitors. These were replaced by higher grade capacitors. I used an air spaced 50pF variable as the series tuning capacitor and a fixed 180pF Steafix fixed capacitor for parallel loading.

This allowed the SWR to be adjusted to a lower value at resonance and produced a slightly narrower bandwidth, see Fig 2. There was no real noticeable improvement in the antenna performance. The conclusion is that the wider bandwidth is the result of using a larger gauge material in the construction of the toroid, although more experimental work is required to verify this.

ANTENNA MOUNTING

THE WAY IN WHICH these antennas were mounted on the car had a profound effect on their tuning and loading. G2AJV's HF models used magmounts. A magmount introduces capacitance between the earth point of the antenna (and the coax screen) and the body of the car. This capacitance may not be significant at VHF but with a low impedance feedpoint HF antenna the results will be unpredictable. One of these unpredictable effects is that there are antenna currents on the feedline. Even with the Mk1 antenna, with its large four-footed magmount, performance was improved with a direct earth connection.

The 21MHz antenna was fixed to the car using a antenna gutter clamp. To get the best antenna/earth connection to the car I scraped away the paint down to bare metal under the clamp and coated the area with grease to prevent corrosion. This earth point then served as a low resistance point for all other antennas tested and proved useful for testing the effectiveness of magnetic base clamps for HF antennas.

Those of you who may be horrified that I should have treated my Vauxhall car in such a cavalier fashion [how else – *Ed*] can rest assured that I have developed a much more car friendly antenna mounting system. This is made of a sheet of aluminium – theoretically the larger the better. My Mk 2 antenna uses one of these mounts and it is shown in Photo 2. Construction is as follows:

Eight holes are drilled in the base plate in groups of two. The metal between the holes is lifted so that tie-wraps can be inserted to fix the plastic cage to the base without touching the roof of the car.

A hole is drilled for the earth point, which should be close to the antenna feedpoint when the antenna is assembled. The hole is countersunk so that the head of the earthing bolt is flush with the bottom of the base.

The outside edges of the base, facing the roof of the car, is faced with strips of plastic tape to prevent the base scratching the roof of the car. Magnets, with plastic sheet protec-

continued on page 37 ▶

EVALUATION OF THE G2AJV TOROIDAL ANTENNA

continued from page 35

tion, can be used to hold the base in place and reduce the base/car roof capacity.

As I have already said the base has some effect on the antenna tuning. I tried the Mk2 antenna fixed and earthed to the aluminium frame of a greenhouse. The antenna resonant frequency had shifted from 14.2 (when fixed to the car) to 14.8 MHz, although its performance was good when the antenna was retuned.

ANTENNA PERFORMANCE COMPARISONS

I MADE SOME COMPARISON signal strength tests of the 14MHz toroid antenna using an 8ft (2.5m) home made centre loaded vertical as a reference. This antenna has a lower section constructed from 22mm copper tubing and the air-spaced loading coil 3in (760mm) in diameter. This reference antenna was fixed to the rear of the car, level with the bumper, with a good earth connection to the car chassis for the coax braiding.

The Mk 2 toroid was fixed to the roof, as already described, and both antennas remained in place during the tests. I reasoned there would be little interaction because the unused antenna is detuned as the feeder is disconnected from the transceiver (load) when the antennas are changed over. (the feeder was not a multiple of a quarter of a wavelength at the test frequency).

Short skip contacts to Europe were inconclusive; sometimes the vertical antenna outperformed the toroid and other times toroid was the better performer.

I then tried ground wave tests with GB3RS, the RSGB HQ station. At distances of between quarter and half a mile away from RSGB I transmitted a carrier, carefully monitored on a power meter. John Crabb, G3WFM, the senior station operator made measurements using the S-meter on the IC781.

Most of the measurements gave the vertical a 0.5 to 1 S-point advantage. The exception was when the car was facing the HQ station, when the toroid antenna had the 1 S-point advantage.

Some DX contacts worked using these toroid antennas are shown in extracts from my mobile log book, see **Fig 5**

CONCLUSIONS

THE DOUBLE TOROID design appears to work very well once the problems of matching are overcome. The implications are that the G2AJV design is particularly useful for low band HF, particularly where space is at a premium.

Because the antenna works so well, and has a reasonable bandwidth, there is a suspicion that it violates the principles established by H A Wheeler [2] and L J Chu [3] [see Note 4]. This principle states that the bandwidth as a fraction of the frequency of interest cannot exceed a constant times the volume of the sphere (expressed in units of wavelength cubed) in which the antenna can be contained, no matter what shape the antenna is or what material it is made from.

However, it is highly unlikely that the double toroid does violate these principles. In a European Patent Application EP 0 043 591 Al on a toroidal antenna, [see Note 5] made by James Corum, K1AON, of West Virginia, USA (brought to my notice by Pat Hawker, G3VA,[4]) it was claimed that the basic principle of toroid antennas "by virtue of their construction possess a greater radiation resistance than known antennas of similar electrical size not having the slow-wave winding features possess greater radiation resistance and radiation efficiency than loop antennas of similar size".

AREAS FOR EXPERIMENTATION

THERE ARE A NUMBER of areas where the additional experimenting would be useful and interesting. An analysis of toroid antennas, using the MFJ-249 antenna analyser, indicates that there are higher order resonances. The third resonance looks promising because of its wide bandwidth, although the performance as an antenna in this mode is so far unknown.

Other unknowns regarding toroidal antenna performance are: the ratio of series capacitor to inductor, capacity of the base to earth, spacing of top and bottom toroids and the diameter of the toroids. The effect of earth on an end fed double toroid also requires more investigation.

21/4	1745	PP5AVM	21016	559	559	90W	A1	SM	San Francisco Island	QSL VIA PP5LL	T2
"	1755	PY2NFE	21034	569	579	"	"	SM	Sao Paulo	Ron	T2
"	1948	PZ1DY	21026	539	579	"	"	SM			T2
"	2000	VP2MCO	21016	579	559	"	"	SM		Harry QSL VIA AA6WC	T2
22/4	0635	VK3ARC	14062	539	539	"	"	SM	Melbourne	Rob	T1
	0700	VK1FF	14033	449	549	"	"	SM	Dipole Ant Canberra	Jim	T1
	0725	VK2ALH	14055	519	529	"	"	SM		Les	T1
15/6	2055	LU9ELU	21045	559	579	"	"	PB	BA	Ric	T
"	2110	LW3DGE	21019	529	529	"	"	PB			T2
16/6	2045	9Y4VU	21012	559	579	"	"	PB			T2

Fig 5: Extract from the mobile log during the period of tests on the double toroid antenna.

NOTES

1. G2AJV, in further correspondence regarding my experiments using toroids wound on ferrite rings, comments that a toroid wound on a ferrite ring will only be one hundredth as effective as an air spaced toroid.
2. Various sizes of large gauge enamelled copper wire can be obtained from AA&A Ltd, Sycamore House, Northwood, Wem, Shropshire SY4 5NN.
3. The method of producing these impedance plots using a computer, plus experimenting with, and measurements of, antennas generally is described in *The Antenna Experimenter's Guide,* available from the RSGB, see page 94.
4. Copies of these documents are available at RSGB HQ for viewing only. We are unable to provide photocopies because of copyright restrictions.
5. The James Corum patent on the toroid antenna is available from The British Library, Science Reference and Information Service, 25 Southampton Buildings, London WC2A 1AW; enclosing a cheque for £10 and quoting Patent Application EP 0 043 591.

ACKNOWLEDGEMENTS

TO BERT WELLER, WD8KBW, for arranging the meetings with the Batelle Radio Club and James Corum, K1AON, and for locating the original papers by Harold A Wheeler and L J Chu, see [2] and [3] below.

To James Corum K1AON, for supplying additional information on his toroid antennas.

To Batelle (industrial research company), Columbus, Ohio, USA, for access to their comprehensive technical library.

REFERENCES

[1] 'The G2AJV Toroidal Antenna', Roger Jennison, G2AJV, *Radio Communication*, April and May 1994.

[2] 'Fundamental Limitations of Small Antennas', Harold A Wheeler, *Proceedings of the IRE*, December 1947 (see Note 4).

[3] 'Physical Limitations of Omni-Directional Antennas', L J Chu, *Journal of Applied Physics*, Volume 19, December 1948 (see Note 4)

[4] 'Toroidal Helix Antennas', Pat Hawker, G3VA, *Technical Topics, Radio Communication*, June 1994.

Turn to this month's *The Last Word* for correspondence on the toroidal antenna.

RADCOM USER REVIEW

Propagation Prediction Software

Don I Field, G3XTT, looks at IONSOUND

TO ACHIEVE SATISFACTORY results on the HF bands, whether in DXing, ragchewing or contesting, requires an understanding of ionospheric propagation. Over the years an HF operator will gain a fair idea of propagation patterns to different parts of the world but, as with the weather, it is handy to be able to predict more accurately than by experience alone. The tables which appear monthly in *RadCom* are useful, but have to be prepared well in advance, in other words without an accurate knowledge of what the solar flux (the main determining factor) will be at the time they appear. Also, it is impossible for them to cover every possible propagation path.

PROFESSIONAL SOFTWARE

THIS IS WHERE propagation prediction software can be useful. For many years professional propagation forecasters (for example, those planning schedules for a shortwave broadcaster) used tabular methods to predict propagation, but this was extremely time-consuming and, in due course, mainframe computer programs were written to speed things up. The best known, and still probably the most comprehensive and accurate, is the US Government's IONCAP software.

```
*************** W1FM IONSOUND, VER 4.00B ***************
*                       MAIN MENU                        *
**********************************************************
          CHANGE TIMES                              0
          CHANGE LOCATION(S) & S/L PATH             1
          CHANGE SUNSPOT/FLUX/EF LAYER HT           2
          CHANGE FREQUENCIES                        3
          CHANGE MONTHS                             4
          CHANGE MAJOR TX/RX VALUES                 5
          CHANGE MODES                              6
          CHANGE TX POWER                           7
          CHANGE MINIMUM ELEVATION ANGLE            8
          SWAP TX/RX LOCATIONS & S/L PATH           9
          CHANGE COLORS                             10
          ENABLE DOS (TYPE 'EXIT' TO RETURN)        11
          CHANGE E/F LAYER HEIGHTS                  12
          TABULATE TX/RX ANTENNA GAINS              13
          TABULATE ANTENNA LOBES/NULLS              14
          CHOOSE NEW LAT/LON/CTY FILE               15
          PRINT DISTANCE/BEARING TABLE              16
          EXIT IONSOUND                             17

   ENTER CHOICE: <DEFAULT=CHANGE TIMES: 0 OR RETURN>
```

A PC version of this software is available, but is extremely cumbersome to use; user-hostile would be a far better description than user-friendly. However, in terms of the accuracy of its forecasts, IONCAP is the standard by which others are measured.

AMATEUR SOFTWARE

THE MAJORITY OF us will be looking for something more straightforward and there are currently two real contenders, MINIPROP by W6EL and IONSOUND by W1FM, the subject of this short review. There are also a number of shareware and public domain programs, but most if not all of these are based on the basic MUF model (which only looks at the two ends of a propagation path, and not at intermediate reflections) and can therefore be somewhat misleading.

USING IONSOUND

IONSOUND RUNS ON IBM-compatible personal computers and, given that any sort of mathematical modelling places large demands on the computer, a maths co-processor is recommended. It is easy to install and run. The manual comes as a file on the disc which you can print out if you wish.

When you fire up IONSOUND it takes you through a series of menus asking you to specify a host of parameters from transmit and receive location, through antenna gain, solar flux and much more, to the date(s) and time(s) you are interested in. For many of these parameters there are simple choices and defaults (eg the location can be selected in broad terms, or there is a full list of DXCC countries to choose from). Once everything is specified you run the prediction to produce a table of signal strengths and a plot. The plot gives a visual feel for how the propagation will vary with time.

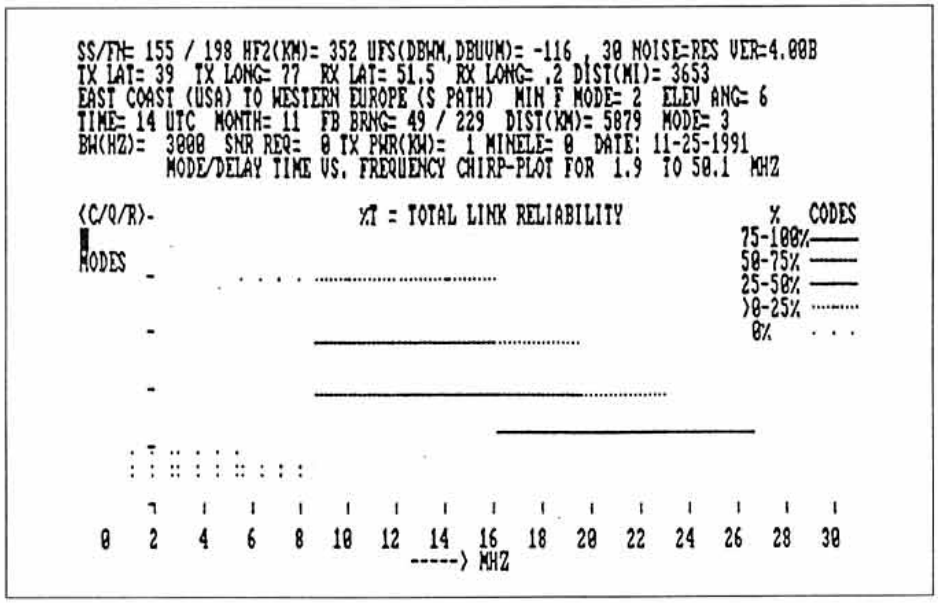
The table contains much more detail – received signal voltage and power, noise power, signal-to-noise ratio, percentage availability of the propagation path, etc. You can, of course, go back and recalculate after changing one or more of the parameters.

All this optimisation of input parameters suggests that the results will be reasonably accurate and, indeed, the author claims that the program draws heavily on the pioneering work of R Fricker of BBC External Services. I was therefore surprised at fairly significant discrepancies between some of the predictions given by IONSOUND and those produced by IONCAP and MINIPROP – for the same set of input parameters. The program ran very much more quickly on my PC than either of the others, which suggests that the algorithm perhaps isn't as advanced as is suggested by the manual. I also found the IONGRAMS (the graphical outputs) a little confusing in the way they use dots and dashes of different lengths to indicate different probabilities of a solid propagation path. Some thoughtful use of colour here would have been helpful.

Of course, propagation forecasting is almost as notorious as weather forecasting and, at

```
ENTER THE LETTER CODE FOR THE FOLLOWING TRANSMIT ANTENNA OR GAIN

1)  10 DB GAIN YAGI-UDA ARRAY (OVER GROUND):                        Y
2)  2.15 DB GAIN VERTICAL MONOPOLE (OVER GROUND):                   V
3)  5.2 DB GAIN HORIZONTAL OR VERTICAL DIPOLE:                      D
4)  7 TO 12 DB VAR. GAIN (1.8-30 MHZ) LOG PERIODIC & RHOMBIC:       L
5)  23 TO 28 DB VARIABLE GAIN (1.8-30 MHZ) CURTAIN ARRAY:           C
6)  -40 TO +40 DB: CHOOSE YOUR OWN ISOTROPIC GAIN:                  G
                     ENTER CHOICE <DEFAULT = 0 DB ISOTROPIC>:          Y

CHOOSE RX ANTENNA IDENTICAL TO TX ANTENNA: Y/N <DEFAULT = Y>         N


ENTER THE LETTER CODE FOR THE FOLLOWING RECEIVE ANTENNA OR GAIN

1)  10 DB GAIN YAGI-UDA ARRAY (OVER GROUND):                        Y
2)  2.15 DB GAIN VERTICAL MONOPOLE (OVER GROUND):                   V
3)  5.2 DB GAIN HORIZONTAL OR VERTICAL DIPOLE:                      D
4)  7 TO 12 DB VAR. GAIN (1.8-30 MHZ) LOG PERIODIC & RHOMBIC:       L
5)  23 TO 28 DB VARIABLE GAIN (1.8-30 MHZ) CURTAIN ARRAY:           C
6)  -40 TO +40 DB: CHOOSE YOUR OWN ISOTROPIC GAIN:                  G
                     ENTER CHOICE:  <DEFAULT = 0 DB ISOTROPIC>         D
```

Many parameters are definable when setting up Ionsound.



Screen print of Chirp Plot. This is the first of two screens.

the end of the day, the test is whether you can hear and work the station concerned. Typically, prediction programs underestimate the possibility of a path; amateurs can make marginal contacts (especially on CW) under conditions which a broadcaster would regard as totally unacceptable.

The real benefit of a propagation prediction program for most of us, therefore, is to give an idea of how, in broad terms, the MUF will rise and fall over a particular path as the day wears on. IONSOUND will certainly do this, and for a lower price than MINIPROP while offering more than public domain and shareware offerings. I do have some doubts about the accuracy of the predictions, and I was unhappy with the user interface – if you make an error in entering data it is not easy to go back and make a change, and there is no summary of the selections you have made. However, if you want to explore HF propagation at modest expense this program is certainly worth considering.

SOLAR DATA

TO RUN ANY PROPAGATION prediction program you need access to solar data. This is broadcast by WWV in the US, but is also carried by *GB2RS* and published weekly in the *RSGB DX News Sheet.*

AVAILABILITY

IONSOUND IS NOW available in three versions; IONSOUND HDX which covers only the locations used in the propagation predictions in the 'How's DX' column of *QST* magazine ($15), IONSOUND STD as reviewed here ($35) and IONSOUND PRO which has some additional features and comes with a printed manual ($75). Add $5 in each case for shipping. Orders should be sent to SkyWave Technologies, 17 Pine Knoll Rd, Lexington, MA 02173, USA. Send US cheque or International Money Order and remember to specify required disk size

APPENDIX

THE *ARRL HANDBOOK* compares five propagation prediction programs and the results are shown in the table. A report on IONSOUND (a slightly earlier version than our review copy) reads:

"IONSOUND V3.19 provides calculated data that one would not expect from a program of its price class. Graphs present mode chirp plots (frequency versus delay time versus intensity). These displays, simulating the results of oblique ionospheric sounding, may be unfamiliar to many amateurs. For each path calculation, the user must first answer several screens of questions, such as noise environment at the terminal points, receiver bandwidth, required S/N ratio, layer height, order of layer modes and so on."

Program Feature	ASAPS	IONCAP	IONSOUND	MINIMUF	MINIPROP
User friendliness	Good	Poor	Fair	Good	Good
Review data	Yes	No	No	No	Yes
User library of QTHS	Yes	No	No	No	Yes
Bearings, distances	Yes	Yes	Yes	No	Yes
MUF calculation	Yes	Yes	Yes	Yes	Yes
LUF calculation	Yes	Yes	No	No	No
Wave angle calculation	Yes	Yes	Yes	No	Yes
Vary minimum wave angle	Yes	Yes	Yes	No	Yes
Path regions & hops	Yes	Yes	Yes	No	Yes
Multipath effects	No	Yes	Yes	No	No
Path probability	Yes	Yes	Yes	No	Yes
Signal strengths	Yes	Yes	Yes	No	Yes
S/N ratios	Yes	Yes	Yes	No	No
Long path calculation	Yes	Yes	Yes	No	Yes
Antenna selection	Yes	Yes	Limited	No	No
Vary antenna height	Indirectly	Yes	No	No	No
Vary ground characteristics	Indirectly	Yes	No	No	No
Vary transmit power	Yes	Yes	Yes	No	No
Graphics displays	Herc/CGA	ASCII	Herc/CGA	No	ASCII
UT-day graphs	Yes	Yes	No	No	Yes
Color monitor support	Yes	No	Yes	No	No
Hard disk required	Yes	Yes	No	No	No
Save data to disk	Yes	Yes	No	No	No
Documentation	48 p	226 p	Disk file*	*QST* art.	56 p
Price class	$350#	$128 fee	$35	-	$50

Features and Attributes of Propagation Prediction Programs (reproduced from the *ARRL Handbook*).

Notes:

'Review data' indicates ability to review previous program display screens
Herc = Hercules/compatible; CGA is also compatible with EGA and VGA systems. ASCII uses characters such as .... and xxxx, no graphics card required
Price classes are for mid-1992 and subject to change
* 45-page printed manual available as an optional extra
# Australian dollars, equivalent to about $280 US at mid-1992 exchange rates.

THE PETER HART REVIEW

Kenwood TS-60S 50MHz Mobile Transceiver

KENWOOD LAUNCHED their TS-50S small HF mobile transceiver onto the market early in 1993. It was reviewed in this magazine in the May 1993 edition and today still remains as the smallest full power, fully featured HF transceiver available. A year later, Kenwood unveiled the TS-60S. This 50MHz transceiver is virtually identical in features and styling to the HF transceiver but covers just the 50MHz band with an output power of 90 watts.

50MHz really comes into its own for a year or two around sunspot maximum. Unfortunately we will have to wait another seven years or so for real ionospheric DX propagation to return, but during the Summer months, sporadic E propagation gives plenty of contacts up to 2000 miles or more with occasional US and African DX [see this month's *VHF/UHF News – Ed*]. It was indeed fortunate that I had this radio to review during a particularly lively period of sporadic E this Summer.

PRINCIPAL FEATURES

INCLUDED HERE IS A summary of the principal features. More comprehensive coverage of the features is given in the TS-50S review [1].

The TS-60S covers the frequency range 50 to 54MHz as supplied in Europe. However, a simple dealer modification enables the receiver to cover the range 40 to 60MHz as supplied in other parts of the world and this is particularly useful for monitoring Eastern European TV channels as a guide to band openings. The radio is 12V operated and covers USB, CW, AM and FM modes. LSB can also be selected.

The 33mm diameter main tuning knob tunes in 5Hz step size at low speeds (2kHz per revolution) which increases smoothly up to 200Hz step size as the knob is turned faster, through the use of fuzzy logic control. The FM rate is ten times higher. UP/DOWN keys select either 500kHz or 1MHz increments or step through the sub-bands. The frequency range of the transceiver may be continuously tuned or selected in three sub-bands, where each sub-band stores the last used frequency and mode. 100 battery backed memories are provided with twin A/B VFOs for split frequency, scanning and TF-SET from the microphone.

An RIT clarifier is provided, functioning on receive only, operating over the range +/- 2.2kHz. IF filter bandwidths are selected automatically according to mode with 2.4kHz standard on SSB and CW and 6kHz on AM. An optional narrow 500Hz bandwidth filter

may be fitted on CW. An IF shift control is also provided to help with interfering adjacent channel signals.

The receiver front-end may be set for optimum sensitivity or improved signal handling with reduced sensitivity (AIP setting), and an additional 20dB input attenuator may also be selected for really big signal problems. The normal and AIP settings correspond to the receiver RF amplifier being switched in or out of circuit.

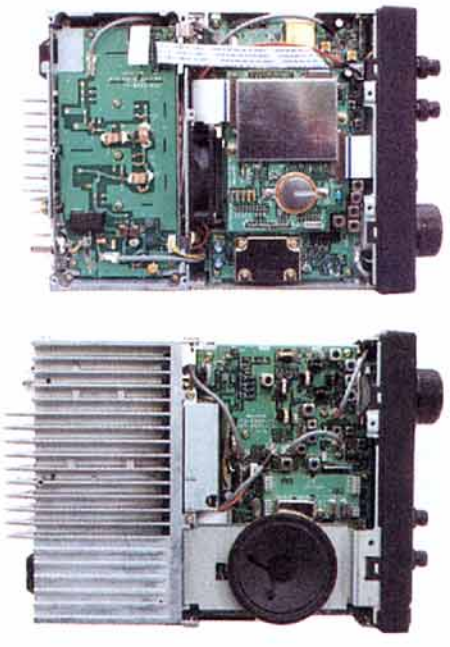
A noise blanker is provided and fast or slow AGC presettable for each mode. There is no RF gain control.

The transmit power is switchable to three output settings, nominally 90, 50 or 10 watts output. There is no speech processor or VOX on SSB. On CW either semi or full break-in may be selected.

Two set-up menus are provided to enable some 41 of the functions of the radio to be tailored to individual preferences. These include step sizes, scan parameters, transmit audio characteristics, CW pitch, delay and reverse sideband, beep and alarm messages, automatic power off and many other characteristics. The MC-47 microphone provided with the radio has four function keys which may be programmed to select from some 27 different functions.

The backlit liquid crystal display indicates the usual status messages, frequency to 100Hz resolution, memory number, RIT offset and bargraph S meter. The rear panel provides relay controlled linear switching, key and speaker interfaces only.

The TS-60S is provided with a mobile mounting bracket and 60-page instruction manual with circuits. This is similar to the TS-50S manual.



TS-60S top view and TS-60S bottom view with covers removed.

DESCRIPTION

THE TS-60S REALLY IS a tiny radio for its capabilities, measuring only 179mm (W) by 60mm (H) by 233mm (D) and weighing only 2.9kg. The construction is rugged and compact using surface mount technology extensively. The PA is housed in a substantial finned diecast assembly and a fan is switched on when the heatsink becomes hot. A thin 6.5cm diameter speaker is mounted upward facing through the top of the case.

The receiver is double conversion on SSB, CW and AM with intermediate frequencies of 73.045 and 10.695MHz. On narrow band FM, there is a third conversion to 455kHz. The transmit signal is generated at 10.695MHz and mixed via 73.045MHz to the 50MHz final frequency.

MEASUREMENTS

THE MEASUREMENTS WERE made with the TS-60S powered from a 13.6V power supply and are detailed in the table. Note that the NOR setting in the table corresponds to the front-end setting for maximum sensitivity.

The receiver sensitivity is entirely adequate, well within the quoted specification. The S-meter calibration is the same on SSB, CW and AM and gives good range and linearity but on FM the range is cramped as usual. The resolution is limited by the bargraph type display.

Rejection of the IFs and image was in excess of 95dB – a very good result and the receiver was very clean in terms of other unwanted spurious signals. The receiver third order intercept and dynamic range was much better in the AIP setting than with the RF amplifier in circuit. This shows that the performance of the receiver RF amplifier is limiting the signal handling capabilities of the receiver.

The transmit output power on all modes was considerably higher than specified on all three output settings. At full output on SSB, two-tone intermodulation products were poor at only –15dB but improved substantially at the 100 watt level and below. Harmonic output levels were good and the critical 2nd harmonic which falls in the FM broadcast band was at a low level of –75dBC. The frequency calibration was within the display resolution of 100Hz.

ON-THE-AIR PERFORMANCE

IT WAS VERY FORTUNATE that good sporadic E conditions were around during the period I had the radio for review. This gave rise to plenty of contacts around Europe and further afield to JY, 5T and openings to W, VE and CY9. The radio performed very well on both receive and transmit and the extra transmit power was useful with my long lossy length of feeder.

Although the radio is small it is very easy and convenient to use. However, a finger indent for the small tuning knob would be a great help. The variable speed-up on the tuning I regard with mixed feelings. It is very convenient and effective for tuning over moderate distances, but if only small changes are needed, it tends to move the frequency unexpectedly far if the knob is turned fast.

CONCLUSIONS

THE TS-60S IS AN EXCELLENT radio for the 50MHz band. Although ideally suited to mobile use, this band is not exactly popular for mobile operation and in most cases the radio will be used fixed. However, its small size and weight makes it ideal for lightweight expeditions and taking on holiday and is easily taken as hand luggage on aircraft. The performance is good and in the AIP setting an excellent dynamic range is achieved. A generous 100+ watts output power was achieved in the review radio as against the 90W specification, but this may not be typical of all radios.

The current price of the radio is just under £1000 and as such it is quite expensive for a monoband radio. As a next step, perhaps Kenwood will consider combining the TS-50S and TS-60S to give an HF plus 50MHz radio. This is now a popular combination and if it could be provided in such a small case would be a very interesting radio.

KENWOOD TS-60S MEASURED PERFORMANCE

RECEIVER MEASUREMENTS

	NOR	AIP
SSB sensitivity for 10dB s+n:n	0.13uV	0.32uV
AM sensitivity for 10dB s+n:n, 30% mod	0.9uV	2uV
FM sensitivity for 12dB SINAD 3kHz pk dev	0.18uV	0.63uV
Third order intercept (50kHz spacing)	–6dBm	+20dBm
Two–tone dynamic range (50kHz spacing)	86dB	98dB

S–READING	INPUT LEVEL			
	SSB(NOR)	SSB(AIP)	FM(NOR	FM(AIP)
S1	0.9uV	7uV	0.5uV	4uV
S3	1.4uV	10uV	0.7uV	5uV
S5	2.5uV	20uV	0.9uV	7uV
S7	7uV	56uV	1.3uV	10uV
S9	25uV	200uV	2uV	14uV
S9+20	280uV	2mV	2.8uV	22uV
S9+40	3.2mV	25mV	4uV	32uV
S9+60	22mV	160mV	5.6uV	40uV

MODE	IF BANDWIDTH	
	–6dB	–60dB
SSB,CW	2480Hz	5120Hz
AM	7550Hz	25.2kHz
FM	13.5kHz	18.4kHz

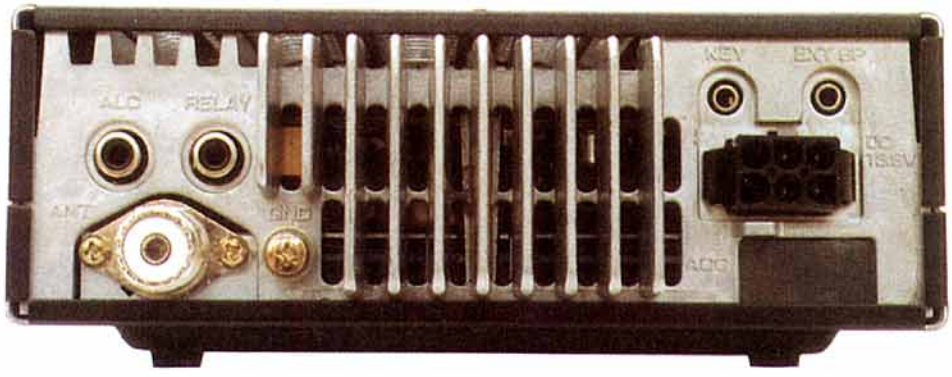
AGC threshold: 0.56uV
100dB above AGC threshold for +1.5dB audio output
AGC attack time: 5–10ms
AGC decay time: 0.1–0.2s (fast), 2–3s (slow)
Max audio before clipping: 1.9W into 8ohm at 1% distortion

TONE SPACING	3rd ORDER INTERCEPT	2 TONE DYNAMIC RANGE
3 kHz	–34dBm	68dB
5 kHz	–31dBm	70dB
10 kHz	–20dBm	77dB
15 kHz	–10dBm	84dB
20 kHz	–6dBm	86dB
30 kHz	–6dBm	86dB
40 kHz	–6dBm	86dB

TRANSMITTER MEASUREMENTS

Power output – high (100%):	130W
Power output – medium (50%):	68W
Power output – low (10%):	15W
2nd harmonic output:	–75dBC
3rd harmonic output:	–63dBC
Carrier suppression:	–40dBC
Sideband suppression:	–75dBC at 1kHz
Transmitter AF response at –6dB:	220–2750Hz
Transmitter AF distortion:	<1%
Microphone input sensitivity:	10mV (low), 4mV (high)

NOTE: All signal input voltages given as PD across antenna terminal. Unless stated otherwise, all measurements made on SSB with the receiver preamp switched in (NOR) and operating from a 13.6V PSU. All two-tone transmitter intermodulation products quoted with respect to either originating tone.



ACKNOWLEDGEMENTS

MY THANKS TO Kenwood (UK) for the loan of the equipment.

REFERENCES

[1] 'Kenwood TS-50S Mobile HF Transceiver', Peter Hart, G3SJX, *RadCom*, May 1993, pp43-45.

G3SJX

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Pat Hawker's

Technical Topics

MORE ON THE 1:1 BALUN

THE USE AND ABUSE of balanced-to-unbalanced (balun) devices inserted between a transceiver and the antenna system, can still provoke heated debate. 'Heated' is perhaps the appropriate word since it is all too easy to use up appreciable output power from the transmitter in heating up the wires or cores of matching networks and baluns. It can be very revealing to measure power output before and after an ATU or balun especially on the lowest or highest band for which it is intended, eg 1.8 or 28MHz.

It is not surprising that many of those using dipole-type wire antennas prefer not to use either an ATU or a balun, depending on careful adjustment of the dipole element to resonance. It is, however, widely recognized that in the case of Yagi beam antennas a balun is highly desirable; there is also the question of TVI/RFI that can result from the radiation of current flowing on the outer braid of a coaxial feeder.

A long, detailed and valuable contribution to this debate has been provided by Jerry Sevick, W2FMI in 'More on the 1:1 balun' (*CQ*, April 1994, pp26-46, less some pages carrying advertisements). W2FMI reviews the various types of broadband 1:1 baluns, reviews some of the more significant balun articles that have appeared in (mainly) American journals, and also presents the results of his own experiments from which he has developed several workable designs. He covers the origins and practice of Ruthroff and Guanella ferrite toroid core baluns, the ferrite-rod balun, air-core baluns based on coaxial-line transformers, and the currently popular W2DU ferrite-bead 'choke' transformer.

In a section 'When to use a balun', he reports experiments with baluns used with a 14MHz half-wave dipole at a height of 0.17-wavelength, which gave a resonant impedance of 50**ohms**: "VSWR curves were compared under various conditions. When the coaxial cable was in the ground plane of the antenna (that is, perpendicular to the axis of the antenna), the VSWR curves were identical with or without a well-designed balun no matter where the outer braid was grounded. Only when the coaxial cable was out of the ground plane was a significant difference noted. When the cable dropped down at a 45-**degree** angle under the dipole, a large change in the VSWR took place."

From this one can deduce that with a dipole antenna, there is little or no need for a balun provided that with a horizontal element (or an inverted-vee that is balanced about its support) the coaxial feeder drops down vertically from the element. W2FMI continues:

"Feeding a Yagi beam without a well-designed 1:1 balun, however, is a different matter. Since most Yagi designs use shunt-feeding (usually hair-pin matching networks) in order to raise the input impedance close to 50Ω, the effective spacing(s) of **Fig 1** is greatly increased. Furthermore the centre of the driven element is actually grounded. Thus, connecting the outer braid (which is grounded at some point) to one of the input terminals creates a large imbalance and a real need for a balun. an interesting solution, which would eliminate the matching network is to use a step-down balun designed to match 50ohm cable directly to the lower balanced-impedance of the driven element.

"In summary . . . . it appears that 1:1 baluns are really needed for (a) Yagi beam antennas where severe pattern distortion can take place without one, and (b) dipoles and inverted Vees that have the coaxial cable feed lines out of the ground plane that bisects the antennas or that are unbalanced by their proximity to man-made or natural structures. In general, the need for a balun is not so critical with dipoles and inverted Vees (especially on 40, 80 and 160 metres) because the diameter of the coaxial cable connector at the feed point is much smaller than the wavelength." Fig 1 shows the various currents at the feed point of

USING SCRAP MOTORS, SCRAP TOASTERS

THE JUNE *TT* ITEM describing briefly how Ron Mathers, ZL2AXO had built a 230V petrol-electric generator from a salvaged lawn mower as the prime mover in conjunction with a similarly salvaged single-phase induction motor used as an induction generator attracted interest. But there were some doubts expressed by those who had not previously come across the idea that with capacitive excitation such motors can be used as generators by making use of their residue magnetism.

ZL2AXO in his article gave as reference a near 60-year old paper in an Australian professional journal: Bassett, E D and Potter F M "Capacitive excitation for induction generators", (*Trans AIEE*, May 1935, Vol 54, p540) which is unlikely to be readily available to many *TT* readers. However, Bruce Carter, GW8AAG writes:

"I was intrigued by the reference to the ZL2AXO generator and soon afterwards came across the following book in a local library: 'Electric Motors' by Jim Cox (Cox, V J), workshop practice series No 16, published by Argus Books, 1988, (reprinted 1992) 134pp, £6.95, (621.462), ISBN 0 85242 914 2. On page 47, the author provides a table of capacitance needed for 50 and 60Hz motors ranging from 0.25HP (0.18kW) to 2HP (1.5kW). Apparently, the values are better 'understated' since higher values confer no advantage. Cox's chapter on stepper motors (including disc drives) is enlightening. The chapter on identifying and using scrap motors is required reading."

To quote further from ZL2AXO's *Break-in* article: "In operation, as load is applied to the generator the terminal voltage needs to be kept constant by opening the throttle of the petrol motor. This increases the speed and results in an increase in the frequency.

The frequency is proportional to the rotor speed minus the slip speed which at full load is about 150rpm. With a load of 500W the frequency rises to 56Hz. This rise is unlikely to be a problem in normal use apart from electric clocks running fast. To assist in the setting up of the generator a frequency meter was built up using an old Jonan automobile tachometer driven by a nine volt transformer. The speed of the generator at no-load is just over 3000rpm. This needs to increase with load until at 500W output an estimated 3500rpm is reached. On the petrol motor shaft a pulley of 095mm (3.75in) diameter drives a 0.50in vee belt to a 76mm (3.50in) diameter generator pulley."

G3ERY finds that the high-impact plastics case of a discarded toaster (top) can be transformed into a housing for an antenna tuning unit, etc (bottom).

The building of a 230V AC generator from scrap is in the proud tradition of amateur radio in the days when the idea of simply buying new purpose-made equipment (even if available on a limited market) would have broken the budgets of many enthusiasts, particularly the younger generation. It bred a generation that tended always to think twice before throwing away any discarded household items that could conceivably find an amateur-radio application.

Recent notes on salvaging components from old microwave ovens (*TT*, November 1993 and February 1994) encouraged John Wood, G3EAY to look carefully at his toaster when this proved to be beyond repair. He writes: "There were no electronic components to salvage, but the high impact plastics case looked interesting. With a little modification this has been transformed into an attractive housing for an antenna tuning unit. The case was lined internally with aluminium foil, stuck on with high-impact adhesive. The illustrations show the toaster case, before and after.

a dipole. I1 is the dipole current and I2 the unwanted inverted-L (imbalance) current on the outer surface of the braid.

W2FMI argues that "even though I consider some of the amateur articles [on 1:1 baluns] significant, their impact upon the use and understanding of these devices has not always been positive. In fact, in some cases just the opposite has been true." He points out that there are only two significant articles in the professional literature that provide the fundamental principles upon which the theory and design of this class of transformers are based, with later investigators only really extending the work of the two authors:

"The first presentation on broadband matching transformers using transmission lines was by G Guanella "Novel matching systems for high frequencies" (*Brown-Boveri Review*, Vol 31, September 1944, pp327-329). He coiled transmission lines forming a choke such that only transmission-line currents were allowed to flow no matter where a ground was connected to the load: **Fig 2(a)** . . . . The second article was by C L Ruthroff "Some broad-band transformers" (*Proc IRE*, Vol 47, August 1959, pp1337-1342). His 1:1 balun, **Fig 2(b)** used an extra winding to complete (as he said) the path for the magnetizing current with the third winding (5-6) on a separate part of the toroid forming a voltage divider with winding (3-4)." A modified form of the Ruthroff balun was introduced later by Turrin, W2IMU: **Fig 3**.

The two-conductor Guanella 1:1 balun came to be known as the basic building block for this whole class of broadband transformers. It not only presents a balanced power source to a balanced antenna system but can also prevent an imbalance current (an inverted-L antenna current) by its choking reactance when the load is unbalanced or mismatched or when the feedline is not perpendicular to the axis of the antenna.

After comparing the performance of the various forms of 1:1 transmission line baluns that have been described in the amateur literature, W2FMI provides details of low- and medium-power versions of his favoured bifilar toroidal (Guanella/current) 1:1 baluns. The low-power versions are capable of handling the output of most HF transceivers; the medium-power versions the full [American] amateur legal limit. **Fig 4** shows two versions of W2FMI's bifilar toroidal 1:1 baluns.

His baluns are capable of providing efficiencies of near 99% at 1.8MHz and 97% at 30MHz with type 250 ferrite material provided that the system is well matched. When a balun is exposed to a high impedance (VSWR of 2:1) voltage, the loss increases by about 40%; with a VSWR of 4:1 the loss doubles and with a VSWR of 10:1 the loss is more than three-fold.

W2FMI summarises his views on 1:1 baluns as follows: "In preparing this article I was quite surprised to see the ferrite- and powdered-iron-core 1:1 balun designs that have been available in the literature and elsewhere since 1964. They not only had poor low- and high-frequency responses, but they were also susceptible to flux in the cores at their low-frequency ends. Furthermore, since they only used single-coiled wires, they were also prone to voltage breakdown. No doubt, these designs were responsible for the poor reputation that the balun has had for many years.

"It was not until 1978, when Joe Reisert, W1JR published his article "Simple and efficient broadband balun" (Ham Radio, September 1978, pp12-15 see also ART7, p334), see **Fig 5**, using thin coaxial cable wound on the toroidal core that a balun became available with all of the attributes of a good design, namely: (a) Is efficient because it uses a low-permeability core; (b) has sufficient choking reactance to meet its low-frequency requirement; (c) is not prone to flux in the core (and hence, saturation) since it has no third winding; (d) has a 50**ohm** characteristic impedance and thus maintains a 1:1 transformation ratio with a 50ohm load; (e) has a good

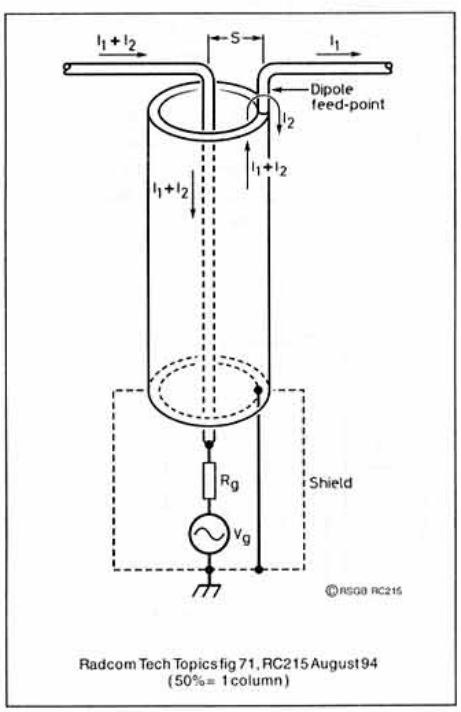

Fig 1: The various currents at the feed point of a dipole element fed from an unbalanced coaxial cable feeder. I1 is the dipole current and I2 the unwanted inverted-L (imbalance) current on the outer surface of the cable braid.

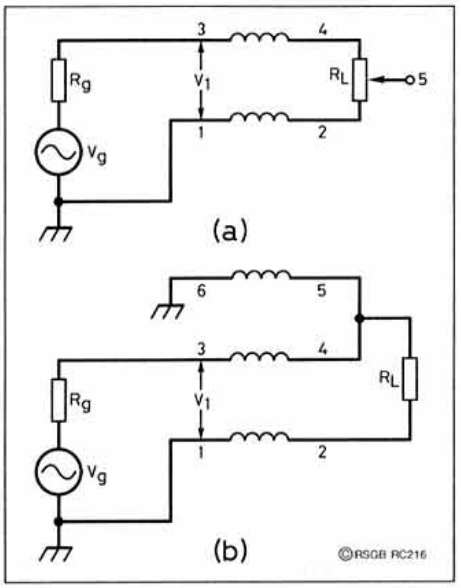

Fig 2: Two versions of the 1:1 balun as described by W2FMI. (a) The Guanella balun and basic building block; (b) the Ruthroff balun as originally drawn.

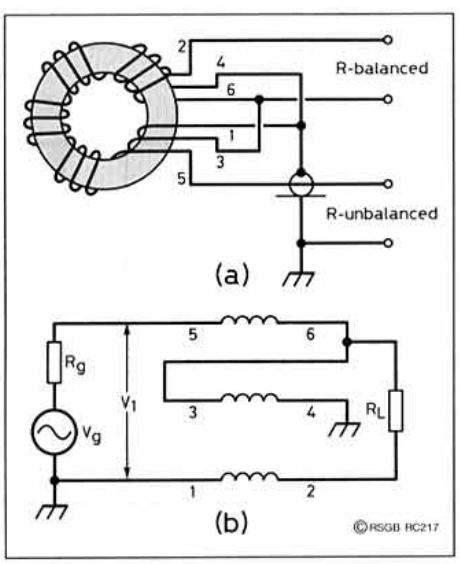

Fig 3: (a) Pictorial representation of Turrin's 1:1 balun, and (b) the schematic.

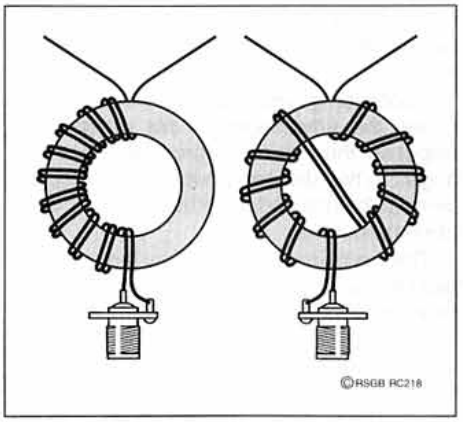

Fig 4: Illustration of two of the many versions of W2FMI's preferred bifilar toroidal (Guanella/current) 1:1 balun. The one on the right uses the cross-over technique of W1JR as used in his 1978 HF broadband balun.

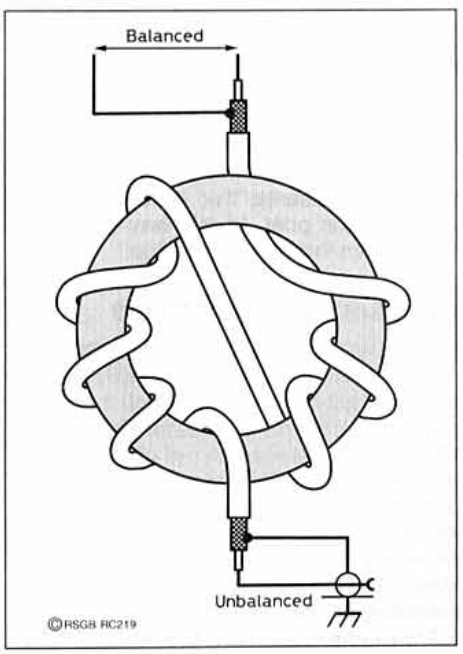

Fig 5: W1JR's 1978 broadband balun based on a thin coaxial cable winding. This used an Indiana General F368-1 Q1 core with some 12 turns (36-40-in of RG-141/U cable) and covering 3.5 to 30MHz with reduced efficiency on 1.8MHz. For use over 7-30MHz ten turns of cable should be sufficient and TC9 core might prove more suitable for lower frequencies. The basic design can be used at VHF if attention is paid to layout and lead lengths.

voltage breakdown capability (1.9kV); and (f) can handle a mismatched and/or unbalanced load.

"Succeeding investigators, however, failed to see the advantages of his design and proposed their own. Surprisingly, they belonged to two distinct groups. One favoured 'air-core' baluns and the other 'choke' (beaded-coax) baluns.

"The main argument given by the 'air-core' followers was that their balun would never experience the problems with saturation while the 'ferrite-core' balun would. The Reisert balun, however, is a current/choke type balun which could only have flux in the core by the imbalance (inverted L) current, which is much smaller than the transmission line currents. In fact, with any degree of choking reactance by the coiled transmission line, the imbalance current is essentially negligible. Therefore, saturation is not a concern with a Reisert type balun. But in all fairness, it would be pointed out that with the 4:1 current/choke and voltage baluns it is a different story. All three of these types of baluns have a 'magnetizing inductance' in their low-frequency models and hence a possibility of saturation with a poor design.

"The advocates of the 'choke' 1:1 balun claim that their beaded-coax balun can't saturate while the bifilar (current) toroidal balun can. This is entirely wrong, since they are basically the same kind of structure – neither has a third conductor which could allow a flux-causing current at the very low-frequency end. But of all the attributes listed above for the Reisert balun, the first one has the 'choke' balun at a disadvantage in the HF band. Since its transmission line is not coiled about a toroid, it does not have the multiplication factor of N-squared (due to mutual coupling) where N is the number of turns, while the toroidal balun does. Therefore, higher-permeability beads are required in order to obtain sufficient choking reactance. This results in lower efficiency."

In his final remarks, W2FMI admits to being quite sure that some readers will disagree with his views and/or think they have better designs than those of the Reisert baluns and the ones he presents: "If so, I encourage them to respond in print. In this way we will all benefit from the new information."

SOLID-STATE 'FIRSTS'?

THE NEWS ITEM in the February *RadCom* 'The Transistor Transmitter is Forty' continues to attract comment, although it must be stressed that the claim made for the February 1954 contact between Yeovil (G3CMH) and Haslemere (G3CAZ) was for the first 'skywave' contact using a transistor transmitter and not for a first contact using a solid-state device, for which there are records dating back at least 70 years, to the pre-transistor era of oscillating crystals.

For example, in an article in *Vintage Wireless* ('An invention that changed the world', Part 1 Vol 19 No 1) on the birth of the transistor, I noted that "although the transistor [born 1947] was clearly the first [practical] solid-state near equivalent to a triode valve, there was already a long history of crystal devices that could function, albeit unreliably, as amplifiers and oscillators . . . .

". . . . there had been a flurry of interest in the 1920s, when peaking in 1924, articles in *Wireless World* described work by the Russian engineer O Lossev on oscillating and amplifying zincite crystal detectors . . . . Lossev had investigated many circuit possibilities for receivers and even low-power transmission: 'Using some of the circuits described, it has been possible to achieve transmission over a distance of one mile. On both sides the crystal served simultaneously as a generator and detector, so that even duplex transmission was possible.'. . ."

In 1953, the year before the Yeovil 3.5MHz skywave contact, Francis Ladd, W2IDZ made several 50MHz contacts using a point-contact transistor transmitter. He writes:

"I have some accomplishments using transistors that I would like to pass on. On March 7 and 8, 1953, I had CW contacts with W2WCM using a point contact transistor [input power 135mW]. I then modified the circuit for phone. The resulting signal was narrow-band FM. I had a phone contact with W2WCM on March 9. W2WCM then duplicated my transmitter and on March 10 we had two-way phone and CW contacts using transistor transmitters at both ends. All contacts were made in the 50MHz band and were prearranged. On March 10, I had a CW and phone contact with W2MEU which were not prearranged. I wonder if any of these contacts were records?"

W2IDZ sends along a photocopy of his log

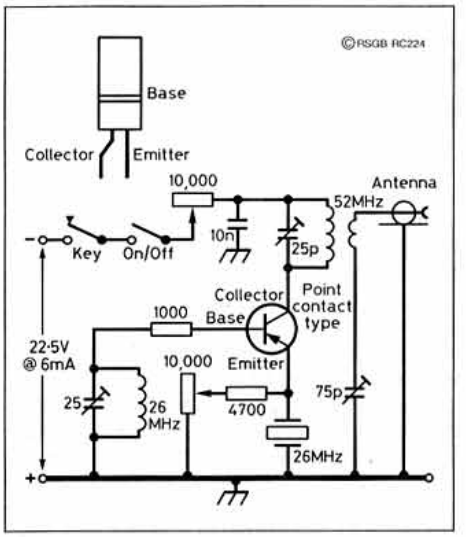

Fig 6: Circuit diagram of the CW transistor transmitter used by W2IDZ for his first 50MHz transistor contact at 1912 local time on March 7, 1953.

in which he recorded against the March 7, 1953 contact with W2WCM "My first QSO using a transistor transmitter . . . . I believe this is 1st 50Mc QSO using transistor." **Fig 6** shows the circuit diagram of W2IDZ's transistor transmitter as used for his first CW QSO at 1912 (local time) on March 7, 1953, as recorded in his log.

HOME-BREW BURGLAR ALARM

D S BROWN, G0LYX notes the increasing number of burglaries involving garden sheds, outhouses, garages etc, some of which form radio shacks with relatively costly equipment.

He provides details of a simple alarm circuit incorporates a switch-off delay circuit as now required by law.

He describes the functioning of the circuit diagram shown in **Fig 7** as follows:

(1) Mains on, press reset to activate TR1. This puts supply to on/off switch and lights the LED indicator.

2) On/off switch is placed to 'on' position. Power applied to TR2 which is in cut-off state when door/window micro- or magnetic-switch line is closed.

(3) Switch line broken. TR2 conducts activating Relay 2 which locks 'on' and simultaneously breaks circuit holding TR1 conducting. The time-constant of R1-C2 of approximately three to five minutes holds relay Rly 1 until discharged when supply to R2 is switched off (contacts 6-7 on Rly 1 also break, preventing circuit activating until reset button is pressed.

Note that the time that the alarm sounds can be varied by altering the values of R1-C2. In Fig 76 Rly 2 contacts are shown when reset button is pressed, those of Rly 2 when alarm is inactive.

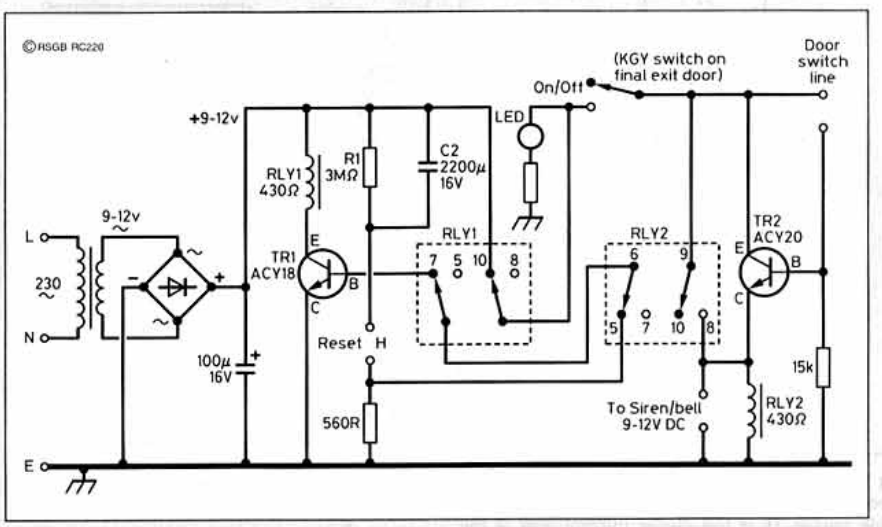

Fig 7: G0LYX's simple burglar alarm can be used to protect radio shacks, sheds, garages etc.

A CENTURY OF RADIO-TELEGRAPHY!

IN THE MARCH *TT* item 'The sound of spark', a brief reference was made to the fact that in August 1894, Professor Oliver Lodge of the University of Liverpool publicly demonstrated for the first time anywhere in the world that Hertzian waves could be used for telegraphic signalling in the Morse code.

A detailed appreciation of this historic event on August 14, 1894, together with an account of the many other – too often overlooked – pioneering achievements of Lodge has been described by Dr Brian Austin, G0GSF in a five-page article 'Oliver Lodge – The forgotten man of radio?' in *the Radioscientist*, Vol 5, No 1, March 1994, pp12-16: "When Lodge performed his demonstration he [like Hertz before him] made no claims for the eventual usefulness of his technique but it is the first recorded occasion on which intelligence was transmitted through space without wires. For a practical application of radio the world had to wait for the arrival in England of Marconi in 1896 . . . .

"At that demonstration in Oxford, which was at a joint meeting of physicists and physiologists on the subject of vision, Lodge transmitted Morse code letters from his induction coil and spark gap transmitter in the Clarendon Laboratory to a receiver some 60 metres away in the Oxford Museum. He described it as 'a very infantile form of radiotelegraphy', a statement reflecting his modesty but significant because it established what he had actually done when the induction coil was actuated by a Morse key operated by his assistant E E Robinson.

The receiver (**Fig 8**) consisted of a coherer, a Lodge invention, which was connected to either a Morse recorder which printed onto tape or a Kelvin marine galvanometer, the deflected light spot of which made viewing by the audience easier." By about 1897, Lodge was using his 'definitive radiator' antenna system (**Fig 9**) which as G0GSF emphasises was an early form of biconical antenna.

G0GSF shows that Oliver Lodge made many other significant contributions including an attempt in 1894 to detect radio emissions from extra-terrestrial sources, most notably the sun. The experiment failed because his coherer detector of centrimetric waves was not sufficiently sensitive but is recognized as the first attempted experiment in radio astronomy and preceded the successful experiment by Jansky some 37 years later.

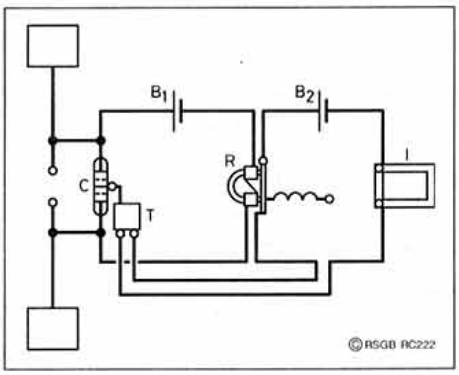

Fig 8: The receiving system used by [Sir] Oliver Lodge on August 14, 1894 at Oxford when Morse signals were received and demonstrated for the first time. B1, B2 batteries; C, coherer/T, trembler; R - relay; I inker.

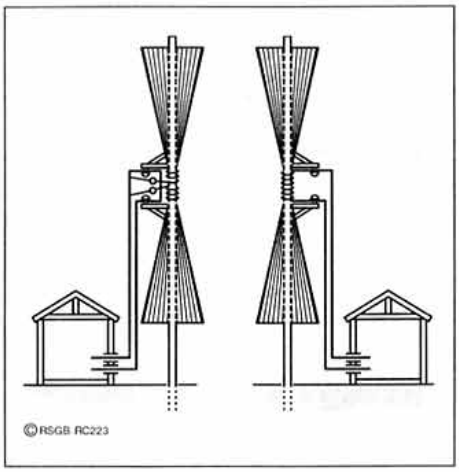

Fig 9: By about 1897, Lodge had developed transmitting and receiving antennas similar in form to the modern biconical antenna.

'KISS' VK2ABQ 14MHZ BEAM ANTENNA

VERSIONS OF THE 1973 VK2ABQ three-band two-element parasitic wire array (ART 7 etc) continue to attract interest: see for example 'Antenna Workshop' by Peter Dodd, G3LDO (*Practical Wireless*, June 1994, pp42-43) in which he traces an earlier but basically similarly shaped single-band version to W1QP/W8CPC in *QST*, October 1937. More recently, Fred Caton, VK2ABQ (formerly G3ONC) has described several even simpler and/or smaller single-band arrays, including a KISS array in *TT*, May 1992, p37. (But note that he has pointed out that the gaps between the elements given as 4-inches should have been 4-mm or about 0.25-in).

VK2ABQ has now sent along details of a simple array that does not use the 'square' folding with crossed X-type bamboo spreaders, but retains the small gaps between driven and parasitic elements. This can be erected as shown in **Fig 10** as a single-mast, inverted-vee type structure or (for a fixed array) as a conventionally suspended array using a cantenery rope in lieu of the mast.

What VK2ABQ calls the phase adjustment gaps are adjusted for equal power in the two half-wave elements, as discussed in the earlier May 1992 item. He has, however, provided details of an improved 'current sampler' giving better position stability and greater sensitivity and, in his letter, provides some further hints on construction and adjustment but I find these a little confusing, and hope that the information given above and in the May 1992 *TT* will at least prove a starting point for investigating this simple directional antenna.

VK2ABQ acknowledges that modelling of this antenna was first done on 144MHz by VK3KZ in Melbourne who built a 7MHz version which proved very effective on long-haul DX to Europe etc. VK2ABQ claims that his antenna outperforms a much larger standard 2-element Yagi array and has a forward gain of the order of 5dB and a front/back ratio of over 30dB.

I suspect that other users may find the forward power gain of such an array to be rather less impressive when compared to the theoretically possible gain for a close-spaced two-element Yagi array of 5.2dB. Nevertheless, it should provide a useful power gain and a good front-to-back ratio.

In *TT*, October 1983, attention was drawn to the use by the IBA (now NTL) of a medium-wave vertical monopole antenna with a sloping twin-wire reflector. This approach gave a single-mast array with vertical polarization, providing roughly 3dB forward gain and an f/b ratio of from 5-15dB and better than 20dB in laboratory studies.

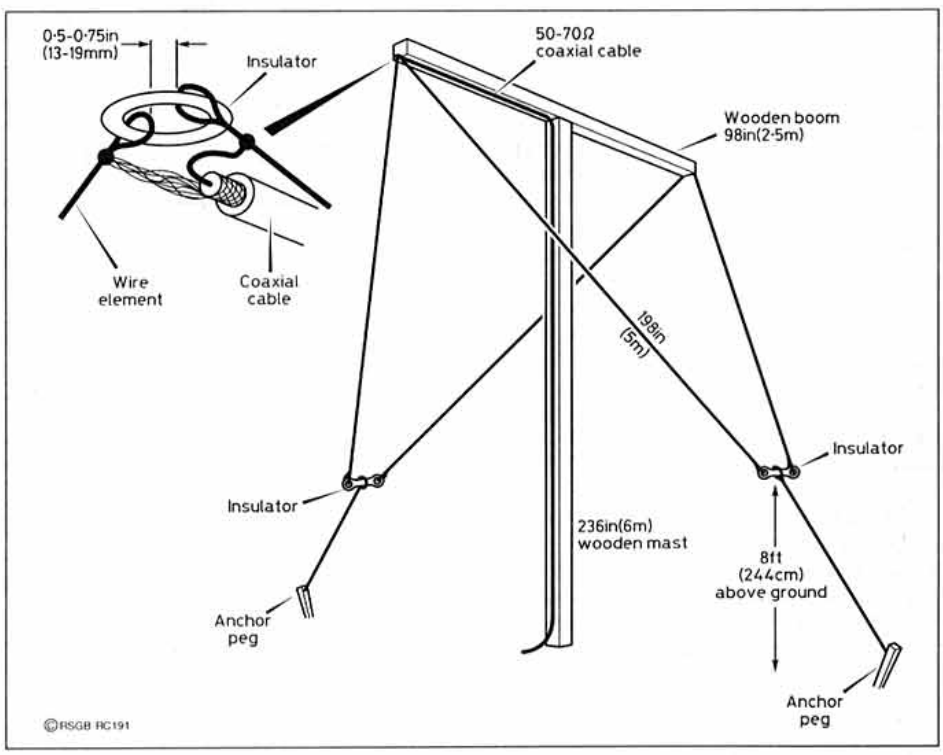

Fig 10: 2-element 14MHz 'KISS-type' beam antenna in inverted-vee form with the end 16-feet above ground level. It can be rotated at ground level by moving the ground pegs. Note that the two-dimensional representation shows the 90-deg angles as acute angles.

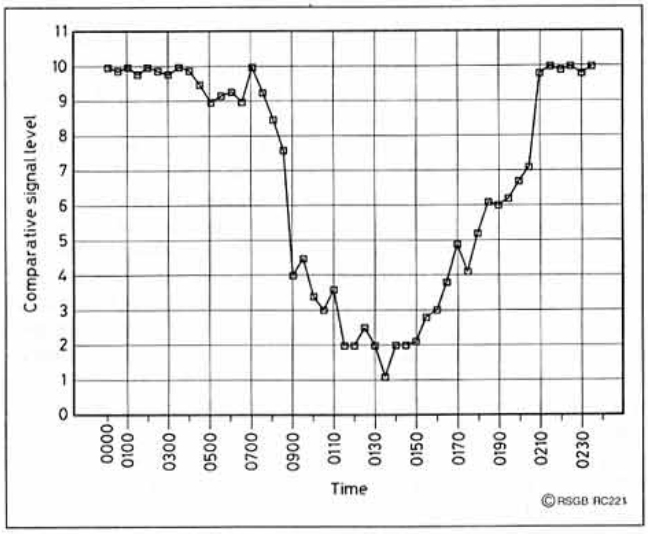

Fig 11: Plot of 1.8MHz signal levels over a 126-mile path during a September day made by G4HOJ showing that although 'daylight' existed for some 13 hours, only 4-5 hours show low levels of skywave enhancement with signals still peaking at regular intervals even through this period.

DAYLIGHT PROPAGATION ON 1.8MHZ

IN THE 1970s when I was involved with answering listeners' complaints about interference with the reception of the early Independent Local Radio medium-wave stations, it soon became obvious that the D-layer which absorbs MF sky-waves from distant high-power stations during 'daylight' does not reform immediately at dawn and (particularly in the winter months) begins to lose its absorptive characteristics some time before dusk. This has the effect that interference from distant MF broadcast stations can be quite severe during much of a 'winter day'.

From an amateur viewpoint it is worth remembering that the 1.8MHz band is an MF band and not HF (MF spectrum 300 to 3000kHz). Contrary to simplified theory, skywave propagation is not limited to night-time.

This point is underlined by investigations made by P Hobson, G4HOJ in the course of developing a computer program which would model and predict the performance of short loaded whip antennas. In the course of this he built about 80 different whip antennas to explore all the different parameters. His work led to really accurate computer modelling.

He writes: "Most of the text books describe 1.8MHz as having a useful working range of around 50 miles in 'daylight – when no skywave is present'. Yet I found that I could frequently work up to 150 miles to good fixed stations, and sometimes more, even at lunchtime when much of the testing was done. This encouraged me to explore the belief that sky wave propagation was often present on 1.8MHz even at noon on a summer's day.

"After a few random checks I decided that the best appliance to take the tedium out of regular and frequent checking was the computer. I wrote a short program which made the computer check the voltage on a particular port every 2 seconds, and then to record the highest level reached during successive one minute periods .... The results obtained gave no specific measurement, but rather a comparison between the signal received at a specific time of day and the best night-time signal when high levels of skywave enhancement were present. Information could be displayed on screen, or printed out.

"With a very stable, home-brew VXO receiver and a low active antenna, positioned to reduce response to ground-wave signals to a minimum, tests were made on a number of incoming signals, at different distances, repeated on a number of days. The equipment recorded signal level and time of day. The sampling method chosen did not record peaks and troughs since these were often so short in duration that they were missed.

"A plot made during one September day, (one of the poorest signal days) is shown in **Fig 11** with sunrise about 0525GMT, sunset about 1825GMT. Maximum temperature 22°C, minimum 10°C on a signal over a 126-mile path. Note that although 'daylight' lasted for 13 hours, only 4-5 hours show low levels of skywave enhancement. It would appear that at no time throughout the day was enhancement completely absent, although the signal levels, at their lowest, might not be usable for communication purposes at noisy locations. But from a quiet site, the enhanced signals are useful on almost every day. Occasionally, the signal levels can be high even at noon.

"Winter days seem to produce wider differences although there is more enhancement right through the day."

G4HOJ sums up his results (which have been truncated in these extracts) as "proving to my satisfaction that 1.8MHz completely out-performs the alternative bands, particularly for mobile working, when short/medium distance is the objective. Perhaps more important is the reliability of the band, both from day-to-day and difficult terrain viewpoints. While this is appreciated by those who have used 1.8MHz in the past, there are many who remain unaware of the virtues of this band."

G4HOJ's home QTH is a village several miles from Swindon where the electrical noise level is presumably reasonably low. I recall making daytime contacts of over a hundred miles on 1.8MHz in the distant days when I operated from Minehead, Somerset. A very real problem in urban and suburban locations, at least in London, is the high level of electrical noise that can swamp weak daytime signals from more than a few miles away. Even without sky-wave enhancement, reliable 1.8MHz ground-wave signals between quiet sites having good ground conductivity can comfortably exceed 50 miles and proba-

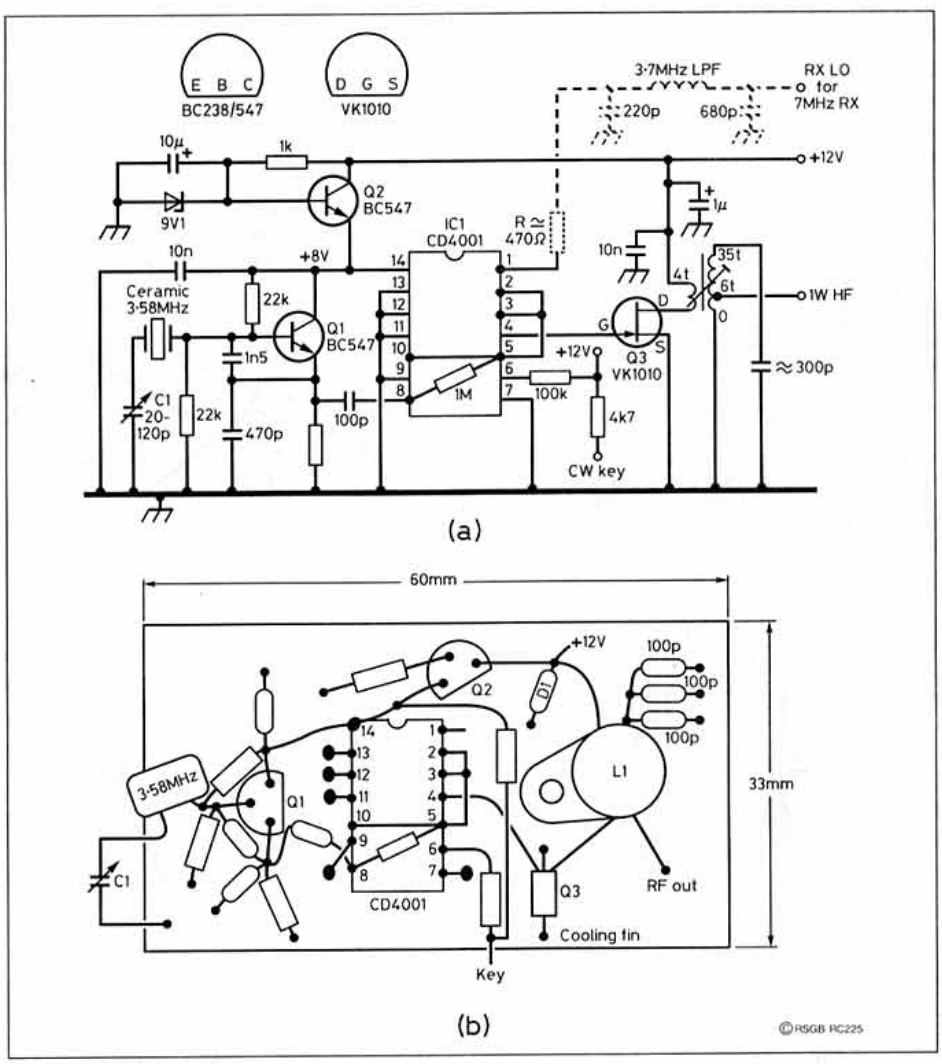

Fig 12: LA8AK's version of the QRP (1W) transmitter using a ceramic resonator in a variable frequency oscillator covering the 3.5MHz CW band.

bly well over 100 miles, particularly on over-sea paths. The main snag is the low level of day-time amateur activity. However, perhaps G4HOJ's propagation experiments will encourage more use of this interesting and valuable MF allocation.

HERE & THERE

ADDING TO THE *TT* ITEM 'Variable-frequency ceramic oscillators' (May 1994, pp54-55), Jan-Martin Noeding, LA8AK has modified the G3BBD QRP transmitter circuit, using a few transistors and a CD4001 ic instead of the CD4069: **Fig 12**. He writes: "A 100 or 120pF tuning capacitor, covers the 3.5MHz CW band and RF output is about 1-watt.

"For simplicity, a parallel-tuned output circuit is used. Harmonic radiation may be reduced by using a good pi-network filter, provided that the input impedance is much higher than the load impedance. With 50Ω input/output with a single coil pi-filter, the harmonic attenuation is negligible below about 10MHz. The CMOS inverting amplifier (pins 8, 9, 10) solves the problem of the variable drive from the oscillator. If used for a receiver local oscillator, additional components may be required to establish constant RF voltage over the tuning range, in LA8AK's case for use with a 7MHz direct-conversion receiver using a RA3AAE-type harmonic mixer as mentioned in the May *TT*. **Fig 12(b)** shows how the main components for a QRP transmitter may be located using dead-bug mounting on the PCB earth side, with the IC and transistors installed upside down. L2 is 10mm diameter with iron core, dipped to 3.6MHz.

Bruce Carter, GW8AAG, provides a solution to the problem that is encountered when a coaxial cable (or other stiff conductor) has to be clipped tight to a wall, but at a corner such a method is likely to seriously damage the electrical and physical characteristics of the cable. His solution is to make use of the property of a tangent to an arc of a circle. Treat the cable run as forming a semicircle or quadrant as it approaches the corner.

The hard line of the corner is then a tangent over which the cable can 'slip' in an inch or so: see **Fig 13**. GW8AAG adds that the corner can be internal or external including two walls, a wall and floor, or a wall and a ceiling. Even a cable along one side of a sheet can be satisfactorily taken to the edge and back down the other side. Furthermore, the angle of attack to the corner does not necessarily have to be at a right angle.

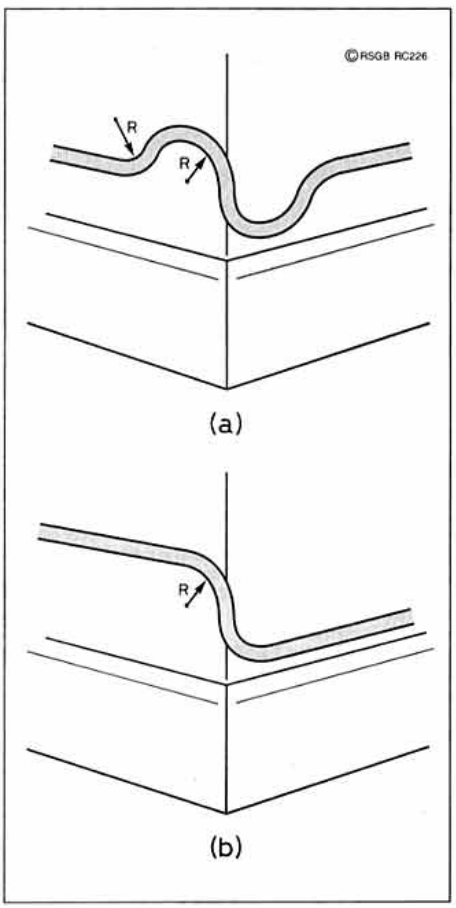

Fig 13: GW8AAG's method of overcoming the problem of taking a coaxial cable around a 90deg corner when the cable needs to be clipped tight to the walls. (a) Where it is necessary to retain the cable run at the same level; (b) where the cable run can be at different levels. R is the permitted minimum radius for the cable in use.

Two German theoreticians, L Molgedey and H G Schuster, have produced what may be a mathematical explanation, and specification of a neural network to go with it, of the so-called 'cocktail party effect' ie the problem of disentangling meaningful signals from a background of otherwise distracting noise: see an article 'Cocktail party effect made tolerable' by John Maddox (*Nature*, 16 June 1994, page 517). They go so far as to mix together two library records of crying babies and show that the separate sounds can be successfully disentangled from the mixed signal by a straightforward application of their technique. No doubt the next step will be to build the appropriate silicon chip to see whether it will function as intended." Ideal for a crowded band!

As we have noted before, the electronics industry has for many years used many chemicals and substances that are hazardous to the environment or in some cases directly to those involved in the assembly of equipments. For example, until the late 1980s, the industry used vast amounts of ozone-depleting substances including CFCs under many trade names and also 1.1.1. trichloroethane.

However the proof that man-made chemicals (particularly chlorofluorocarbons – CFCs) are seriously damaging the ozone layer, and the suggestion that they may also contribute to the global warming process have led to various international regulatory controls. As noted in an article 'The technical options for replacing CFCs for cleaning electronic assemblies' (*GEC Review*, Vol 9, No 1, 1993, pp3-20). There are now the Montreal Protocol and European Community regulatory controls. CFCs (Arklone, Freon, Frigen, Flugene, Forane, Kaltron, Fluorisol, Geneseolv, Delifrene, Isotron, Racon, Dional, Algofrene, Fronsolve, Daiflon, Flonshowa CG, Triflon, Isceon) were phased-out 85% by January 1994 and by 100% by next January. 1.1.1. trichloroethane (Genklene, Propaklone, Prelete, Sovethane, Dowclene) were cut by 50% last January and are due to be 100% phased-out by January 1996.

However, there is a range of technically-viable options. Choice for manufacturers, it is suggested, for cleaning PCBs will depend on factors other than a purely technical appraisal – cost, volume, market sector, customer requirements, health and safety, environment, etc must all be considered. GEC scientists have also been investigating 'Lead-free solders for electronic assembly' (*GEC Journal of Research*, Vol 11, No 2, 1994). The safe use and disposal of lead and lead-containing materials is an issue that is attracting considerable interest from both environmental and legislative bodies.

Correction: Although the callsign of Jorge Dorvier, EA4EO was given correctly in the text of the June *TT* item on page 53, it appeared incorrectly as EA4FO in the caption to Fig 3. ***G3VA***

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Although the summer sale has finished, I'm still offering very competitive prices across the range. I won't sell to you at a loss as the back up service is worth more to you (and me), in the long term. All prices quoted are RECOMMENDED MAXIMUM RETAIL. That's the starting point. If you want to haggle, call 081-566 1120 then the Lynch Mob will talk turkey. I've used that term before, haven't I?

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The FT990 is available with built in PSU or as a DC version. Maximum retail price of £1899 (DC) or £2199 (AC).

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Still the only Base Station that can take all four VHF/UHF bands at once, the FT736 for 6/2/70 & 23CM is out on it's own. No other offers you a built in PSU. No other offers satellite operation at the press of a button and is so convenient for packet operation. It's SSB facility allows true DX when the local FM chat becomes a bore. A Turbo front end, courtesy of messers muTek has been available for almost two years enhancing the receiver performance even more on 2 & 70.

The FT736 retails at a maximum price of £1699, with 2 & 70 fitted.

Yaesu FT747GX

Now in it's final stages of production, the FT747GX allowed thousands of operators to get on the H.F. bands for the cost of a dual bander mobile rig! It's simple in operation and Yaesu's brief was to give the user 100 watts on all Amateur Bands, include a General Coverage Receiver and the option of all modes. The biggest crunch was the price. I've managed to secure the very last production from Yaesu Japan and I'm offering them to you at cost. Last chance - there are no more!

Maximum retail price £849. Last few at only £649 and a microphone thrown in.

Yaesu FT840

With the FT747 now finished, the FT840 takes over. The reports from the "big boys" on H.F. constantly remind me how good the FT840 is. (see our newsletter, FT840 - First Impressions by Henry Lewis G3GIO). I'm so confident that you'll agree, the FT840 really has performance to match the big rigs, I'm offering a TEN DAY money back guarantee. Buy an FT840 during August and if you don't like it, return it direct as in new condition and I'll refund your money in full, (less original shipping costs). How's that for money where my mouth is!

Maximum retail price of the FT840 is only £875.00

Yaesu FT530

Hands up all those who thought they had bought the right dual band handie, only to find their mates bought the correct one first - the FT530. The new FT530 from Yaesu is in our opinion the easiest to use, most feature packed, only one to offer CTCSS as standard, super-wide extended coverage Handie available. Like other Yaesu products, once you've read the manual, we doubt you'll need to read it again.

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Kenwood TS-50S

I've been using one mobile for nearly a year. For all those skeptics, it hasn't gone wrong, even running 100 watts output. I remember other manufactures scoffing at the fact "I wonder how long it takes to burst into flames?" Well let me tell you, they don't. The TS-50S is the most reliable HF transceiver we probably sell. It only begs the question why are the other H.F. transceivers so large?

The TS-50S retails for a maximum of £999.

Icom IC-820H

This one's so new that we still get asked what is it? It's the latest Dual Band Multimode Base Station from Icom. 35/45 watts on two & seventy, it's the neatest package around for the VHF operator. Once again, the men at Icom have priced this very sensibly.

IC-820H from Icom. Maximum retail price of £1699.

Icom IC-736

It's funny that only a year ago you were all asking me when a manufacturer was going to bring out an HF rig with six, that offered 100 watts across the whole range. Icom's ears must of been wagging, presto! the new IC-736. It didn't stop there however. Whilst they were busy giving you a world first, somehow they've squeezed in a mains PSU and an auto tuner in the smallest space possible! Don't forget what Peter Hart said about it's brother, the IC-737 (without 6m), "amongst the best receive performance of any rig I've tested".

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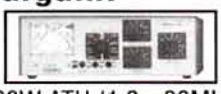

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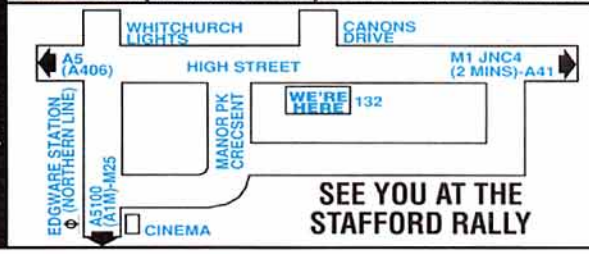

SEE YOU AT THE STAFFORD RALLY

RADCOM TECHNICAL FEATURE

The Ferret Audio Filter

by Paul Lovell, G3YMP

SIMPLE RECEIVERS for the HF amateur bands can give excellent results, but reception can often be improved by the addition of a variable bandwidth audio filter. The Ferret was designed with just such a purpose in mind, and the design is based around the Maxim MAX294 low-pass filter IC featured in the March '94 *Simply Silicon* column.

HOW DOES IT WORK?

ESSENTIALLY, THE CIRCUIT consists of three sections, as shown in the circuit diagram **(Fig 1)**. R1 provides a suitable load where the filter is driven from the speaker output of a receiver.

The first section is a band-pass filter (BPF) which has a switch selectable cut-off frequency. The top position of S1 by-passes this for SSB reception, with the audio input being applied to IC1 via capacitor C4. The second position (CW HI) has a resonant circuit consisting of inductor L1 and capacitors C2 and C3 in series. These components resonate at about 600Hz and give a response which is approximately 100Hz wide at the –3dB points. The third switch position (CW LO) shorts out C2 bringing the filter 'nose' to a frequency in the region of 410Hz.

Although this band-pass characteristic is useful for CW reception, the skirt selectivity and in particular the response above 600Hz leave much to be desired. This is where the second section of the circuit, based around IC1, really comes into its own. The chip is an eighth-order switched capacitor low-pass filter, with an internal oscillator operating at 100 times the cut-off frequency. This can be set by means of an external capacitor. In the case of the Ferret a dual varicap (D1A and D1B) is used to provide a variable capacitance from approximately 60pF to 1000pF.

Varying the applied voltage on RV1 gives a low-pass filter whose cut-off frequency (f_o) can be set anywhere between about 240Hz and 3.5kHz when the circuit is operated from a 9V supply. Since the response is in the

continued on page 55 ▶

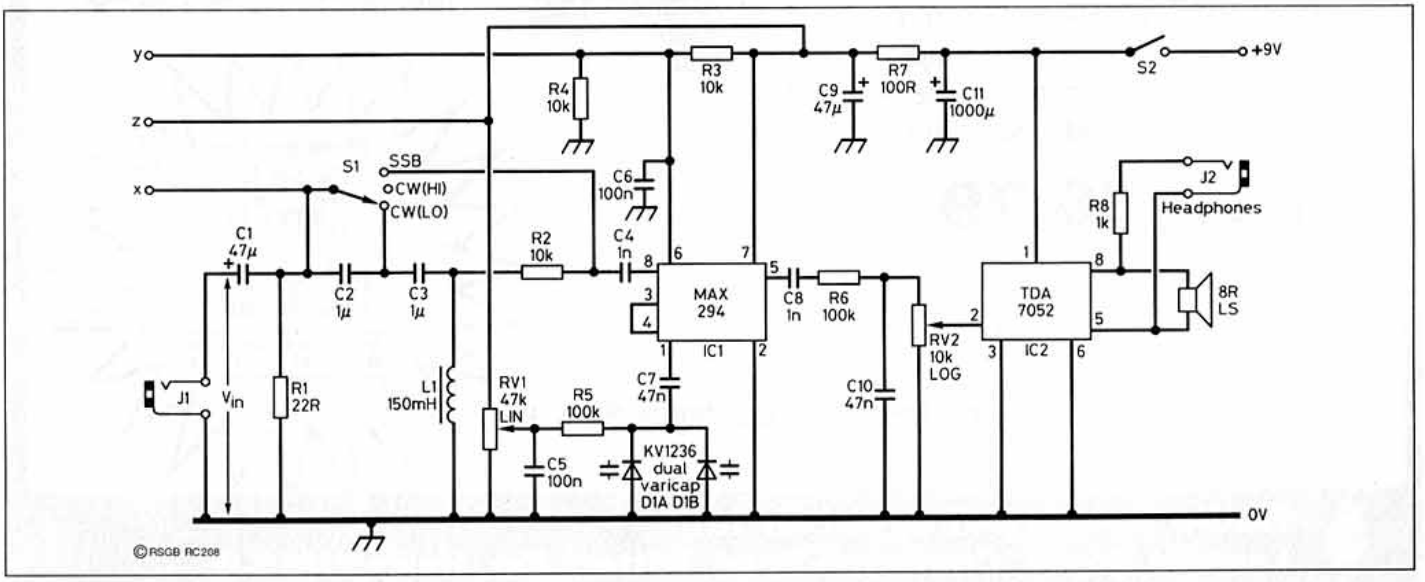

Fig 1: Most component values are not critical. The value of resistor R8 may need to be increased for high impedance phones.

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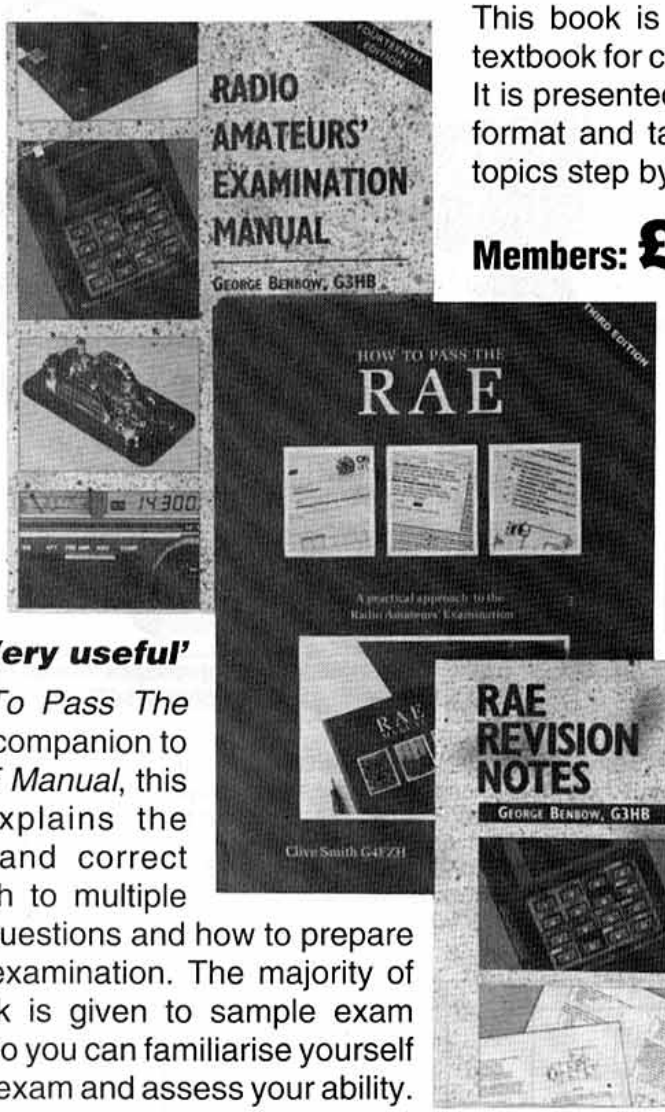

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Radio Society of Great Britain
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The Ferret Audio Filter

continued from page 53

order of –58dB at 1.2 x f_o, setting RV1 to give a cut-off at 500Hz means that signals above 600Hz are practically inaudible. For SSB, the setting can be 2.4kHz which results in practically a zero response to audio signals above 2.9kHz.

The relatively small value of C8 limits the LF response in all modes, and C10 filters clock frequencies from the audio signal before this is applied to the final stage, a TDA7052 audio amplifier. Plenty of output is available for either headphones or a speaker, as required.

LET'S FERRET AROUND

TO TEST THE CIRCUIT, I selected a receiver with a very broad audio response, tuned to the CW end of the 7MHz amateur band during a contest. This is rather the radio equivalent of 'throwing a Christian to the lions', but the Ferret emerged unmauled and with its credentials relatively intact! My own preference was for the lower of the two CW centre frequencies, although each was helpful in picking out weak stations.

I found it best to tune around with the filter set to a relatively wide position, and then reduce the LPF cut-off with RV1 when necessary. On a number of occasions it was most effective in 'splitting' two CW stations of similar strength, separated by less than 100Hz. On SSB, the low-pass filter could be adjusted to deal with some fierce adjacent channel QRM.

Some experimentation with the value of inductor L1 and its associated tuning capacitors (C2 and C3) may be required to achieve best results, or to suit individual preference. If the filter is to be used in conjunction with a transceiver, then it might be useful to make the centre frequency the same pitch as the side-tone. Some constructors may opt to delete the audio amplifier IC2 completely, and feed the filtered audio signal back into the rig's existing output stage.

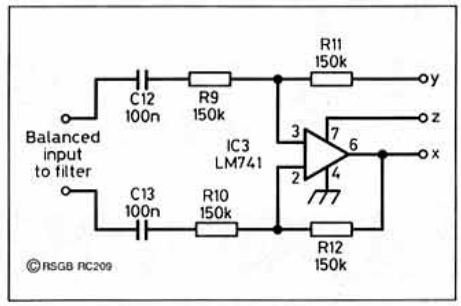


Fig 2: Balanced inputs may be used with the circuit shown above. Sensitivity can be increased by raising the value of resistor R11.

JUNK BOX FRIENDLY

VEROBOARD CONSTRUCTION proved perfectly satisfactory for the prototype, as signal levels on the board are relatively high. Note that switch S1 is a two-pole changeover type in the prototype, although only one pole is used. It has a centre-off position which corresponds to the 'CW HI' mode. Although 9V operation is specified, a stabilised mains adaptor of up to 12V may be used, and this is advisable for extended operation.

The MAX294 and dual-varicap diode may be the only components that some constructors need to buy. Practically any audio amplifier could be used for the output stage – a bipolar emitter follower stage should be sufficient to drive headphones. Inductors such as the surplus (ex-BT) 88mH types could also be pressed into service, with suitable selection of the resonating capacitors, C2 and C3.

Although this circuit is suitable for single ended output stages such as the LM386, balanced circuits such as the TDA7052 (used in the Yearling, *RadCom*, Jan 1994) may also be used. The balanced/unbalanced (balun) converter shown in **Fig 2**, has been used successfully to match a variety of inputs. If such a circuit is used, then capacitor C1 and resistor R1 will not be required. In fact C1 may not be necessary in any case, but was included for protection against any possible DC voltage at the speaker output of the receiver.

With a higher resonant frequency for the band-pass filter, the circuit could also be useful for datacomms applications. In any event, it should provide readers with some useful ideas for experiments. Whilst not up the same performance as a top-notch filter using Digital Signal Processing (DSP) techniques, the Ferret has the advantage of simplicity and it can be constructed at low cost.

COMPONENTS LIST

Resistors

All 0.25W 5% unless stated

R1	22R 1W
R2,R3,R4	10k
R5,R6	100k
R7	100R
R8	1k0
RV1	47k linear
RV2	10k log.

Capacitors

C1,C9	47µF 25V
C2,C3	1µ0 100V polyester
C4,C8	1n0 25V ceramic
C5,C6	100n 25V ceramic
C7,C10	47n 25V ceramic
C11	1000µF 16V

Inductors

L1	150mH toroidal type: Toko 10RBH series or similar

Semiconductors

IC1	Maxim MAX294CPA
IC2	Philips TDA7052
D1A,D1B	Toko KV1236 dual varicap diode

Additional Items

S1	Single or double-pole changeover switch, with centre-off position
S2	On/Off toggle switch
J1	3.5mm jack plug
J2	0.25in or 3.5mm output socket

2 control knobs

LS 8 to 64Ω speaker or headphones

PP3 battery and connector, or external power adaptor.

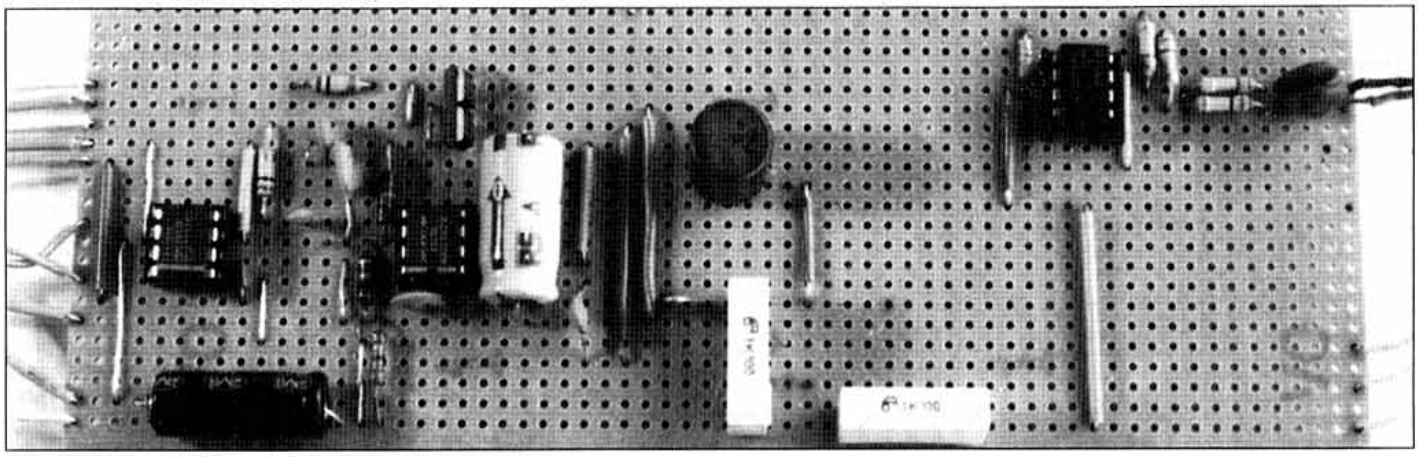
Stripboard 2.54mm(0.1in) matrix, at least 20 tracks x 50 holes

Case approx. 8 x 3 x 6in (200 x 75 x 150mm) such as type JA83 from JAB Electronic Components (see below).

Additional Items for Balanced Input (Fig 2)

IC3	LM741 Op-amp integrated circuit
C12,C13	100n ceramic
R9,R10,R11, R12	150k

A kit for the Ferret is available from: JAB Electronic Components, The Industrial Estate, 1180 Aldridge Road,Great Barr, Birmingham B44 8PB



"Veroboard construction proved perfectly satisfactory for the prototype, as signal levels on the board are relatively high."

RADCOM TECHNICAL FEATURE

Repeater Linking: The Bedford Experiment

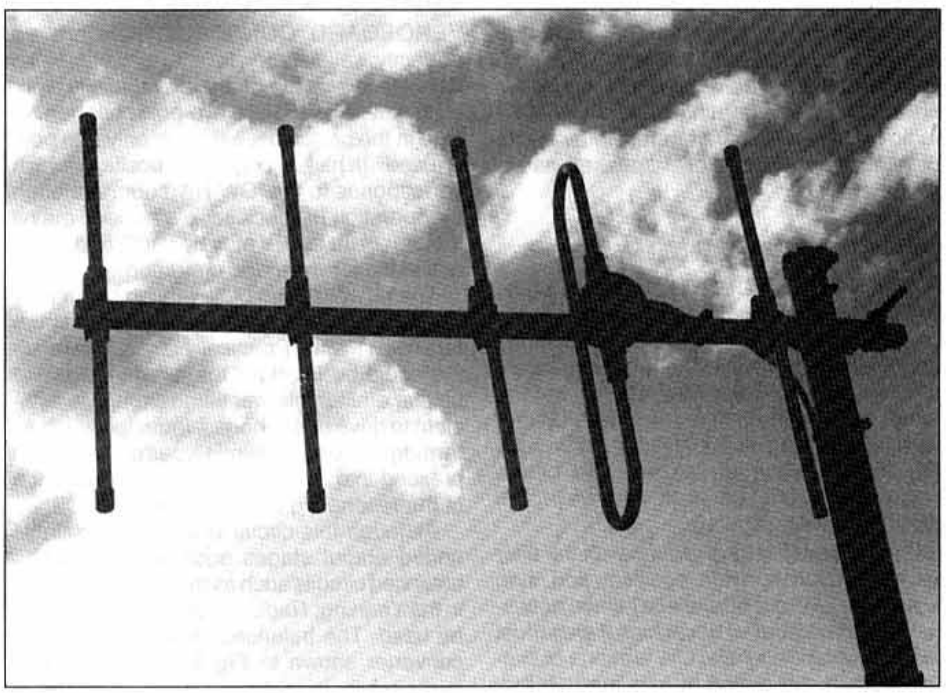
by Doug Ash, G1BWW

MOST NEWCOMERS to amateur radio soon discover their local repeater. For many this will be on 2 metres, with the area of coverage being geographically fairly large. Whilst 2m repeaters are designed primarily for wide area coverage with mobile to mobile working, 70 centimetre repeaters are designed to cover 'the community' or in most cases a town.

With the increased use of dual-band transceivers you will find many mobiles and handhelds, as well as home based stations, using 70cm. In some localities it is used as a way of staying in touch with other local amateurs. There are sixteen channels available, twice as many as on 2m.

There is still the potential to accommodate some more 70cm repeaters in those areas that currently have no coverage, by the use of low power units on an alternative set of frequencies to those currently in use. With the large numbers of Novices now becoming licensed, the easy way for them to contact other local amateurs is via 70cm repeaters, as they are not licensed to use 2m.

Getting onto 70cm is not expensive. Ex-commercial radio equipment (handheld and mobile) is coming onto the market in increasing numbers due to commercial UHF users being made to re-equip for 12.5kHz spacing. These radios are easily converted for amateur use, all you need is some crystals for the channels you want to use, a toneburst board, plus a small amount of internal adjustment to get it working on amateur frequencies. Many magazine articles have been published on these conversions [1].



The 5-element yagi used for the directional transmit aerial on GB3BD. Similar aerials are used on the linking receivers at both sites.

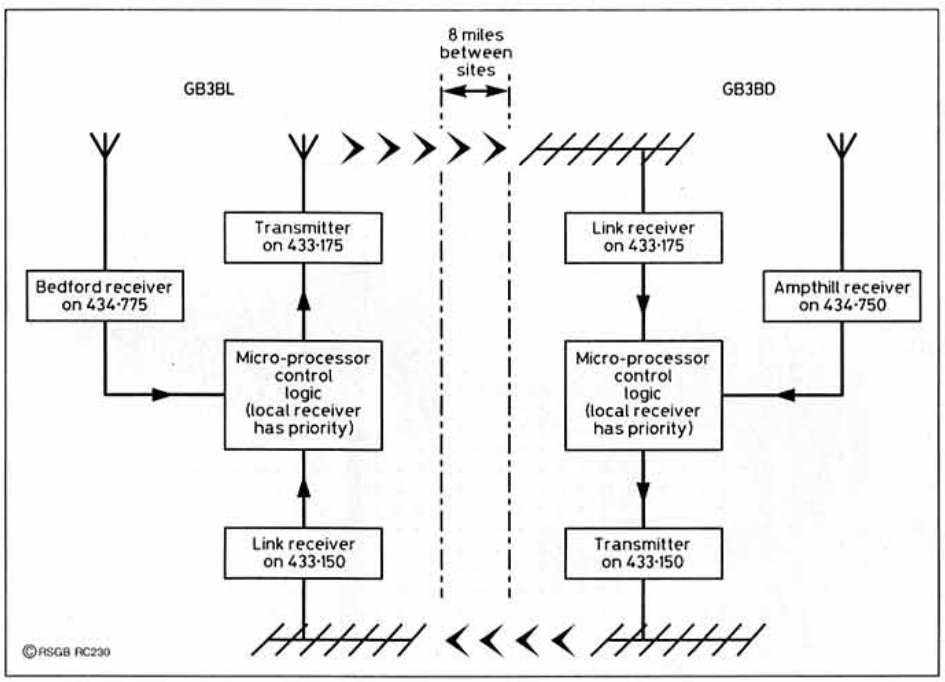


Fig 1: Bedford UHF repeater linking configuration.

SUB-AUDIO

AN EXTRA FACILITY which might exist on your local repeater is the radiation of a sub-audible tone on top of the relayed speech. This tone enables radios fitted with a CTCSS tone squelch facility (set to the correct tone frequency) to relay only speech instead of that annoying Morse callsign every few minutes. This is especially useful when out in public with a handheld or when monitoring at home with the family listening. The Radiocommunications Agency has agreed that repeaters may be accessed by using a CTCSS tone as an alternative to the normal 1750Hz toneburst [2]. In the Bedford area we have been allocated the frequency of 77Hz. Both GB3BD and GB3BL radiate the 77Hz CTCSS tone and accept it instead of a toneburst.

Many amateur handhelds are now also fitted with a keypad which is used to programme the functions of the radio. These buttons also permit the transmission of DTMF audio tones when the PTT switch is operated. DTMF tones use the same frequencies as those used on telephones that are connected

GB3BD on site in the church tower. GB3BL is similar. Note the two receivers at the bottom, with the logic tray between them and the transmitter. The logic tray has a lockable key switch which permits the linking to be switched off.

to electronic exchanges.

UK amateurs have for some time considered that there are some areas where it would be useful to connect to your home repeater whilst in the service area of a neighbouring one. Bedford Repeater Group runs two repeaters, one serving the town of Bedford whilst the other covers the villages of Mid-Bedfordshire. The repeaters are at different heights above sea level, with Mid-Bedfordshire being on a plateau above Bedford. A proposal for the experimental linking of these two 70cm repeaters was submitted to the RSGB's Repeater Management Group and subsequently received approval for a trial period.

MAKING THE CONNECTION

SO HOW DO YOU LINK one repeater to another? The system that has been working successfully in Bedfordshire uses 'in band linking', this means that at both repeater sites, an extra receiver and beam antenna 'listen' to the other repeater.

From the user's point of view, the link is enabled by sending a 2-digit DTMF code from the rig's keypad, after the normal 1750Hz toneburst (if the distant repeater is already in local use, the link cannot be set up). When repeater A hears the DTMF tone sequence it radiates a sub-audible tone on its transmitter output. Repeater B hears this tone via its second receiver, and connects its second receiver's audio path to its transmitter. The link is then completed by repeater B radiating a sub-audible tone back to repeater A, which responds by connecting its second receiver to its audio path. From then on all that happens is that, instead of either repeater just relaying audio from its own local receiver, it will also relay the audio received via the its second receiver.

Users of either repeater should not notice whether the station they are speaking to is local or is being received over the link. Once the link is set up, even if the remote repeater is not being used locally, it will continue to relay the other repeater. After the conversation has ceased both repeaters time out and the link drops. It can be set up again at any time by either user accessing either repeater with the 2-digit DTMF code.

When the link has been successfully set up the user will hear three 'pips', instead of the normal one pip, when he releases his PTT button at the end of the DTMF code sequence. Because each repeater relays the other's audio, special provisions have to be made in the software to ensure that neither repeater will transmit locally the Morse callsign of the remote repeater.

For those people who do not have a DTMF keypad built into their handheld or microphone, a suitable pad which can be held over the microphone is available from Tandy, or can be bought at rallies for a few pounds.

OUR EQUIPMENT

THE BEDFORD REPEATER Group use identical equipment for both GB3BD and GB3BL. At each site the repeaters consist of two modified Pye R460 receivers, a tray containing the controller logic and a modified Pye T461 transmitter (**Fig 1**).

Whilst the equipment is the same, the aerial system for each site differs. GB3BL is located on top of a tower block to the east of the town centre of Bedford. Here we use two vertically mounted dipoles, one for transmit and one for receive. These provide an omni-directional radiation pattern. The link aerial is a 5-element vertically mounted yagi situated at the other side of the roof (with the lift room between it and the main dipoles). The gain of yagi, plus the physical separation and any screening the lift mechanism may provide, appears to give sufficient receiver isolation.

At GB3BD, located in a church tower which overlooks the towns of Ampthill and Flitwick in one direction, and Bedford in the other, the installation has been designed to provide coverage of the former places rather than duplicate coverage of the latter. This has been achieved by placing a 5-element yagi transmit aerial on the roof beamed at the Ampthill area, the back radiation from this aerial being sufficient for it to be used by the linking receiver at GB3BL. The receive aerial at GB3BD is a dipole mounted on the southern side of the church tower one level down the tower from the transmit aerial, a lead roof providing some isolation. The linking receivers aerial, another vertical yagi, is also mounted at the same level but this time inside the tower. This points directly at GB3BL on a line-of-sight path.

ACKNOWLEDGEMENTS

THE LINKING PROJECT would not have been successful without the time given by G8MGP and G8SEZ who wrote the software and built the logic units, and G8IAY who was responsible for obtaining the equipment and aerials.

Besides the trial linking of repeaters in Bedfordshire, another trial has commenced in North Wales where GB3AN on 70cm can be linked to GB3AR on 2m. If these experiments are successful, it is hoped that linking may become a regular facility on some repeaters.

REFERENCES

[1] Ham Radio Today, various editions 1986 – 1994 (Argus Specialist Publications).

[2] 'CTCSS Repeater Areas', *1994 RSGB Call Book and Information Directory*, p110.

Flying the Flag

THE RSGB at its Headquarters Open Day and at HAMfest-UK.

RSGB book and information stand at HAMfest-UK.

Brisk business in the HQ Book Shop on Open Day.

Representing the RSGB at HAMfest-UK: Adrienne Hold and Sylvia Manco, 2E1CYL, pose in front of the official RSGB flag.

Martin Lynch (right) deals with a customer whilst Dennis Goodwin of Icom UK (left) looks on. Also supporting Open Day were Waters and Stanton.

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.

NOW YOU can send perfect Morse at the touch of a button! A dedicated CW keyboard has been introduced into the MFJ range of products. The **MFJ-451** includes an IBM-AT compatible keyboard, a 200 character type-ahead buffer and two 100 character non-volatile message memories (which, it is claimed, saves messages and settings for up to 20 years without power or batteries!). The keyboard can also be used as a teaching aid – by repeatedly pressing a key the sound can soon be learnt and recognised. The MFJ-415 costs £109.94 and comes complete with a power supply unit, and is available from:

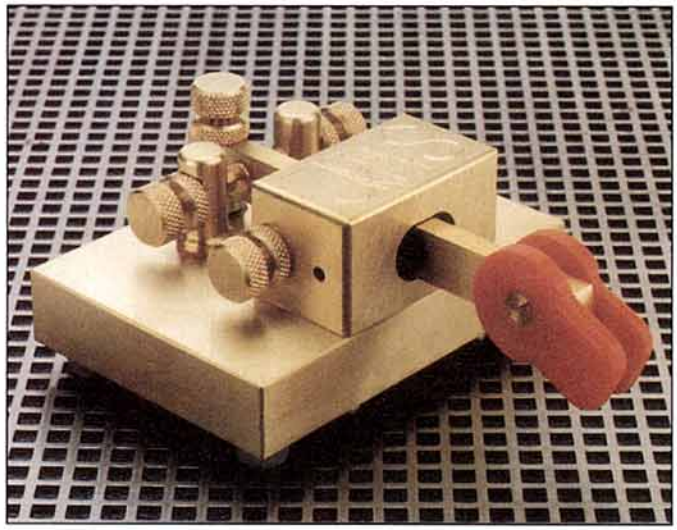
Waters & Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS. Tel: 0702 206835/ 204965; Fax: 0702 205843.

THE NEW **RS catalogue** is now available in three volumes, covering Components, Equipment and Mechanical. This new version includes 3,200 new products now stocked by this company. For further details of this, and the CD version of the catalogue contact:

RS Components Ltd, PO Box 99, Corby, Northants NN17 9RS.

STEVE HUNT, G3TXQ, has developed a number of **software** applications for the Acorn's RISCOS (Reduced Instruction Set Computer Operating System) range of computers which will be of interest to both professional and amateur RF design engineers. These include a filter designer, a receiver noise figure / intercept point analysis tool, an inductance 'ready reckoner', and a comprehensive Smith Chart Design aid. For more details:

Steve Hunt, G3TXQ, 21 Green Street, Milton Malsor, Northampton NN7 3AT. Tel: 0604 858090 (after 7pm).

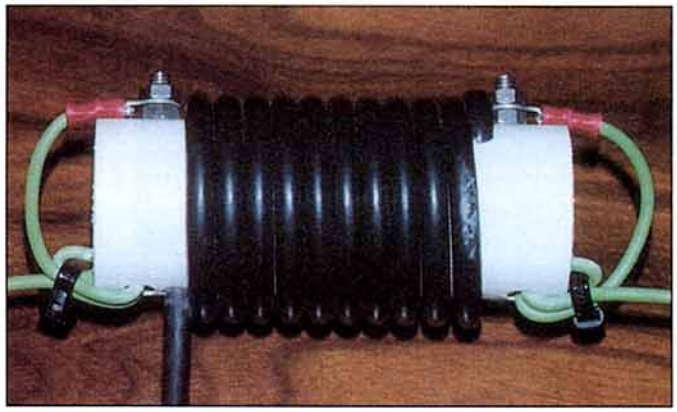


A NEW **SINGLE lever paddle key** has been added to the range of keys supplied by Peter Jones Engineering. This joins the pump handle and twin lever paddle which are already proving very popular keys. The key is available with a choice of base finish and this model introduces a new magnetic damping mechanism.

Chris Rees, G3TUX, The QRP Component Company, PO Box 88, Haslemere, Surrey GU27 2RF. Tel: 01428 641771.

ANTENNA BUFFS will be interested to see **the new range** marketed by SRW Communications Ltd. In their current range they have the MkII version of the popular G3TPW CobWebb, which covers the 14 – 28MHz range (see review, *RadCom*, June 1993, p68); the Spider and the Flytrap, which cover the 1.8, 3.5, 7 and 10MHz bands; and the 5-element horizontally polarised version of the CobWebb. Further information from:

SRW Communications Limited, Astrid House, The Green, Swinton, Malton, N Yorks YO17 0SY. Tel: 0653 697513.



● UKEUG IS THE user-group for the **Einstein computers**. Membership is £10, £18, or £27 depending on whether 6, 12 or 18 issues of the bi-monthly *All Micro News* (20pp A5) are required. **UKEUG, c/o A E Adams, Ivy Cottage, Church Road, New Romney, Kent, TN28 8TY.**

● THOSE SITTING the US Novice or Technician Licence examinations (available in the UK) will appreciate **Hampass for DOS and Hampass for Windows** which are exam review programs for the PC. Full details from the **ARRL, 225 Main Street, Newington, CT 06111 USA.**

GEC PLESSEY Semiconductors has produced a couple of new products which are well worth mentioning: The first is the SP8858 **chip** which is the **updated version of the SP8853** (Plessey's low power, single chip frequency synthesiser).

The SP8858 offers a 15-20dB improvement in phase noise and is designed for professional applications up to 1.5GHz and contains all the elements (apart from the loop amplifier) to fabricate a phase locked loop frequency synthesis loop.

The second product is a new range of **crystal oscillators** that can work at frequencies as low as 1kHz, thus removing the need for the external frequency divider normally required to reduce the output down to these frequencies.

GEC Plessey Semiconductors, Cheney Manor, Swindon, Wilts SN2 2QW. Tel: 0793 518582.

ICS HAVE sent us details of the **weather stations** produced by Davis Instruments which are available direct from ICS.

These can be connected direct to the computer and used for long term data logging and producing graphs.

More radio amateurs appear to be interested in monitoring the weather and these instruments are an economical way of keeping a check on the temperature, rainfall, and barometric pressure, on a regular daily basis.

Prices range from £149.95 to £369.95 for the basic weather station. ICS also have a range of software for IBM PCs. This covers weather satellites and marine charting software. Full details can be obtained from:

ICS Electronics Ltd, Unit V, Rudford Industrial Estate, Ford, Arundel, West Sussex BN18 0BD. Tel: 0903 731101.

RADCOM USER REVIEW

MFJ-492 Menu Driven Memory Keyer

By Rev George Dobbs, G3RJV

A MERE HALF HOUR in the open air flea market at a temperature of 107°F in the shade, at the HamCom exhibition '93 in Arlington, Texas, and I took shade in the exhibitors refreshment area. Taking refuge in an enormous iced tea, I shared my respite with Martin Jue, that imaginative President of MFJ Enterprises. To my question: "What's new?", he took me back to his stand and showed me a range of the latest products. A couple things caught my eye, one of which was their Menu Driven Memory Keyer.

Recently I had the opportunity to try a sample of the MFJ-492 Keyer. This coincided with the G QRP Mini Convention in Yeovil so a whole crowd of QRP operators, most of them dedicated CW operators had a chance to try it out.

The MFJ-942 appears to offer all that a CW operator would require in a memory keyer. It will connect to either a single paddle or a double iambic paddle. The back panel also contains an optional remote control connection to gain access to the keyer menu if the main unit is out of reach.

The basic operation is very simple. At switch-on the keyer switches on the four front panel LEDs sequentially and sends the characters 'O' and 'N'. The operator can then begin to send with the paddle adjusting the speed and volume to preference. So the initial operation is simply: power up, switch on and send Morse.

A SIMPLE MENU

I AM A LITTLE WARY of menu driven keyers. I have a CMOS Super Keyer II built from a kit. It is a clever little thing with roughly the same facilities as the MFJ-492, all controlled by four buttons. It has served me very well but I can rarely remember what it does or what combinations of the buttons offer each feature. Whenever I want to do anything more than use it in its basic form I have to find the manual to work out what to do. Perhaps it is just a function of age! I am much the same way with my multi-featured two metre handheld transceiver.

The joy of the MFJ-492 is that the menu operation is transparent. There is a clearly marked front panel with a series of buttons and LEDs to choose the options. These are arranged within a table printed on the front panel which clearly shows which feature may be selected. It makes for a larger than average front panel for a keyer but it also makes sound sense.

To test out the simplicity of operation, I tried to use the menu without reading the manual. With one slight exception when I made a mistake in entering a message into the memory, I succeeded in performing all the menu operations without having to search through the manual. Quite an achievement for a modern microprocessor controlled piece of equipment! Even the most inexperienced keyer user should have little difficulty in picking up the operation of the MFJ-492 very quickly.

The message memory is a pleasure to use and even helpful. At gaps between words, it sends a 'W' to show that a word break has been inserted. It also sorts out bad Morse in that if it fails to recognise a valid Morse character, it sends a series of eight dots and that character is not saved. If the operator wishes to correct an error, sending a series of eight dots erases the previous word.

A whole series of commands can be used with the messages in the memories to do such things as: insert serial numbers, create a message loop, add timed pauses and insert extra spaces. The manual gives an example setting of a complete message sequence for

MANUFACTURER'S SPECIFICATION

Power Requirements:
12V DC at 250mA

Memories:
Four soft sectored message memories for a total of 192 characters. [MFJ-492X] 8 memories of 1000 characters each

Embedded Commands:
Auto-incrementing serial numbers, Timed pauses up to 99 minutes 99 seconds, Message loop, Linked Messages, Message insertion.

Adjustable Parameters:
Code speed, is variable from 5 - 100WPM, Weight varies from 5 to 95%.

Parameter Save:
Message memory and keyer parameters saved in non-volatile memory.

Sidetone Speaker:
Internal sidetone speaker with adjustable volume and frequency.

Output Tune Mode:
Constant key to tune antennas

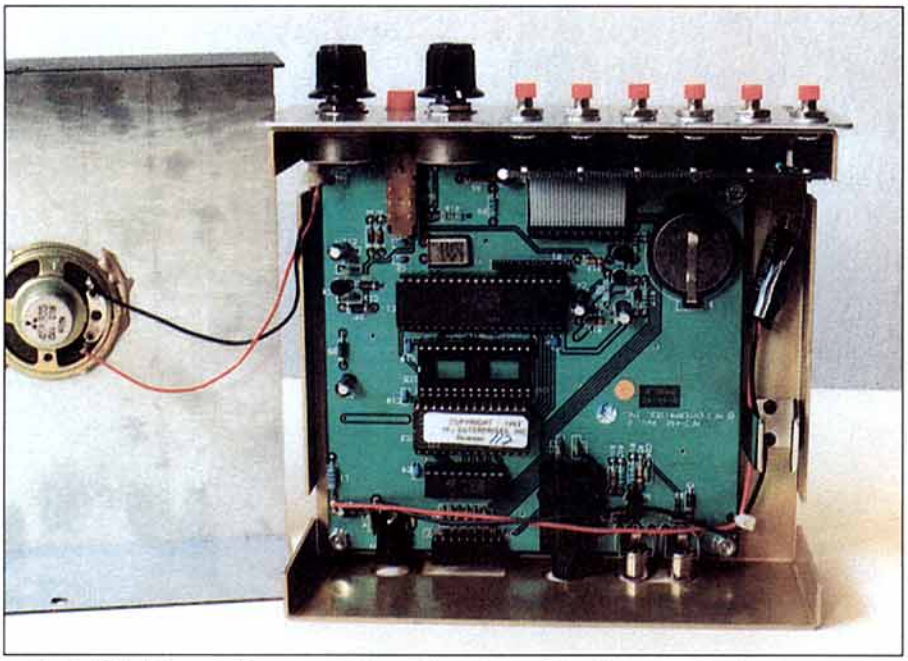
Key Output Disable:
Enable and disable key output to practice operation.

Keying Modes:
Iambic On/Off, Iambic A or Iambic B, Hand Key (straight key), Semi Auto (bug), and Reverse Paddle modes are user selectable.

Positive or Negative Key:
Supports both positive and negative radios

Transmitter Compensation:
Adjustable key down delays to compensate for transmitter rise-time delays

Morse Code Trainer:
Random code generator with 5 character or random 1-8 character length words. Random characters are selectable from alphabetic, numeric, or punctuation sets or specific 6-character sets.



Inside the MFJ-492 menu driven memory keyer. The volume of the sidetone speaker is adjustable.

use by contesters.

The menu selection of the keying and output modes is also very simple. The speed set adjusts the speed to which the speed control knob is set by using the paddles. The side-tone frequency is set in the same way. This one is fun . . . The paddles clock the frequency up and down: the cat enjoyed that one! The disable output is very useful for setting up a paddle or just practising without disturbing the ether or other people.

MORSE CODE PRACTICE

THE CODE PRACTICE facility might be seen just as a pleasant optional addition to the keyer but it is quite a valid teaching tool. The facility includes a 'Farnsworth' mode. Farnsworth is the method of Morse training, preferred by many teachers in which the characters are sent at a relatively high speed but the gaps are stretched out for the pupil to read the code.

The technique is to close up the spaces as the Morse code reading skill increases. the advantage is that from the beginning, the pupil begins to learn what 'real Morse' sounds like. In the MFJ-492 the Farnsworth speed is set at 18 words per minute so the practice facility could be useful for increasing speed skills beyond the test sped of 12 words per minute.

The Morse tutor also offers a choice of words or random groups with choices of character sets to learn the code a little at a time.

CONCLUSIONS

THE MFJ-492 MEMORY KEYER seems to include all the facilities that a dedicated CW operator might require, and perhaps a few more. My fellow QRPers seemed to like it too. It is a little larger than many keyers but would make an ideal main station unit. I especially like the simplicity of operation and the clear menu on the front panel. It sells in the UK for £119.95 plus £3 postage.

The MFJ-492 is available from Waters and Stanton Electronics, 22 Main Road, Hockley, Essex. SS5 4QS (Tel: 0702 206835 or 204965). My thanks to Jeff Stanton for the loan of the review unit.

ROTATORS CONTINUED

MY ROTATOR HAS SWITCHES for 'Left' and 'Right' and a direction display. How does the display work?

IN THESE ROTATORS the motor control and the direction indicator are completely separate. They rely on you to start, stop and reverse the motor as required. Generally the display uses a DC voltmeter or bridge circuit, controlled by the variable potentiometer in the rotator.

The circuits are basically quite simple. What sometimes makes them difficult to understand is that power supplies may be 'floating' with neither the positive nor the negative terminal at ground potential, and often one of the direction indicator wires is shared with the motor circuit.

For example, the meter circuit of the old CDE Ham-M rotator looks something like **Fig 1a** – really quite obscure until you ignore the unusual ground connection and redraw it as **Fig 1b**, which turns out to be a simple moving-coil meter measuring the voltage difference between one end of the potentiometer and the slider.

In this case the 360° pot is a custom-designed component with a rising spiral track, so that the finish of the track is directly above the start. As I mentioned last month, the slider is driven directly by the rotating bell-housing. The disadvantage of this type of display is that 360° of beam rotation has to be compressed into the 90° arc of the meter movement, so the direction indication does not look realistic.

As another example, the Yaesu/Daiwa/Kenpro 400- and 600-series rotators use a more conventional-looking potentiometer

IAN WHITE, G3SEK
52 Abingdon Road, Drayton, Abingdon, Oxon OX14 4HP – or @ GB7AVM

which has 360° of track. This pot is driven by its own gear train, but with the same reduction ratio as the main drive so that 360° of antenna rotation is also 360° on the potentiometer. The controller is available with two types of direction display. One uses a conventional meter in a circuit rather like Fig 1b, while the so-called 'round controller' has an indicator that follows the beam heading through a full 360°. **Fig 2** shows the simplified circuit of the 'round controller', which is basically a DC Wheatstone bridge and a motor-driven servo. RV1 is the 360° pot in the rotator and RV2 is an identical component in the control box.

When RV1 and RV2 are both in the same position, the bridge is balanced (zero voltage between points A and B) and the pointer attached to the shaft of RV2 shows the beam direction. When you turn the rotator, RV1 changes, the bridge becomes unbalanced and a DC offset voltage appears across A–B. This is applied via a servo amplifier to a small DC motor.

Because one side of the motor is grounded while the output from the servo amplifier can swing either positive or negative, the motor drives RV2 in the direction required to re-balance the bridge. When the bridge is balanced the output of the servo amplifier falls to zero and the motor stops. In other words, the servo makes RV2 and its direction pointer follow the motion of RV1, up in the rotator.

MY ROTATOR HAS NO switches or display – just a knob that you rotate and push down. The rotator turns around to the position that I set, and then stops on its own. How does that work?

THE 'FOLLOW-ME' TYPE of rotator controller generally uses a 360° potentiometer, connected in an AC bridge circuit with a similar 360° control pot in the rotator. When you turn the control potentiometer to a new direction and push the knob down to start the rotator (or push a separate start button) the bridge will initially be unbalanced. The out-of-balance or 'error' voltage is amplified to operate a relay, which starts the rotator motor to drive its potentiometer around until the bridge is balanced again. When the rotator has turned to the correct direction, the error voltage across the bridge falls to zero, so the relay drops out and the motor stops.

Let's look at the CDE AR-40 controller for further details; **Fig 3** shows the simplified circuit. The centre-tapped mains transformer forms an AC bridge together with R1, RV1 in the rotator and RV2 attached to the control knob. The output (point A) is at zero voltage if the sum of (RV1+RV2) equals 1kΩ, the value of R1. The two pots are identical, both 1kΩ maximum, so if they are connected as shown in Fig 3 the bridge will be balanced when RV1 and RV2 are both set at the same angle.

When you operate the rotator, the AC error voltage appearing between point A and ground is amplified by transistor TR1, and the output voltage is capacitively coupled to the bases of TR2 and TR3. If the positive-going voltage swing at the base of TR2 is greater than its base-emitter voltage drop, TR2 will conduct and activate the 'motor start' relay RL1.

As described above, the rotator continues to turn until the bridge becomes balanced, no AC voltage appears at point A, TR2 ceases to conduct and RL1 drops out. This leaves RV1 and RV2 set at the same angle, which means that the control knob and the antenna are pointing in the same direction.

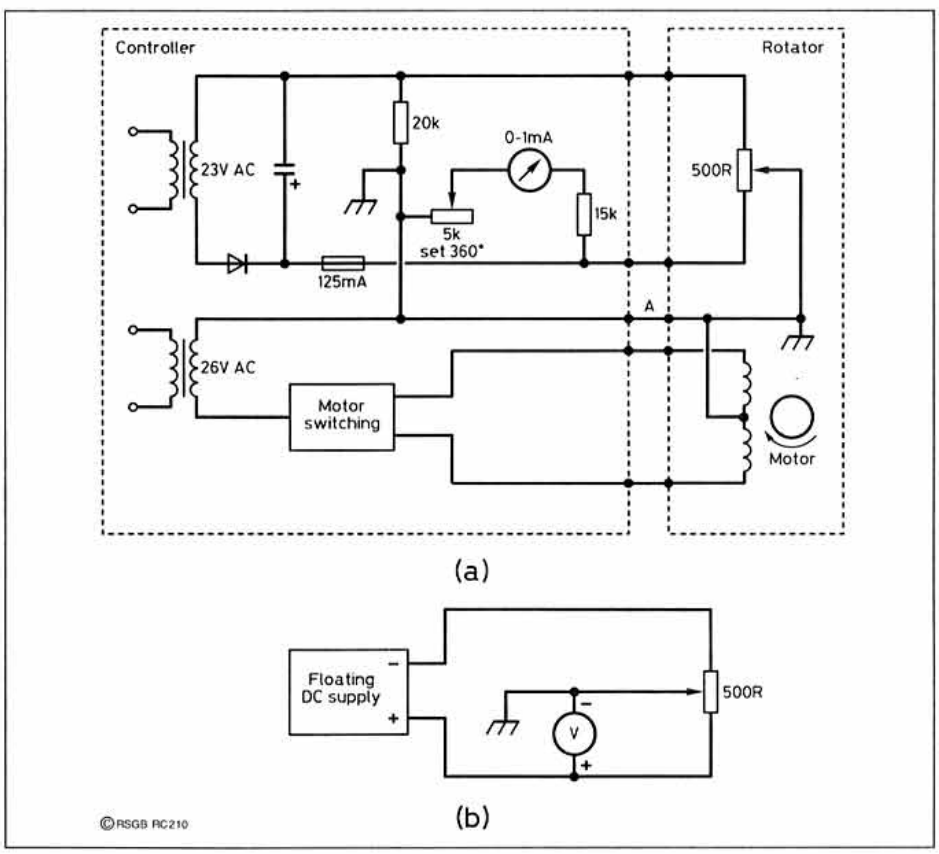


Fig 1: (a) Extract from the circuit of the CDE Ham-M controller. Note how wire A is shared between the indicator circuit and the motor circuit. (b) The same indicator circuit simplified to reveal a voltmeter fed from the potentiometer in the rotator unit.

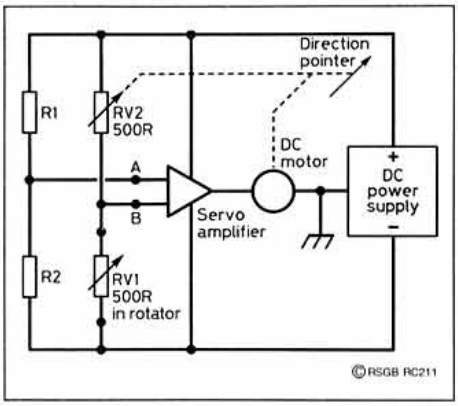


Fig 2: Simplified circuit of a 360° rotator indicator. The servo amplifier drives the DC motor in either direction to keep RV2 equal to RV1 and balance the bridge circuit. The direction pointer is linked to the shaft of RV2, and thus follows the motion of RV1 in the rotator.

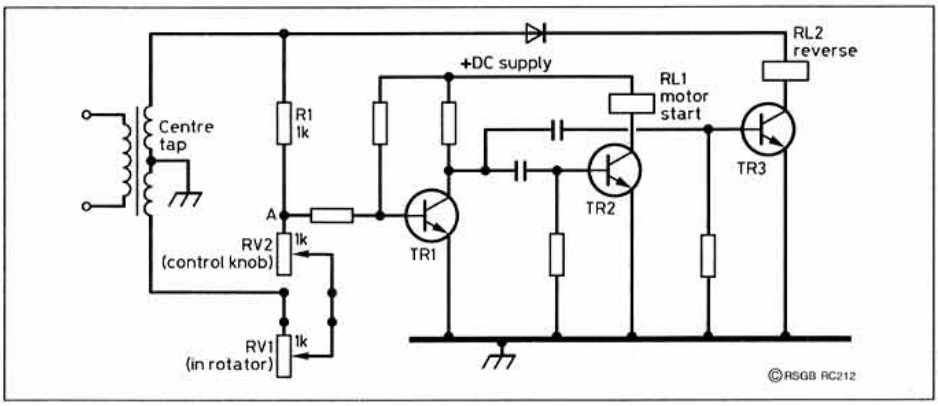


Fig 3: Simplified circuit of a 'follow-me' controller such as the CDE AR-40. R1, RV1 and RV2 form an AC bridge with the centre-tapped transformer.

But how does the motor know which way to turn? This cunning circuit uses another useful property of the AC bridge: if it is unbalanced towards the upper half of the centre-tapped transformer winding, the AC output voltage will be 180° different in phase than if it were unbalanced in the opposite direction. If TR2 conducts to activate RL1 and start the motor, so also will TR3 which is connected to the 'motor reverse' relay RL2. However, unlike RL1 which is powered by a constant DC supply, RL2 is powered via D1 which only passes the positive half-cycles of the AC supply waveform.

This means that RL2 will only activate if its supply voltage and the waveform at the base of TR3 are both on their positive half-cycles at the same time. Because of the phase reversal at either side of bridge-balance, turning the control knob one way will activate RL2, while turning it the other way will not. With appropriate wiring, the rotator will always turn in the correct direction to follow the control knob.

The AR-40 is a five-wire rotator, three for the motor and two connected to the direction potentiometer. If everything is working correctly, the motor cannot be driven beyond the end-stops of the control knob, so there are no limit switches in the rotator and this saves two extra wires.

Instead there is a thermal cutout on the power transformer, which will sense the higher current demand if the motor stalls on its end-stop and will interrupt the mains supply to give everything a few minutes' rest.

Unfortunately it also cuts off the power after the rotator has been used for only a minute or two – often little more than two full revolutions. This feature tends to over-protect the motor, and can be a major nuisance when you are using the rotator intensively.

SPEAKERS, HEADPHONES AND BOOM MIKES

PLUGGING IN THE HEADPHONES to my transceiver cuts off the loudspeaker, but I would like the option to leave the speaker on when operating with the club station. Any suggestions?

THERE'S NOTHING MORE antisocial than a club event where the operator is wearing headphones to keep out the background noise, but nobody else can hear what's happening on the air because the headphone plug has operated the speaker muting switch.

If you never want to mute the speaker, the answer is obvious enough: bridge across the speaker muting contacts with a bit of wire.

The second option is to push the headphone plug in until the tip just touches the contact but doesn't operate the muting switch, but this is very unreliable – there's nothing holding the headphone plug in place.

Fortunately there is a third method, based on a stereo jack socket and a simple modification to the headphone plug. When you insert the plug half-way, it clicks into place and the signal goes to both the headphones and the speaker; when you push the plug fully home, the speaker is muted. This kind of very simple modification can make all the difference between your station merely working the way it came out if the boxes, and working the way you want it to.

Fig 4 shows how: the modification is done to the headphone plug, but it requires a stereo headphone socket on the transceiver. Many modern rigs already have this for use with 'walkman' headphones, the same audio output going to both the 'tip' and 'ring' contacts on the socket. The headphone plug can be either mono or stereo, but in both cases the left and right earpieces are both connected to the **tip** of the plug.

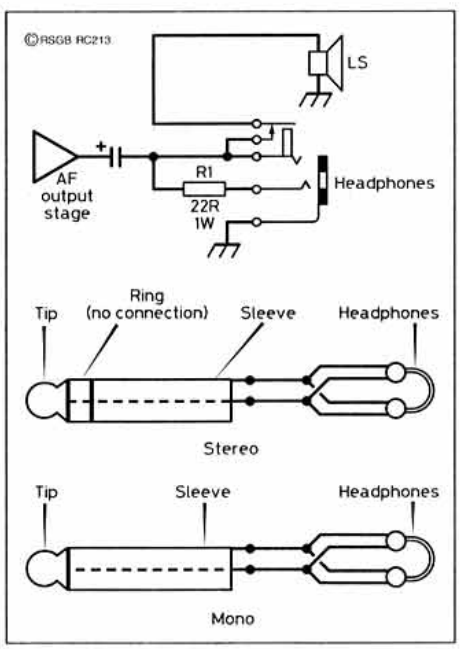


Fig 4: Optional speaker muting for a typical stereo headphone jack, showing where to insert R1.

If the plug is a stereo type, simply move one wire from the 'ring' contact to the 'tip' contact, leaving the 'ring' contact open-circuit. When the plug is inserted half-way, the tip engages with the 'ring' contact on the headphone socket, and the headphones receive their signal via R1 without muting the speaker. When the plug is pushed fully home, its tip engages with the 'tip' contact in the socket, and the speaker is muted.

R1 is essential if you use a mono headphone plug, because when fully inserted it will short-circuit the audio output to ground through the 'ring' contact. The value of R1 should be 3 times the impedance of the speaker, e.g. about 22Ω, rated at 1W.

Fitting R1 reduces the audio output to the headphones in the halfway-inserted position, which is a definite advantage for club events and field days because you can turn up the speaker volume without deafening the headphone-wearer.

TIP – If you use an extension speaker with its own headphone socket, there's an even simpler solution. Disable the speaker muting in the extension speaker and leave the transceiver as it is. Then plug the headphones into whichever socket you prefer.

Still on the subject of headphones, many operators find that aircrew headsets (often available at rallies, with or without the boom microphone) are more comfortable than the hi-fi or 'walkman' type. They are rugged, designed to be worn for very long periods, can exclude high levels of external noise, and have a tailored audio response which reduces operator fatigue caused by high-frequency noise. Especially in older models, the boom mike housing is large enough to accommodate a modern miniature insert.

The Heil HC4 dynamic insert has a good tailored response to give most voices that extra punch for SSB DXing, and unlike electret microphones, it requires no power supply. Unfortunately there appears to be no UK agent for Heil at present: try Ham Radio Outlet in the USA (0101 714 533 7373, call at the cheaper rate after 8pm).

On the other hand you may be able to find a much cheaper solution by the 'glass slipper' method: try out a whole range of low-quality mic inserts – the ones that *don't* have a flat frequency response – until you find one that fits your voice perfectly for DX!

Although boom mikes prevent you from wandering around the shack, and can get soggy if you drink your coffee carelessly, they are highly favoured by DXers and contest operators because they leave both hands free and a clear desk. To overcome the lack of a push-to-talk button, many operators use a foot-switch (e.g. Electromail/RS 316-901).

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 or by packet (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.

IDEAS FROM ABROAD

TRANSLATED AND EDITED BY ERWIN DAVID, G4LQI

Crystal oscillators for UHF/SHF are discussed by **W (Pim) C Niericker, PA0TLX**, in *Electron* (NL) 2/94, with a recent update. His findings regarding a frequency source to be multiplied into the gigahertz range follow. A UK manufacturer comments on some of Pim's crystal problems.

NOT ONLY AMATEURS have problems with presumably simple crystal oscillators, if their output is multiplied into the gigahertz range. My otherwise excellent local-oscillator (LO) chain from SHF-Systems (USA) suffers from excessive phase noise, while one from SSB Electronics (D) could not be adjusted to its nominal frequency. Is the crystal manufacturer to blame?

WHAT IS NEEDED?

THE LO SIGNAL FOR UHF/SHF transverters is often derived from a crystal oscillator in the 90-110MHz range. There is good reason to start with so high a frequency: the LO frequency should be as far from the signal frequency as possible to simplify filtering out transmitter spurii and receiver birdies.

In a 23cm transceiver one might start with a 96MHz crystal oscillator, multiply x12 to 1152MHz, and mix this with a 144-146MHz transceiver for an RF range of 1296-1298MHz. What are the requirements for this 96MHz oscillator?

1. STABILITY. If the oscillator drifts 8Hz during one over, the RF drifts 100Hz; acceptable for FM but intolerable for SSB.
2. SPECTRAL PURITY. Spurii can cause out-of-band signals being transmitted. They, and phase noise, can spoil receiver performance.
3. ACCURACY. For easy frequency translation from 1296-1298MHz to the 144-146MHz transceiver read-out with 1kHz accuracy, the crystal frequency must be within 80Hz of its nominal frequency, ie better than 1ppm (part per million).

WHAT CAN GO WRONG?

WHILE TRYING TO MEET these requirements, I faced the following problems:

1. The oscillator cannot be 'trimmed' to the nominal frequency or will not start if pulled that far. Reason: The oscillator's pulling range does not include the actual crystal frequency.
2. The frequency drifts aimlessly. Reason: poor choice of oscillator components; temperature-sensitive ceramic capacitors or trimmers, unstable coils and poor support insulators are unsuitable for precision VHF oscillators. If the drift (after warm-up) is mainly in one direction, generally down, your crystal may be insufficiently aged.
3. The oscillator will not start when (over)loaded by a following stage, especially if the latter runs in class-C (as a frequency multiplier must). This is difficult to predict, as 'activity', ie the equivalent series resistance (ESR) of specification-meeting crystals, can vary by as much as 3:1 [Note 1].
4. The oscillator jumps frequency. If an oscillator is pulled too much to get it on frequency, the crystal may jump to a spurious mode.
5. The oscillator runs away when transmitting but comes back when receiving. This happens if the heat from power stages can get to the oscillator components, most of all the crystal. Avoid single-PCB microwave transverters [Note 2].
6. Oscillator spurii. These can be seen on a spectrum analyzer or heard by tuning the band. They can be caused by an inadequately by-passed regulator IC, or, if the oscillator is poorly screened, strong local FM broadcast signals may get into the circuitry and be amplified along with the LO signal.

AVOIDING PROBLEMS

THREE ISSUES MUST BE addressed: the choice of an oscillator circuit, its construction and the procurement of a suitable crystal.

The circuit of **Fig 1** was recommended in the *ARRL UHF/Microwave Manual* [Note 1]. It was developed by the Australian Post Office laboratory.

The mechanical precautions taken with this crystal oscillator at 96MHz are virtually identical with those for my LC VFO at 2.5MHz (*Eurotek* in *RadCom* 2/93): a rigid enclosure which excludes air flow and also provides thermal lagging, lowest-TC capacitors and trimmers in frequency-determining places, glass feed-throughs and short, stiff wiring. (*Eurotek* lacks the space for the details of PA0TLX's assembly in a 50x50x30mm cast-aluminium box).

Having a stable oscillator and a professional frequency counter, RF millivoltmeter and spectrum analyzer, I could now reproducibly test crystals. All readings were taken at the tripler output, ie at 288MHz. The 'true' frequency was defined as the one with C6 tuned for maximum output. That output was then used to compare the activity of crystals.

BUYING A CRYSTAL

I BOUGHT THREE CRYSTALS OF different brands from Dutch stockists (all priced between £9 and £11) and took one out of an existing transverter. The following was learned:

- All were between 11 and 22ppm *above* their nominal frequency. This is much more than can be explained by the difference between my oscillator and the 'standard' instruments used by their manufacturers. One of the crystals was returned to its maker with its frequency as measured in my oscillator and an order for a new one as close to frequency as he could make it; this turned out to be +10ppm!
- By means of C6, crystals could be pulled approximately 5ppm either way. Beyond that, tripler output dropped abruptly on the high-frequency side, less steeply on the low frequency side. None of the crystals could be pulled to its nominal frequency and still provide adequate drive for the tripler stage.
- Two of the bought crystals jumped frequency during the first few hours of operation; thereafter they settled down to where they could be properly measured. One wonders how the manufacturers had tested them.
- After much arm twisting, I finally got yet another manufacturer to admit that they, like others, were *aiming* for +10ppm, because that places the desired frequency on the less-steep flank of the output vs. frequency curve, from where, presuma-

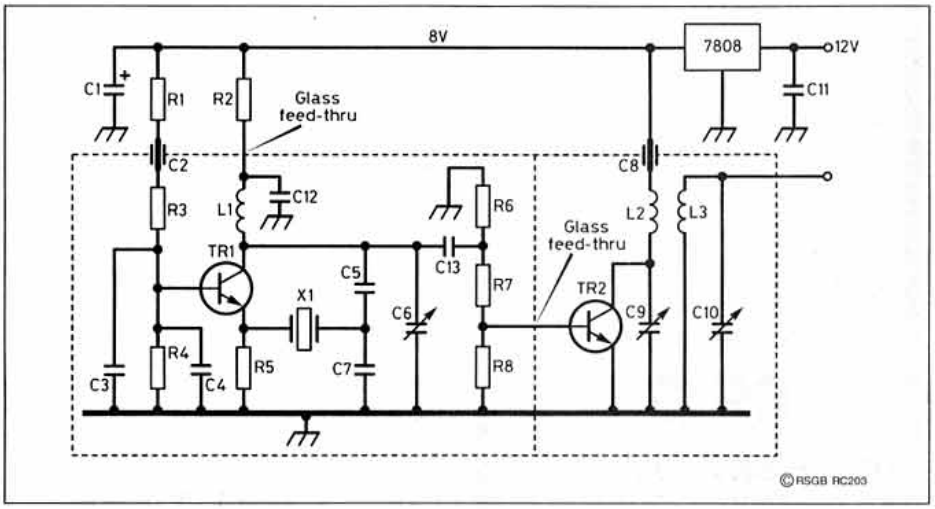


Fig 1: PA0TLX' 96MHz crystal oscillator with tripler to 288MHz for the local oscillator chain of a 1296MHz transverter.

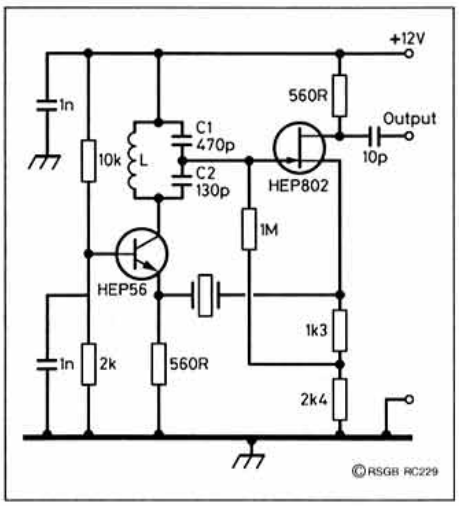


Fig 2. The Butler overtone oscillator. The LC circuit selects the desired overtone, here the 5th at 96MHz, and permits some frequency adjustment. A trimmer capacitor in series with the crystal, eg 3 - 30pF, can provide extra 'pulling'

bly, the crystal can be smoothly pulled either way.

- I then ordered a crystal for 95,999.00kHz. After one reject for low activity, its replacement, the 8th crystal tested, was what I wanted!

THE RESULTS

A CAST-ALUMINIUM BOX is no constant-temperature oven but it does slow down any temperature effects from within, ie warm-up drift, or from the outside, eg changes of room temperature, with a time constant of approximately one hour. With one crystal, the warm-up drift was 140Hz with a settling time of about 90 minutes; this suggests that the oscillator should be left 'ON' between operating sessions. A 1°C change of room temperature caused a frequency change of 20Hz, ie 240Hz at 1296MHz; this is acceptable because it occurs so slowly. Drift during a longish 1296MHz 'over' is no more than 10Hz.

The bottom line: if you can live with a mental correction to the frequency reading of your transceiver, a stock 'amateur grade' crystal will do. If not, expect some frustating shopping!

UK COMMENTS

HAVING BEEN PLEASED with UK-made amateur grade as well as professional crystals, G4LQI called Mr Graham Bird at McKnight-Fordahl Ltd (see advertisement in *RadCom* 8/93, p.72) for his comments on PA0TLX's problems. Here is an excerpt:

". . . . yes, crystal manufacturers aim for a frequency above nominal, but by no more than the expected first-year's aging. How much this is depends on the method used to seal the crystal case: 2ppm for cold-welded cases like ours, 5ppm for resistance-welded cases, and 10ppm for soldered cases.

". . . . we know how to artificially age crystals very quickly; even our rapid-service crystals are so treated before final test and shipment.

". . . . the temperature performance of a crystal is controlled by the angle under which the blank is cut out of the quartz bar. Further processing can only detract from that control. Fifth overtone crystals require extra polishing, hence their temperature performance is less predictable than that of third overtones.

". . . . third overtone crystals are made up to 75MHz. We expect to extend this to 120MHz by year's end.

". . . . our normal adjustment tolerance is ±10ppm at 25°C as measured on an industry-standard oscillator. If you furnish us with a crystal of a near-by frequency with its accurate frequency reading in your oscillator, we can correlate our test oscillator with yours and adjust to ±5ppm.

". . . . for your 23cm transverter I suggest a third-overtone crystal of 72MHz, (requiring x16 multiplication rather than x12), adjusted to ±5ppm at 25°C ±5ppm -10 to +60°C. Such a crystal would be priced around £20 including VAT."

COMPONENTS LIST

Resistors

R1, 2	10R
R3	4k7
R4	3k3
R6, 8	270R
R5	470R
R7	18R

Capacitors

C1	10µF 16V tantalum
C2, 8	1nF feed-through
C3	1nF silver mica
C4	200pF
C5	10pF
C6, 9, 10	Trimmer, 12pF max. tubular ceramic or air
C7	22pF silver mica
C11	10nF 16V ceramic
C12	100nF miniature
C13	4.7pF silver mica

Inductors

L1	Toko S18, yellow no core, 4½ turns
L2, 3	2 @ 2½ turns wound on 4mm drill bit
1mm	silvered wire

Semiconductors

TR1, 2	2N5179

NOTES

[1] Sluggish crystals will oscillate if driven harder; try changing C5 and C7 in **Fig 1**, to 12 and 18pF resp. If overdone, stability will suffer. Another remedy is to unload the oscillator by inserting a class-A buffer between it and the multiplier. The 'Butler' oscillator design includes a buffer. *[G4LQI]*

[2] My otherwise excellent G4DDK 10GHz oscillator-multiplier chain had this problem; my separate oscillator fixed that.

[3] I later heard that with a 'Butler' oscillator, **Fig 2**, (from G6JP's VHF/UHF Manual, 4th ed. Fig 31, RSGB) it may be easier to tame reluctant crystals.

Technical Update

THE YEARLING BEGINNERS RECEIVER, JANUARY 1994

IC2 (NE602) should show pin 3 connected to earth, as shown in IC1.

MSF LOCKED FREQUENCY REFERENCE, MAY AND JUNE 1994

Our thanks to P J Gittings, G8ITY, and J M Dunnet, G4RGA, for pointing out the following:

Fig 4: The component marked 4D66 should be a 4066 with a positive supply line connected to +12V. An alternative to the 4066 is a 4016. The 60kHz input from the head amplifier to the LM393 should reference Fig 3, not Fig 4.

Fig 6: The 12MHz from the VCXO comes via Fig 4, not Fig 6.

Additionally, G8ITY suggests the following:

Fig 3: The MPF102 is somewhat difficult to obtain but can be replaced by a 2N3819.

Fig 4: Pin 3 of the 74HC86 could go to an LED to indicate 'lock', leaving the meter to indicate phase difference specifically.

Fig 6: 74LS92 (or any other version of this chip) is very difficult to obtain. However the 74LS93 can be configured to divide by 12 quite simply by connecting pin 2 to 8 and pin 3 to 11. Pins 6 and 7 are left disconnected.

G8ITY also comments that the switched frequency divider in Fig 6 is rather complicated for most amateur applications and that most commercial units usually have only two or three frequencies. He suggests a simple divider circuit with outputs of 12MHz, 1MHz and possibly 100kHz. He goes on to say that the 108MHz from Fig 4 is a useful frequency output.

Yes, We've c

Not only has SMC pioneered lower transceiver p on most of the accessories giving you the custo the best deals around call your local S

COMET ANTENNAS

CA21	7MHZ Mobile Whip	£38.00
CA-14HR	14MHZ Mobile Whip	£38.00
CA-21HR	21MHZ Mobile Whip	£38.00
CH72S	2M/70CM Whip BNC	£14.00
CH600MX	2/70/23CM Whip BNC	£25.00
CHL21J	6M MOBILE Whip	£38.00
CA2X4KG	2M/70CM Mobile Whip	£45.00
B-10	2M/70CM Mobile Whip	£18.50
CHL21J	2M/70CM Mobile Whip	£15.00
CX-902	6M/10M Base Colinear	£140.00
ABC23	3 x ⅝ Base Colinear	£55.00
GP9N	2M/70CM Base Colinear	£123.00
GP15	6M/2M/70CM Base Colinear	£85.00
CX-902	2M/70CM/23CM Base Colinear	£84.50

COMET DUPLEXERS

CF-305	HF/VHF Duplexer	£25.00
CF-306A	HF/VHF/UHF Duplexer	£34.00
CFX-514	6M/2M/70CM Triplexer	£39.50
CFX-431	2M/70CM/23CM Triplexer	£42.50
CF-520	2M/6M Duplexer	£24.50

COMET ANTENNA ACCESSORIES

RS-9	Mini Boot Mount	£6.75
RS20	Mini Gutter Clip	£15.00
CK-3MB	Mini Cable Assembly	£19.50
WS-1M	Window Mount & Cable	£36.50

COMET STATION ACCESSORIES

CBL-30	HF 1:1 Balun 1KW PEP	£20.00
CBL-2000	HF 1:1 Balun 2KW PEP	£25.50
CSW-20N	Switch 2 WAY 'N'	£39.00
CF-30MR	HF Low Pass Filter 1KW PEP	£34.00
CF-50MR	6M Low Pass Filter 1KW PEP	£35.00
CF-30H	HF Low Pass Filter 2KW PEP	£69.00
CF-30S	HF Low Pass Filter 150W PEP	£17.50
CF-50S	6M Low Pass Filter 150W PEP	£18.00
CF-BPF2	2M Band Pass Filter 150W PEP	£26.00
CD-160H	SWR/PWR 1.6-60MHZ 20/200/2000W	£95.00
CD-270D	SWR/PWR 140-525MHZ 15/60/200W	£82.00
CMX-2	SWR/PWR 1.8-200MHZ 20/50/200W	£110.50

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RL402 70cm 430–440MHz (410–470MHz) expandable

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RL402 ONLY **£199** inc. Carr. C

OPTIONS

★ RNBIII, 72V 600MHh NiCad, **£2150**
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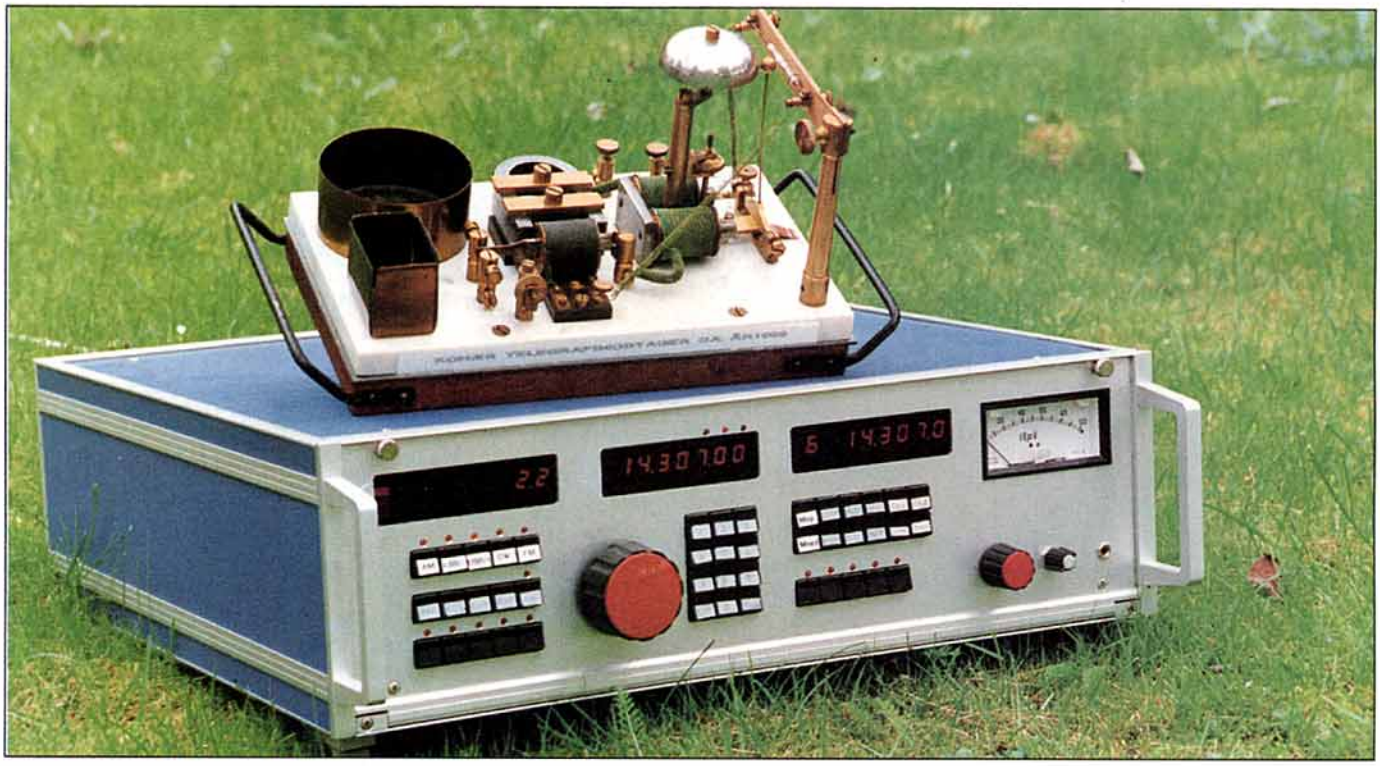
RADCOM TECHNICAL FEATURE

RX84 Advanced HF Receiver

The fourth of a five part project by Tommy E Bay, OZ5KG



THE 1MHz SIGNAL FROM the third mixer is amplified by two MC 1590s, which feed a CA 3001 driving a small power-amplifier. This circuit delivers a very low-distortion signal of up to several volts peak-to-peak (see Fig 12 in part 3). This provides three outputs via a resistor network. These outputs are reasonably well isolated from each other due to the very low output impedance of the amplifier. One of the outputs drives the AGC-circuit described in part 3.

The second output drives a diode ring mixer SBL1 product detector used for SSB, CW and AM. The third output from the third IF is input to the FM-detector TBA 120 S. A block diagram of the demodulator system is shown in **Fig 15**.

The local oscillator signal for the SBL1 is produced by a 1MHz VCO. This VCO is phase locked to an internal reference in the CW and SSB modes and in the AM mode it is phase locked to the signal carrier.

AM MODE

IN THE AM MODE, the amplified and limited signal from the TBA120S is divided by five in the 7490. This is done in order to suppress the sidebands and to obtain a 'clean' carrier. The beat-oscillator is also divided by five and the two 200kHz signals are compared in the CD4046, to lock the VCO in phase with the incoming signal carrier, see **Fig 16**.

The SBL1 product detector operates as a synchronous detector. Detecting an AM signal having a carrier much larger than the original one considerably improves the linearity of the detected signal, especially at high modulation percentages. In fact, the total measured harmonic distortion in the receiver is <<0.2% using a signal 90% modulated with a 1kHz tone. Audio quality is comparable to FM-broadcast, except, of course, the bandwidth is limited.

Many old-timers will remember the pronounced increase in noise, as a weak AM-signal was tuned in. This was caused by the nonlinear characteristics of the diode at low levels, however this problem does not occur using the synchronous detector.

We did expect problems with the phase locking at low signal levels and with signals having high modulating percentages. However, these concerns appear to have been unfounded. The circuit will instantly lock on to signals as low as 0.3μV, even though signals as weak as this are below the receiver's noise level.

SSB AND CW MODES

IN THE SSB-MODE the detector operates as a normal product detector. The product detector local oscillator is set exactly at 1MHz by

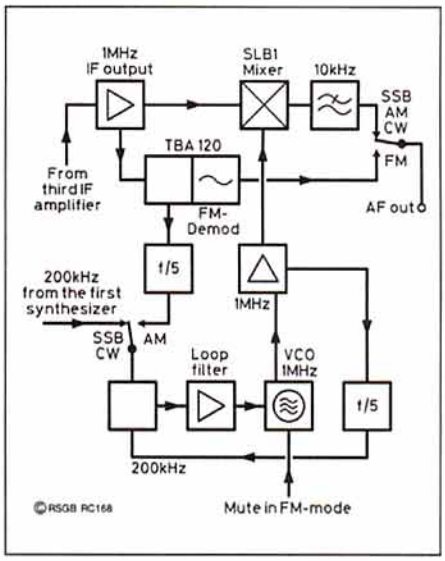


Fig 15: Block schematic of the complete demodulator system.

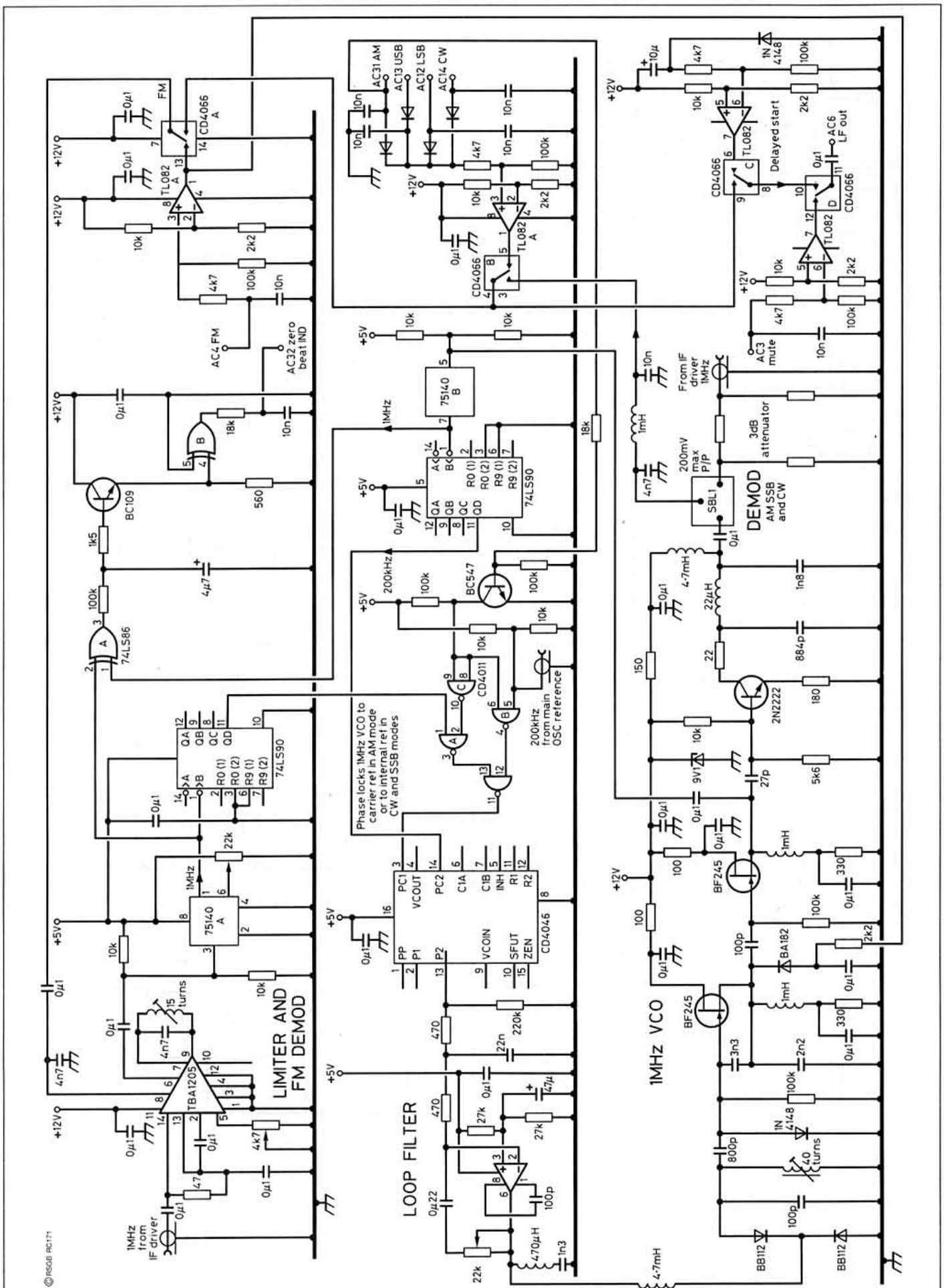


Fig 16: SBL1 AM, SSB and CW demodulator and associated circuitry; FM limiter and demodulator.

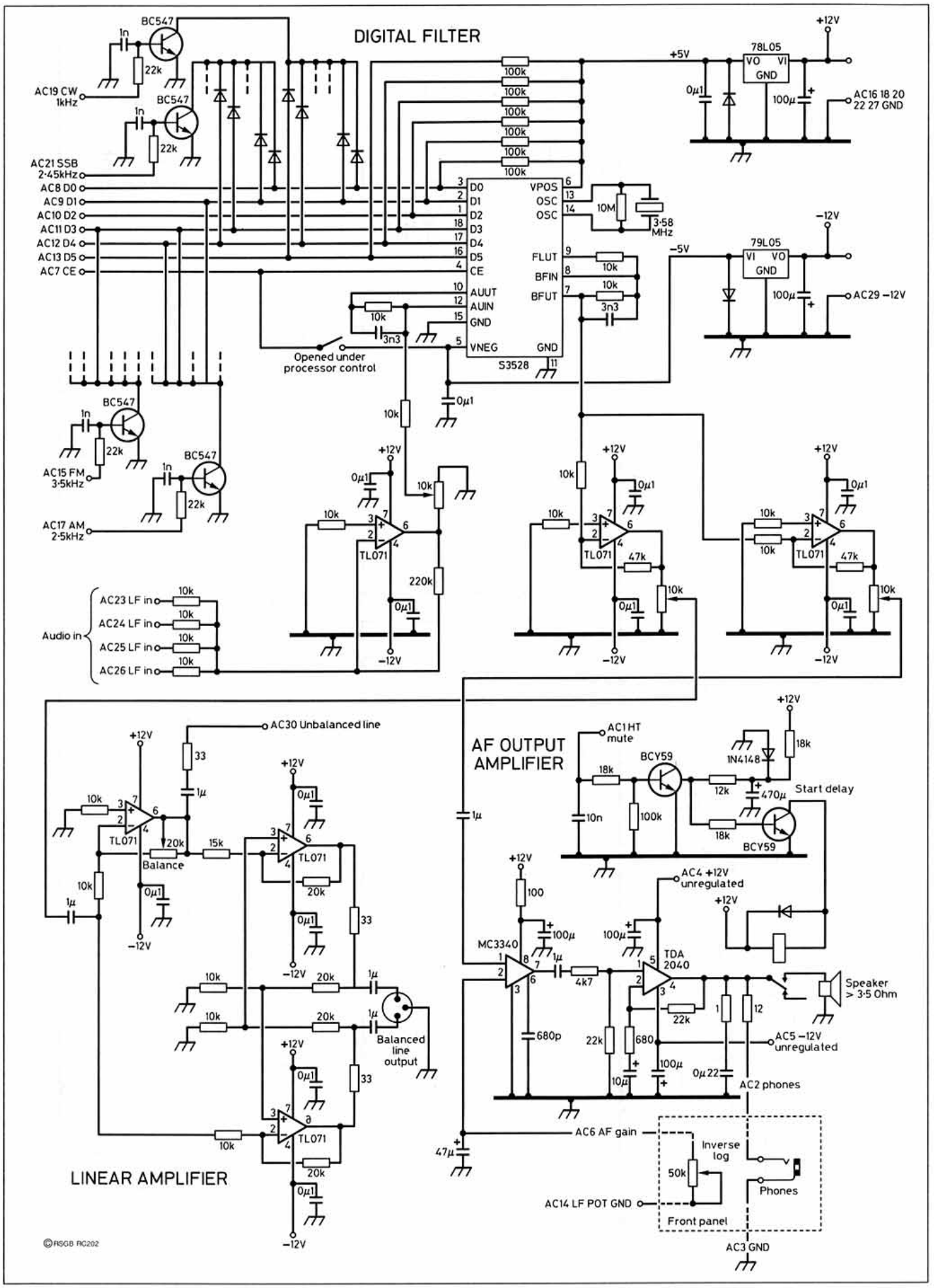


Fig 17: Digital filter, 300Ω line audio amplifier and main audio power amplifier.

phase locking the VCO to a 200kHz square wave, derived from the 10MHz master oscillator in the first synthesizer.

Upper and lower sidebands are selected by shifting the frequency of the second local oscillator to the second mixer. This gives the effect of shifting IF filters. In LSB mode the second local oscillator shifts the IF-centre by plus 1.4kHz and in USB-mode by minus 1.4kHz.

In the CW mode the product detector local oscillator is set exactly at 1MHz, exactly the same as in the SSB mode. The beat note is obtained by shifting the frequency of the second local oscillator to the second mixer by 750Hz.

FM MODE

IN THE FM MODE, the audio output from the TBA120S is fed to the audio module. In amateur service, the maximum expected frequency deviation, in the HF bands, is ±4kHz and requires a wider filter than 7.5kHz. There will be some distortion in the FM mode when listening to normal modulated signals, but we did not want to degrade the performance of other receiver parameters by using a wider filter in the 41MHz IF.

In the FM mode it was found necessary to switch off the 1MHz oscillator, to avoid interference. This is done by the PIN diode, connected from the source of the oscillator FET to ground.

All audio switching is performed by the digitally controlled analog switches CD4066. This is a convenient point for muting the audio while transmitting.

Despite the fact that we have taken care not to degrade the low audio frequency response in the receiver by using small coupling capacitors etc, it is still very difficult to tell the exact zero-beat to a carrier, for instance when calibrating the main oscillator against WWV or other standard frequency reference signals.

For this reason, the simple circuit comprising two exclusive or-gates has been added. They compare the 1MHz square waves of the limited received signal, and the beat-oscillator.

It is in fact a simple phase detector. When tuning in WWV in SSB mode, a LED diode at the front panel will flash at a frequency equal to the difference between the two signals, giving a very clear indication of the zero-beat. The RC pad reduces the effect of the fast phase deviations, caused by delay variations in the ionosphere (fading).

This is also a method of measuring any carrier frequencies very accurately.

THE AUDIO FILTER

AUDIO DIGITAL FILTERING is used, see **Fig 17**, at the input of the audio stage. A digital low-pass filter S3528 (a CMOS device from the American Microcircuits) makes it possible to tailor the cut-off frequency of the filter to the IF-bandwidth in use. We have settled for four fixed cut-off frequencies: 1kHz for CW (using a 0.5kHz IF-filter with the beat-oscillator offset by 0.75kHz), 2.4kHz for SSB operation, 2.5kHz for AM using the 5kHz IF-filter and 3.7kHz while only the 41MHz 7.5kHz filter is in use. Coding the cut-off frequency takes place in a diode-matrix, which is controlled directly by the IF-bandwidth switching.

AUDIO AMPLIFIERS

THE AUDIO GAIN control is controlled by an MC3340 device, remotely controlled via a variable resistor on the front panel. This avoids long audio leads from the audio stage to front panel.

The output amplifier TDA2040 does not require a stabilized supply The audio stage also contains amplifiers for balanced and ununbalanced lines having a 600Ω impedance output.

The level can be set via a trimpot, and will not be affected by the normal audio gain control. Due to the receiver AGC action, the audio level is fairly constant.

. . . to be continued

CORRECTION: Part Three

THE CW FILTER in the 9MHz IF (bottom left-hand corner of Fig 13) should be 0.5kHz, not 2.5kHz as shown.

PROPAGATION RESEARCH

I HAVE RECENTLY developed a system which will enable two HF SSB stations to produce a radar-type display of the ionospheric propagation between them. The traditional method of doing this, using high-power pulsed transmitters, is out of the question for amateur use, but the system that I have developed uses a transmitted signal that is substantially constant in amplitude and can be made of accurately controlled bandwidth so that it can be transmitted through a conventional SSB system without generating or suffering from distortion. This type of signal is sometimes known as a 'chirp' function because of the sound it makes.

This signal is transmitted by one station and received by the other via a skywave path, where it is processed by a DSP system and the resulting output displayed on a PC screen or printed out. The transmitting end could very easily be done by a simple box containing an ISD1020AP chip, with a pre-recorded copy of the chirp signal. I could send this box through the post to other stations who could then transmit the chirp signal back to me over the air.

By recording the results on different frequencies at various times of day, and at different distances, useful information about propagation modes would be obtained. Initial experiments could be done just using stable crystal oscillators at both ends (the ISD1020AP has an external oscillator input for this purpose) and relying on, for example, a groundwave path for calibration purposes, but later developments using, for example, GPS satellite technology, would permit accurate measurement of much longer paths such as chordal hop. The beauty of the use of the ISD1020AP chip is that one end of the link can be done very cheaply!

Peter Martinez, G3PLX

Simply Silicon

COMPETITION RESULTS

JUNE'S *SIMPLY SILICON* column offered prizes of ISD1020AP speech recording chips to the two members suggesting the most unusual application for amateur use of these chips. The winners are: **Peter Martinez, G3PLX,** and **Eric Parvin, G2ADR.**

Many of the entries were so interesting and/or amusing that we've decided to share some of them with you:

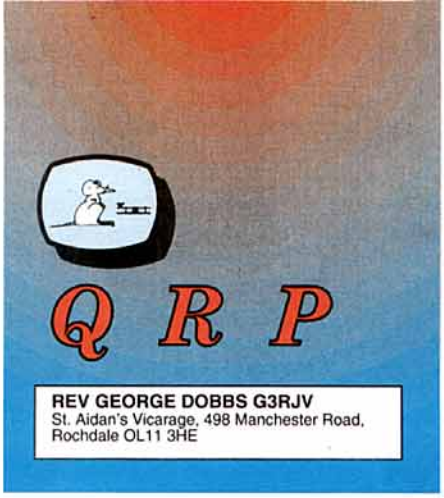
CAR ALARM

INCORPORATE INTO A CAR theft deterrent device, triggered by ignition (switch or 'hot-wired' attempt to start car), to announce "The police have been informed by radio. The car doors will lock you in after thirty seconds"

Eric Parvin, G2ADR

SOME OTHER IDEAS

- I WOULD USE an ISD1020AP as a source of audio for calling CQ on Meteor Scatter with a 555 timer to establish the timing cycle (*Frank Merritt, VE7FPM).*
- I WOULD USE it with reed switches and a magnet to give an audio commentary on the height of my Versatower as it is remotely operated and not visible from the shack (*John Eden, G3VJP).*
- THE CHIP COULD be used to record an apology to be played by remote control, to a station who is speaking when you have to answer the telephone, or some other demanding activity which prevents you personally coming back when it is your turn to transmit (*R Brett-Knowles, G3AAT).*
- I WOULD LIKE to see this remarkable chip in every repeater so that whenever we open the repeater it will transmit its callsign instead of the conventional bleep (*John Ratnayake, G7LXC)*
- ELECTRONIC MODEL projects - generating messages like "The train standing on Platform 5 . . . ." (*D Cloke, G4BMO).*



REV GEORGE DOBBS G3RJV
St. Aidan's Vicarage, 498 Manchester Road, Rochdale OL11 3HE

EVEN FOR THOSE people who do not collect 'shack wallpaper' a certificate is a pleasant addition to the decor. One of the most popular, and simple to achieve, QRP awards is the 1,000 Mile per Watt Award. Anyone who is capable of operating a reasonable QRP station on the HF bands should be able to obtain this award.

The 1,000 Mile Per Watt Award is sponsored by QRP ARCI, the national American QRP group. It is awarded for contact(s) with another amateur whereby the lowest power used by either station is less than a watt per 1,000 miles.

There is a $2.00 fee (or 10 IRCs) for this award, although I would urge UK readers to send extra money to cover postage. For proof of QSO, please send a photocopy of the QSL card and a signed statement by a witness of the card's validity with your payment. If the contact is with another QRP ARCI member, then they should give you their member number, which will be proof of contact. In this case a copy of the log entry with power levels will be satisfactory documentation.

Applications for this award should be sent to Chuck Adams, QRP ARCI Awards Chairman, 830 Waite Drive, Copper Canyon, TX 75067-8581. In the past there was a 30-day processing period. This has now ceased and a one week turn-around should be appropriate in the USA, longer for overseas stations.

To help speed things up and alleviate work, Chuck would appreciate the inclusion of longitude and latitude for both stations. In an atlas this information is usually given in the form of degrees/minutes/seconds. He prefers decimal numbering where longitude = degrees + minutes/60 + seconds/3600, and the same for latitude values. You may apply for the award any number of times.

A SUCCESSFUL CLUB?

IN MY LAST column I mentioned NorCal, the Northern California QRP Club and the exciting kits they have been producing for their members. Chuck Adams, mentioned in the item above, informs me that they are now the third largest QRP club in the world, behind the QRP ARCI in second place and the G QRP Club in first place. They have achieved this in one year.

He has produced a list itemising a number of reasons for their rapid growth, and a copy of this may be of interest to others who would like to run amateur radio clubs.

Among the reasons suggested are: The leadership of the club make it fun; the club goes out and does things; club constructional projects and kits have helped to raise the interest level; they produce a dynamic newsletter; their regular meetings, although informal, help people to stay in touch with one another; they have avoided petty politics and do not seem to have members with unmanageable egos; they try to arrange something for people of all ages. Perhaps other clubs could learn from NorCal?

G QRP MINI-CONVENTION

WHICH AMATEUR RADIO event says "No" to major commercial companies? The answer is the G QRP Club Mini-Convention. Traders do attend but only if they sell components, surplus or kits. The event is designed as a convention rather than a typical radio rally. With this in mind the event has a full programme of lectures, plenty of social space and every attempt is made to help people meet 'like minds' and talk. There are even plenty of seats with light refreshments all day and the now famous 'Pie and Peas' lunch.

Where else can you see radio amateurs showing off their latest piece of home built equipment over tea and cake?

The Convention is on Saturday 15 October at St Aidan's Hall, Manchester Road, Sudden, Rochdale. The doors open at 10am and the admission is £1. A talk-in station will operate on S22 from 9am. The location is about three minutes' drive from Junction 20 on the M62. Further details, including a map and local accommodation guide, can be obtained by sending me a SASE.

WHAT'S NEW?

THE QRP PLUS TRANSCEIVER

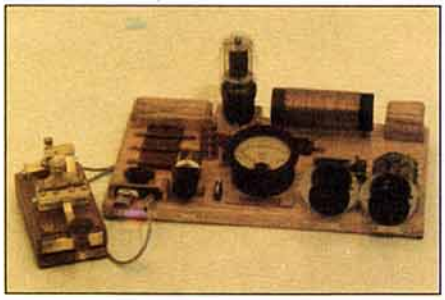
A FEW MONTHS ago I mentioned the new all band synthesized QRP transceiver called the QRP PLUS. This small transceiver (it is only 5.5" x 4" x 6") offers at least 5 watts of SSB and CW on all bands from 160 – 10 metres. It includes a built-in SCAF Filter with 100Hz to 2.4KHz variable bandwidth, 20 memories, SPLIT, RIT and full break-in. I managed to obtain a review sample of the QRP PLUS at the Dayton Hamvention which has been in use for some six weeks and I will soon be completing my review. I think it is going to be a very popular little transceiver.

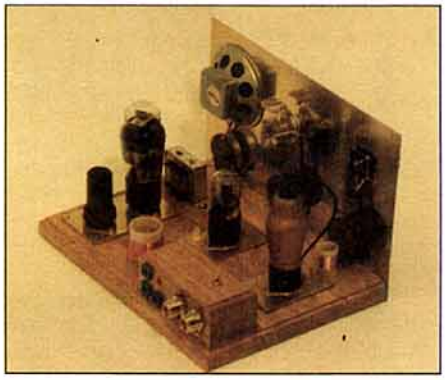
In the meantime the UK news is that Waters and Stanton are to import the QRP PLUS and further information can be obtained from them direct on tel: 0702 206835.

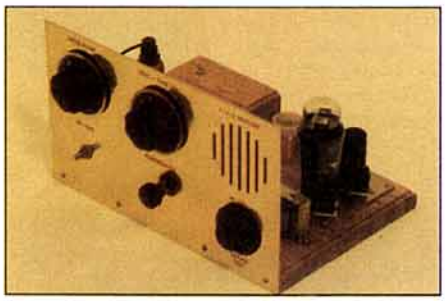
OAK HILLS RESEARCH KITS

I KNOW OAK HILLS well. It is a small, no longer working farm situated on the edge of Luther, a small community in north Michigan. It is the home of Doug DeMaw, W1FB, and I made a return visit there this April to meet Doug to talk about radio construction. Oak Hill Research is a small company dedicated to producing good quality QRP kits, which was founded by Doug following his retirement as Technical Editor of *QST*. The company was sold some time ago but still maintains a fine tradition of producing kits, including a range of QRP CW transceivers.

Some of the Oak Hills QRP kits are now available in the UK from Adur Communications in West Sussex, who are acting as English agents for the company. Further details can be obtained from Phil Godbold, G4UDU, on tel: 0903 879526.







The vintage-style radio equipment built by Johnny Apell, SM7UCZ. Top: A single valve transmitter for 80 metres using a 6L6. Middle: The 80 metre straight receiver. A '1-V-2 design' TRF using the 6K7, 6SN7, 6SJ7 and 6V6. Bottom: Front view of the 1-V-2 receiver.

HANDS-ON SSB

FOLLOWING THE INITIAL success of his first SSB equipment kits, Sheldon Hands of Hands Electronics now produces a full range of modules for the would-be SSB contestor. These kit modules can be used alongside other circuit modules or pieces of equipment, or the whole range can be used to produce a complete transceiver. Multiband versions are also available.

The kits require no sophisticated test equipment and could be built by any amateur with some constructional experience. For further information contact Hands Electronics, Tegryn, Llanfyrnach, Dyfed SA35 0BL or tel: 0239 77427.

NEW STRAIGHT MORSE KEY

DEREK STILLWELL, an instrument maker of Shrewsbury, has just announced the introduction of a hand-made Morse key. The keys have a seven-inch long solid brass arm, fully adjustable ball and cone bearings and large diameter silver alloy contacts. The base is polished marble and each key is engraved with the maker's name, serial number and, if required, the owner's callsign.

Full details of this key can be obtained by sending a SASE (8.5" x 4") to Derek Stillwell, 17 Lesley Owen Way, Shrewsbury, Shropshire SY1 4RP.

EMC

HILARY CLAYTONSMITH, G4JKS
115 Marshalswick Lane, St Albans,
Herts AL1 4UU

THE FOLLOWING LETTER appeared in the Institution of Electrical Engineers newspaper *IEE News* of 2 June 1994: "I have been working in the field of automotive EMC (electromagnetic compatibility) for 10 years and am currently under contract from the Transport Research Laboratory, investigating the nature of vehicle radiated susceptibility failures in service.

"Since such occurrences are fortunately extremely rare, I should like to hear from readers who have experienced such problems. I am particularly interested in the source of radiation which caused the problem; in the case of a fixed transmitter I would like to know its location and in the case of an on-board transmitter I would like to know the frequency, power, antenna type and antenna location on the vehicle together with any other relevant information.

"Can readers who feel that they could contribute to the investigation please write to me, Dr Ian Noble, 12 Tamar Drive, Sutton Coldfield B76 1YT".

We have been in contact with Dr Noble who informs us that by 'radiated susceptibility failures', he means any malfunction of vehicle electronics in the presence of a radio frequency field whether or not the electronics in question is actually damaged by the RF. We have already sent him copies of items on vehicle EMC which have appeared in the *EMC* Column.

PHILIPS QL LAMP SYSTEM

THE SUBJECT OF RF energised fluorescent lights has provoked some interest in amateur radio circles recently. Although such lights meet the necessary EMC standards, these standards weren't designed to protect the reception of weak amateur signals, so we decided to test an RF energised fluorescent light to see whether it might affect reception on any amateur bands. Philips Lighting of Croydon kindly agreed to lend a sample of their QL basic luminaire to the EMC Committee for testing.

The Philips QL Lamp System consists of three components. The RF generator, which is in a well-screened metal box, runs directly from the AC mains and has a nominal input power of 85 watts. The RF output, which is at a nominal frequency of 2.65MHz, is fed to the power coupler which consists of a coil wound onto a ferrite rod. This couples the power inductively into the discharge vessel which looks like a normal pear-shaped lamp but is somewhat larger and has neither filament nor electrodes. The QL Lamp System is manufactured by Philips Lighting Industrial NV of Belgium and is only supplied to manufacturers who build it into a luminaire, that is, a complete light fitting. One such luminaire is the QL basic unit type KGH 085 which is manufactured by Philips Lighting in France.

As well as high efficiency, the QL has a very long lamp life of 60,000 hours or 15 years at 11 hours per day. It is suitable for applications such as public lighting where low maintenance cost is important but it is not intended for domestic use. There are 260 along the Champs Elysées in Paris and installations in the UK include C&A shops in Bromley, Chester and Northampton and the North Stand at Arsenal Football Club.

RF EMISSIONS

SUCH INDUCTION lights could not easily meet the existing CISPR recommendations for radiated magnetic fields at the fundamental frequency, so their manufacturers requested that the limits should be relaxed between 1.6 and 4.0MHz. This included the 1.8 and 3.5MHz amateur bands but fortunately amateur radio interests are represented on CISPR by the IARU delegate, who opposed the relaxation and made an alternative proposal which was accepted. This was that the limits should only be relaxed from 2.0 to 3.4MHz. (See Oct 1992 *RadCom EMC* Column p61.)

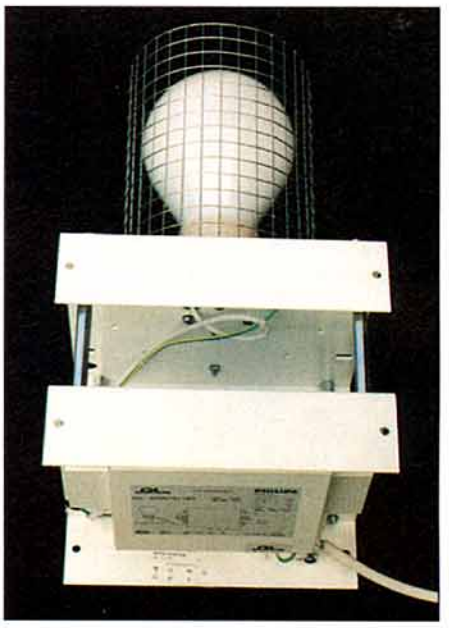
EMC COMMITTEE TESTS

WE TESTED A QL basic unit type KGH 085 which has a screening mesh around the lamp (see photo). The operating frequency is specified as 2.650MHz ±10% and our first sample settled down at around 2548kHz after it had warmed up.

Dave Lauder, G0SNO, used a spectrum analyser and a magnetic field probe close to the lamp to give an indication of which harmonics are significant up to 50MHz. The second and third harmonics are not near any amateur bands but, depending on the exact frequency, the 4th harmonic could fall in the 10.1 – 10.15MHz amateur band, and the eleventh is likely to fall in the 28.0 – 29.6MHz band.

Tests with a portable HF receiver near the lamp showed that the levels of the fourth and fifth harmonics were fairly low compared to the levels of signals and atmospheric noise at these frequencies so they probably would not be audible at a distance of more than a few metres. The levels of the sixth, seventh, eighth and ninth harmonics were even lower but the tenth, eleventh, twelfth, thirteenth, fourteenth and fifteenth harmonic levels were significant, bearing in mind the lower levels of atmospheric noise at 25MHz and above. We submitted a draft of our report together with spectrum analyser plots to Philips Lighting in Croydon who told us that the model which we tested was no longer in production and that, as part of their on-going process of improvements, they had redesigned the HF generator and power coupler. They suggested that we test the new model which had been in production since mid-1993 and they sent us a second QL basic unit for testing.

The second unit had a more compact HF generator with a part number ending in 748 instead of 744, and our sample settled down at around 2.565MHz after warming up. We tested the first and second units side by side and checked the eleventh harmonic. With an HF transceiver and a three element tri-band



The Philips QL Basic Unit.

HF beam at a distance of 20 metres from the QL luminaires, the eleventh harmonic from the earlier type gave a wide 100Hz modulated S3 signal around 28.025MHz. When we looked for the eleventh harmonic of the new type at around 28.215MHz, we couldn't hear anything! Further tests with an aerial very close to the two units showed that the level of the eleventh harmonic on the new unit was much lower, being 16dB less than on the earlier type.

Philips Lighting inform us that UK installations of the earlier type of QL lamp system are mainly confined to shopping centres and that none has been used for street lighting in the UK. It therefore appears unlikely that any of the earlier type are close enough to any fixed UK amateur radio station to produce detectable signals in any amateur bands. The new type may start to appear as street lights in certain areas but we don't think they would cause a problem on HF or VHF amateur bands.

HOW TO SCREEN A BUILDING

THE FEDERAL AVIATION Administration Registry Building on the Aeronautical Centre Campus in Oklahoma City houses the records of aircraft registration and airmen certificate records for all United States civil aircraft and airmen. Records are kept on computerised record storage and retrieval facilities within this new space-age building. This building was designed with one prime objective, to keep all external electromagnetic fields away from the equipment dealing with 280 twelve inch laser disks which hold 50,000 pages of data automatically selected by a robot. What may have concentrated the designers' minds a little is the proximity to the building of a large radar system used by the adjacent air traffic controller training facility.

Before the building was designed and built, EMC consultants were used to ascertain the electromagnetic shielding specifications for the building with respect to RF field levels produced by the radar system. The ideal was to reduce the external field strength (400V/m maximum) to less than 1V/m inside the build-

ing. To achieve this level, the building would require at least 52dB of shielding effectiveness in the 1-3GHz range.

The building's *skin* is made out of special reflective or conductive materials that provide continuous electrical grounding. Special metal covered gaskets provide a bridge between the sections of steel wall panelling. Each joint is sealed with copper tape which has conductive adhesive to maintain electrical conductivity. Obviously it would have been quite easy to construct a large box with no doors or windows but not very practical for an office building. Working in a windowless environment was considered unacceptable and yet, windows and doors would provide the weak link in any shielding plan.

To get round this problem, the entrances have double sets of doors with a gap of 12ft between each, so that the first set of doors can close before the second set open. The interior walls of the lobby are lined with eight inches of electromagnetic absorbing cones and the doors are sealed with special gaskets (shades of MIRA test chamber!). In the particularly sensitive areas of the building (those rooms holding the computer systems) the windows and skylights are made of 'Datastop Glass' produced by Pilkington Architectural and imported from the UK. This type of glass has several layers of special coating material which reflects electromagnetic radiation. The attenuation provided depends on the characteristics of the radiation and the electrical connection at the edge of the glass. For maximum attenuation, the coatings on the glass must be conductively connected to the window frames all the way round. These are then connected to the wall screening itself. Apart from letting in the usual amount of light, other advantages of the Datastop Glass are that it has high solar heat rejection and exceptional thermal insulation qualities. This type of glass panel can be used as internal wall partitions or can be made up into cubicles (Michael Faraday eat your heart out).

After the building was completed, tests were made and it was found that the shielding effectiveness was up to 76dB. Most of the building reached the goal of 1 V/m with levels below that in the rooms housing the computer systems.

EMC COORDINATORS WANTED

WE ARE LOOKING for more front line troops to help eliminate EMC problems throughout the UK. Ideally, we would like one coordinator for each county but perhaps this is being a bit ambitious so let's be more realistic. Looking at the EMC wall map marked with green spots for coordinators, there appear to be several holes where cover is sparse. These are the West Midlands (particularly important because of the density of population), North and South Wales, Cumbria and Oxfordshire, the Swindon and Ipswich areas, Somerset and South Devon. If you live in any of these areas and feel that you could perform the role of EMC Coordinator, please write to the EMC Committee Chairman Robin Page-Jones, G3JWI, QTHR as soon as possible.

EMC Coordinators take queries from RSGB members by phone. They are not expected to go out and solve problems for the amateur/complainant themselves. Members are encouraged to ring back so that the coordinator does not end up having to make lengthy calls. Advice usually entails giving details of good EMC housekeeping, advice on how and where to fit filters and ferrites and how to remain friends with neighbours. In the early days of the scheme, the coordinators used to receive an advice pack but since then G3JWI's comprehensive book *The Radio Amateurs Guide to EMC* is virtually the only piece of printed material needed. A copy is supplied to each new coordinator on joining the scheme.

CALLING OUT THE RIS

THE RIS (Radio Investigation Service) offices are now known as the Local Offices of the Radiocommunications Agency.

If a neighbour is suffering from interference to UHF television or VHF radio broadcast reception from any source, he or she should obtain the leaflet *RA 179*. This is available from The Library, Radiocommunications Agency, Waterloo Bridge House, Waterloo Road, London, SE1 8UA; tel 071-215 2150, fax 071-928 4309. *RA 179* contains two separate forms, for the two routes of complaint.

Form 'A' is to be used when a source of interference is known or suspected. In this case, there is no charge and the RA will investigate the nominated source of interference but will not enter the complainant's house.

Form 'B', *Visit Request* should only be used after a dealer, service engineer or aerial contractor has inspected the installation and has endorsed the form to say that he or she has been unable to solve the interference problem. The form should be sent together with the payment (which is now £35) to the local office of the RA whose address can be found in *RA 179*. The RA will locate and investigate the source of interference, visit the complainant and, if the problem can be cured by fitting filters etc, these will be included in the £35 fee. The fee will be refunded if the RA cannot diagnose the problem or if it turns out to be caused by an illegal transmitter or unauthorised source.

The amateur service is not protected, so if amateur reception is affected by external sources, *RA 179* is not applicable unless the same source also affects UHF television or VHF radio broadcast reception within the service area of the broadcast transmitter. In the October *EMC* Column, we hope to look in more detail at received interference on amateur bands and what can be done about it.

AUDIO BREAKTHROUGH

AUDIO BREAKTHROUGH of RF signals can affect not only hi-fi systems but also radio and TV receivers. If the level of breakthrough is not affected by the volume control, this indicates that the RF is getting into a stage after the volume control. RF may be picked up in loudspeaker cables in which case the breakthrough disappears when listening on headphones with the loudspeaker cables unplugged. Pickup in external loudspeaker cables can often be cured by winding the cables through suitable ferrite rings or other ferrite cores but if this does not work or there are no external loudspeakers, it is necessary to tackle the underlying cause. This can be RF present on the negative feedback line being rectified by non-linear effects within the audio amplifier. The cure is to place a small R/C filter in the negative feedback line – in the case of a stereo system, one in each audio amplifier.

The Ferguson TX100 chassis used in a wide range of television receivers can exhibit audio breakthrough in the remote control 'stand by' mode. Technical modification information was issued to dealers back in 1985 but the EMC Committee still receives questions from amateurs encountering this chassis for the first time.

The TX100 chassis uses a TDA1035T integrated circuit which includes a sound IF amplifier, FM demodulator, DC operated volume control and audio output stage all within one package. The same, or similar design of ICs, are used in many other makes and models of TV receiver. The solution to RF breakthrough into the audio amplifier is to cut the PCB track close to pin 8 of the TDA1035T and insert a 1kΩ resistor from the cut track to pin 8. Then connect a ceramic disc capacitor between pin 8 and the nearest earth point, the heat sink tab which is pin 13. (See **Fig 1**) The capacitor should be in the range 470pF – 1000pF, the larger value is more effective at lower frequencies. This modification has negligible efect on the audio characteristics but solves the RF pickup problem.

A similar solution is probably applicable to many types of equipment using similar designs of audio output stages. Do first check if you can gain access to the negative feedback line(s) and identify the correct pins if you are going to attempt modifications to your own equipment. Otherwise leave the modification to the dealer, he may be grateful to know how to solve the problem.

Modifying neighbours' equipment yourself is *not* recommended. You may be held responsible for any future faults even if they are not related to the work you did.

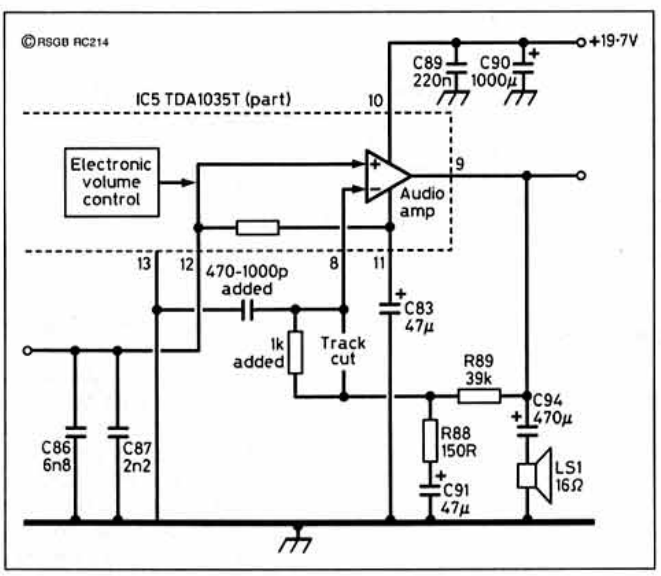
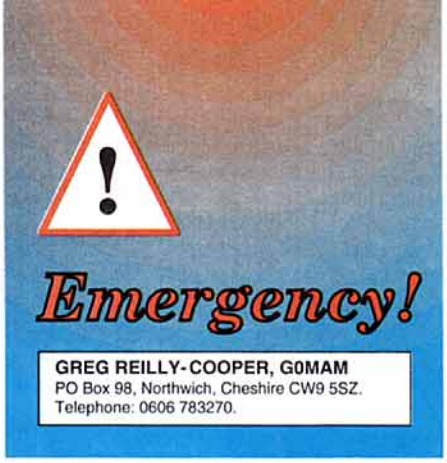


Fig 1: Modifications to TX100 TV audio stage.



Emergency!

GREG REILLY-COOPER, G0MAM
PO Box 98, Northwich, Cheshire CW9 5SZ.
Telephone: 0606 783270.

IT SEEMS UNBELIEVABLE that only three months have passed since our last *Emergency!* column and yet, in operational terms, the emergency communications scene has been blissfully uneventful. This time of the year is traditionally very busy for us all as we provide communications support for our many User Services at events which are as varied as the human mind can conceive. The absence of live 'call-outs' certainly does not signify inactivity!

Many Groups now take the opportunity of logging details of their planned events on the database at GB7NRC and this is very helpful. Licenced radio amateurs who are not members of Raynet are generally very helpful indeed when asked to leave our most commonly used frequencies clear for us - for which our grateful thanks - but it can be difficult sometimes for groups within range of one another to coordinate their choice of frequencies so as not to cause one another unnecessary interference when they are active at the same time. Being able to check in advance whether a proposed frequency has already been 'booked' by another Group is obviously a great help and enables Event Controllers to liaise at the planning stage to avoid problems on the day.

Reports of Groups' activities are always welcome and are stored in the Raynet topic of the CLIVE database at GB7CHS. I maintain the database on a daily basis, and it is heavily used throughout the UK. The reports sent in by Raynet members of their training exercises and 'live' calls out are by far the most requested files and it is clear that all amateurs like to read about what Raynet members are up to.

When deciding whether something your Group has done is news-worthy enough to justify the time needed to write a report about it, do please remember that what may be 'old hat' to you will be quite the opposite to readers living elsewhere. Coastal Groups, for example, may consider their activities with the Coastguard to be quite mundane, but those of us who live further inland do not ever have the opportunity to even train with the Coastguard. Equally, the efforts of our colleagues in the hills here and there to find workable radio paths may be an irksome necessity for them, but would be an education for others who live on the plains.

I read, spell-check and, if necessary, reformat every report received before making it available so no-one need feel that a particular level of penmanship is necessary before they write a report. If you can find the time to send details of your Groups' events, they may be featured in *RadCom* and, for that purpose especially, photographs are very welcome too.

HOME OFFICE TRAINING

THE HOME OFFICE Training College at Easingwold, near York, hosts a number of training courses throughout the year, several of which involve communications and inter-agency liaison. Naturally, many are restricted but it has become the norm for Raynet members to play an active part in the annual Communications Course toward the end of October each year. This is always a very popular and informative course and, at the time of writing, there are still a few vacancies.

The course this year will run from 17 October to 21 October inclusive and, as always, accommodation and full board will be provided at an extremely competitive rate. Many of the people attending will be sponsored by their employers and, in some areas, the Emergency Planning Officer may sponsor one or more of his local Raynet contacts. Others will be paying for themselves and the invoices this year will be forwarded along with the booking confirmations.

The college is set in a beautiful mansion which has been very carefully and skilfully converted. Much of the course takes place in lecture theatres which lack nothing in the way of audio-visual aids, and guest speakers are drawn from the highest echelons of the emergency services, public utilities and emergency planning functions so that the attendee cannot fail to be impressed by the standard of presentation and the accuracy of information shared with him.

Accommodation is in purpose-built annexes, and each student has his or her own room, complete with wash hand basin, work table, television and drink-making materials. Even a tape-recorder and alarm clock are supplied! Meals of a very high standard are served in beautiful, timbered dining rooms with full waiter service. There is much truth in the suggestion that as much information is exchanged over the dinner-table and in the bar as ever passed through the lecture theatres!

During the course, those attending are allocated to syndicates which each represent a cross-section of the skills present. The syndicates meet to discuss different scenarios and plan their response to different problems and it is in this area particularly that Raynet members make a very useful contribution. It follows, therefore, that the course will be of greatest benefit to members who, in the words of the College's 'Participant Profile': ". . . . have a broad understanding of emergency communications systems and knowledge of the plan of their own organisations."

If any Raynet member would like to attend the course this year, or would like further details, please contact me as soon as possible.

RADIOCOMMUNICATIONS AGENCY

I AM OFTEN ASKED, as I take up invitations to visit Groups throughout the UK, about the level of liaison which exists today between the RA and Raynet as a whole. I have no hesitation in confirming that the RSGB, through its Licensing Advisory Committee, continues to represent Raynet as one network. No distinction is ever made between

The elegant mansion used by the Home Office for training courses at Easingwold in N Yorks.

groups which may be affiliated with the Society and those which are not. Indeed, this is largely why I, as the RSGB's link with Raynet, have always been so keen to build-up and maintain an accurate overview of the whole Raynet network, its needs and capabilities. Admittedly, I can only take account of information made available to me by the groups themselves but I do make every effort to try to account for groups where communications are difficult or non-existent. Perhaps this would be an appropriate juncture at which to thank all Raynet members who, knowing this, do make my task so much easier by keeping touch. Your help is always welcome.

I recently received a communication directly from the RA which is worth mentioning too. A number of groups have been involved in support of various activities organised by the British Heart Foundation. The RA in one area contacted me and required details of our involvement. The gentleman who wrote appeared to be quite concerned that no mention of our involvement had been made at the many briefing meetings the RA had attended.

In protracted discussions, then and afterwards, it was agreed that no fault attached to Raynet for the RA's ignorance of our involvement and that the User Services / Organisers of the event might reasonably have been expected to include reference to us along with the other agencies which they listed. However, the RA did suggest that when Raynet is involved in what the RA described as "big events involving lots of organisation", they would welcome local contact from Raynet.

Since this suggestion provides a useful introduction to local RA officers for groups which perhaps do not presently enjoy local liaison, it may be a useful invitation. May I add as my own suggestion, however, that unless personal relationships have already been built-up in your areas, it may be most appropriate for local contact to be restricted to County Controllers, and that they should first check with their local RA offices whether they would be happy to have that degree of liaison. Remembering that this was a local RA initiative and not a national request, it is possible that other offices may be less interested and that frequent, uncoordinated approaches may prove to be counter-productive.

To close this month's column, I should like to remind you of my own contact details. In addition to being available at the address and telephone number shown above, I may also be reached on packet as G0MAM @ GB7CHS and via E-mail as greg@hartford.demon.co.uk. (The fax machine on my telephone line is not auto-switched unless the answerphone is on).

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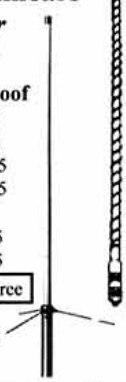
All SO-239 sockets (510N = "N")



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Sends everything from random letters, figures, and groups, to complete QSO's! Just like the real Morse test. Self powered with speaker. PW Review says *"Simplicity itself - a must for Morse Instructors."*

Yaesu FT-840 **£749** Yaesu FT-890AT **£1275**

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A3S	10-20m Yagi 2kW	~~£399.95~~
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A4S	10-20m 4 El. Yagi	~~£495.95~~
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AP8A	8 Band HF vertical	~~£239.95~~
AR2	2m Ringo 3.75dB	~~£39.95~~
AR270	2m/70cm 3.7/5.5dB	~~£79.95~~
AR270B	2m/70cm 5.5/7.5dB	~~£109.95~~
ARX2	2m Ringo 6dB	~~£49.95~~
ARX2B	2m Ringo 7dB	~~£69.95~~
AV3	10-20m vertical	~~£99.95~~
AV5	10-80m vertical	~~£179.95~~
R5	10-20m vertical	~~£299.95~~
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Carriage £8 per box

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10-20m Vertical
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This smart dual-time clock gives you local and DX time. Measures 10" x 8" with brushed alloy "world-map" panel mounted in wood hanging frame. Requires 2 AA batteries.

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14' cable + PL-259 ..... £29.95
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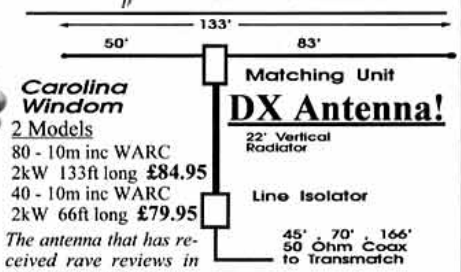
14' cable + PL-259 ..... £39.95
TGSP Scan 30-1300MHz
14' cable + BNC £32.95



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2 Models
80 - 10m inc WARC
2kW 133ft long **£84.95**
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The antenna that has received rave reviews in QST and used on DX-peditions

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RADCOM Helplines FOR MEMBERS

● Donald, GM0PIV, is trying to find, on behalf of the Dundee Heritage Trust, any information about the radio operators **crew members of The Royal Research Ship Discovery,** Captain Scott's Antarctic vessel. In particular can anyone shed any light about the RN Petty Officer Wireless Operator in the photograph or know of his relatives, if he has passed away. It is believed that two operators were seconded for the voyage to handle Morse traffic. To date research in Dundee and with societies connected with Polar Expeditions in 1929, has proved fruitless. Can anyone help identify the person in the photo? If you have any information, then write to Donald, GM0PIV, QTHR or Tel: 0382 455771.

● Martin, GM0JCN, is trying to find out whether the WARC add-on kit for an **FT901 DM** is still available and, if so, from whom? Or can anyone give any details of how to modify this unit? Any help would be appreciated, and all costs will be reimbursed. Please send any information to Martin, *not* QTHR. Tel: 0569 731177.

● Costi, YO8BSE, writes to say that many amateur enthusiasts in Romania wish to **buy second hand radio equipment**. For example HF, VHF Tx and Rx, H/helds and packet radio TNCs, computers and monitors, as well as old amateur radio magazines. If you have any items to sell, please write to: Florea Constantin, Str: Mihai Viteazj, BL:30 AP:41 R-5600, Piatra Neamt 4, Romania.

● Mr R A Howell, G0HZE, is trying to locate a circuit diagram for a **Plessey MTR 6000**, plus any details on converting this to 2 metre packet, crystal formula etc. Any help would be appreciated, and he can copy any documents / manuals and return after copying. Any expenses incurred would be refunded. Please send information to G0HZE, tel: 0733 342439 or write to him QTHR.

● Mr A P Bull, G3ICB, needs information on how to connect a **Wuen-data DWP 1121 Printer** to an Amstrad 1512 computer. If you can help please write to him QTHR.

● Jeff, GI4HCN, wants a **Basic program**, which will convert Irish Grid references, to latitude and longitude and vice versa. He already has programs which cater for National Grid References. If you can help, please contact him on 0226 659769 evenings only, or write QTHR.

● Ambassador Leif Leifland, a Swedish Diplomat Historian is writing an essay on a special mission by a team from the Air Ministry (RAF Ottenby Detachment). The team was stationed on the island of **Oland** in southern Sweden in **late 1944 and early 1945** to intercept radio signals from the U2 test launchings at the German research station at Peenemunde. The Swedish Government issued visas for E C Gardner; J F Mead; D T W Burgess and W H Allen. Leif would like to get in touch with members of the team, their families or friends who might have diaries, letters, photos, reminiscenses, etc relating to this mission. If you can help please write to Leif direct at Nybrogatan 77, 14 40 Stockholm, Sweden.

● Two **DYMAR LYNX ex PMR** Transceivers with remote controller and handsets are required by Kevin, G0AKH. These were originally used by Fire Brigades in the 1970s and 1980s with Tx around 70MHz and Rx around 100MHz. RF circuitry condition immaterial, but boxes must be reasonable for restoration of vintage fire appliance. Please send any information to G0AKH, who is QTHR.

● Adel Khalifa, A92FF, would like to communicate with members to exchange information about **Packet Radio**, Amateur Radio Satellites and AMSAT. If you can help, write to Adel Khalifa, P O Box 5645, Manama, Bahrain, Arabian Gulf.

● Mr S Ainsworth, G0HTP, wants a circuit diagram, giving component values and output transistor types for the **ALPHA Audio** Amplifier model FA-200. This unit was manufactured/marketed by Highgate Acoustics some years back. Any costs for photocopies, postage, will be reimbursed. Please write to him direct, QTHR.

● Douglas, G3KPO, is seeking any information, or the possible loan of a manual, for the **SE Labs Scope** type EMI02. If you can help write to Douglas at 52 West Hill Road, Ryde, Isle of Wight PO33 1LN or tel: 0983 567665.

● Jim, GM3DKW, has an excellent **music-filing** program for a Spectrum +3 Computer, complete with instant search and full print facilities. Also a useful Log-book program for the same computer. Anyone interested can have both programs free on receipt of a blank 3 inch disk. Jim also wants any information, preferably including a circuit diagram, of a Heathkit Grid-Dip Meter, Model GD1U. He can be contacted on 0294 823199.

● Mr T J Rogers, G4YSQ, wants to acquire a copy of the article **'Transceiver Project OMEGA'** by G3WPO, published in HRT in 1984, in order to finish a half-completed project. All expenses reimbursed. If anyone can help, contact G4YSQ by tel: 0491 824048(anytime) or write to him QTHR.

● Mr T R Keats, G4CCN, wants a **Handbook for a Yaesu or Sommerkamp FT 4800R** Transceiver. All expenses will be reimbursed. Contact G4CCN by tel: 0394 386529 or write to him QTHR.

● Rob, G0HJR, wants the manual for a **CT501 Wobbulator**, Army Reference for Manual: EMER T+M I801-I809 and RAF Reference number for Manual AP 117E-0601-1. Any information to Rob on 0526 378685.

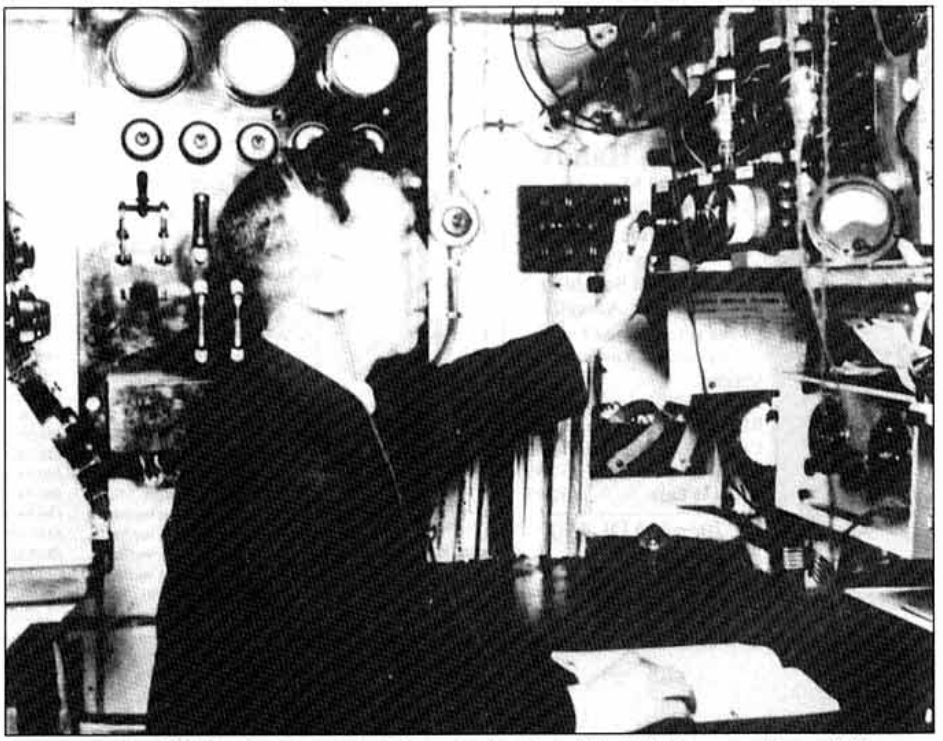
● A circuit diagram for a **Racal RL17 or RL17L** is urgently required by 1st Nottingham Sqadron of the ATC. Lawrie Wood, G4ZSB, says that the main problem is that he can't get either of these units to lock in the magacycle dial. If you can help write to Lawrie at 61 Denson St Beeston, Notts NG9 1AX.

THANK YOU

I RECENTLY SENT IN a request for information about two vintage pieces of test gear; details appeared in the Helplines column of the July *RadCom*.

Within two days of publication I had no less than four phone calls from different parts of the country, with offers of service manuals and other helpful advice. If I get no other benefit from my RSGB subscription this response would have made it money well spent.

I shall be replying personally to those whose addresses I have, but may I use your column to thank Peter, G3HEE, and the gentleman who left some helpful information on my answerphone but didn't give his name or phone number. *Phil Mayer, G0KKL.*



Can anyone identify this wireless operator who served on board the RRS Discovery (See col 1)?

This Month's Book Choice

Reviewed by Ian Keyser, G3ROO

THE ARRL RADIO BUYER'S SOURCEBOOK

Vol 1, published 1991 by ARRL. 384 pages. Vol 2, published 1993, 240 pages. Both vols soft covers. Price (each) $15. Available in the UK from Kanga Products (0303 891106). ISBN Vol 1 0-87259-345-1, Vol 2 0-87259-421-1.

WITH THE OUTDATING OF *The Buyer's Guide to Amateur Radio* (1986, RSGB) buyers have had to scan periodicals for reviews of equipment for second hand gear that catches the eye. But now the ARRL have produced two volumes of reviews that have appeared in *QST* from 1976 to 1992.

Volume 1 covers 140 reviews of all types of gear from HF and VHF transceivers to antenna tuners and keyboards, but no antennas. The reviews were carried out to ARRL specifications to ensure that it is easily possible to compare like with like.

Copies of two articles I thought very educational when I read them in *QST* have also been included: 'Phase Noise and its Effects on Amateur Communication', by John Grebenkemper, KI6WX, and 'Transceiver Features That Help You Beat Interference' by David Newkirk, WJ1Z. Both are written in 'common sense' English and are very easy to read and understand. They are essential reading for those wishing to obtain maximum information from these two volumes.

Volume 2 covers 150 reviews but this time antennas, rotating systems, lightning protection, book and many other related reviews have been included. Another nice feature is that the ARRL have been astute enough to realise that not everyone will wish to buy both editions, especially so if the buyer is principally interested in the newer end of the second hand market. They realised that these people will probably have missed the two important articles in Volume 1 and so have reproduced them in Volume 2.

In both volumes there is an appendix: 'Comparative performance charts' where the performance of various pieces of equipment can be compared without resorting to the complete review. This is a very useful listing as it enables your requirements to be quickly located. The books are well laid out and full of black and white pictures of the equipment to aid recognition, as well as a large number of oscilloscope and spectrum analyser displays to help the reader.

For those interested in buying second hand gear these are essential reading and very good value; quite simply, the answer to a radio buyer's prayer!

Reviewed by Pat Hawker, G3VA

COMMUNICATIONS RECEIVERS: THE VACUUM TUBE ERA 1932 – 1981

By Raymond S Moore

Third Edition published November 1993 by RSM Communications (Key Largo). 125 large pages (8.50 by 11 inches), soft covers. Available from Radio Bygones Bookshelf (G C Arnold Partners, 9 Wetherby Close, Broadstone, Dorset BH18 8JB) price £15.00 (UK); £13.75 (Europe, surface mail). ISBN 0-9618882-2-9.

THIS ADMIRABLY ENLARGED and revised third edition, printed on coated paper giving improved reproduction of the 400-plus photographs, now covers basic details of 738 valved communications receivers manufactured in the USA by 66 companies between 1932-1981. This edition includes a new 'military receiver section' including such well-known models as the BC-312, BC-348, BC-454 etc and a new 'West Coast' history section.

To qualify for inclusion, receivers have to be HF superhets, incorporating a BFO, with continuous tuning (ie not switched or fixed-tuned), manufactured in the USA and offered to radio amateurs or SWL listeners either directly or through surplus channels. UK amateurs will miss the absence of such British manufacturers as Eddystone; a couple of Racal receivers (but not the classic RA17) manufactured in the USA by the Racal US subsidiary are included.

Ray Moore, former K1DBR, published the first 112-page edition of this excellent book in May 1987 (reprinted May 1988). In 1990 he sent me a review copy but unfortunately by accident the review was not published. By the time notice was drawn to it in *Technical Topics* (April 1992, p37) a 2nd Edition had appeared in the USA.

As noted in the 1992 *TT* item: "For those interested in the history, collection or use of the valve receivers that did so much to raise the performance of our hobby, this is a book to savour. It contains potted details (valve complement, IF, date, usually a photograph, the original price [not for military models] but no circuit diagrams) of over 700 receivers and kits made for radio amateurs from the early Comet Pro (1932) to the 'hybrid' Drake R-4c which was finally phased out in 1980-81. The book also contains brief but interesting notes on the major American companies and some of their designers."

Reviewed by Dave McQue, G4NJU

SLOW SCAN TELEVISION EXPLAINED

Mike Wooding, G6IQM

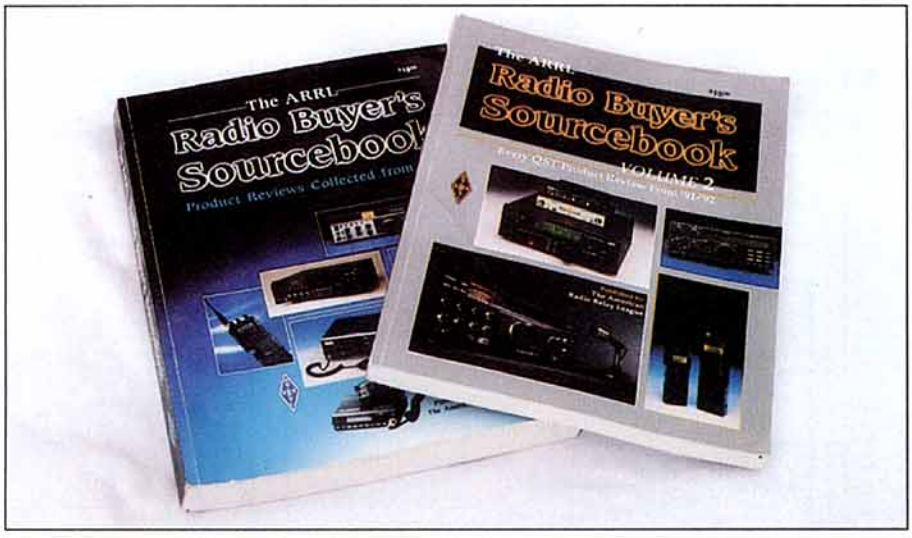
Published 1992 by the British Amateur Television Club. 148 pages, A5, soft covers, £5. ISBN 0-951-3779-3-0.

THIS BOOK IS EXACTLY what its title says! It is written by the editor of *CQTV* to succeed and complement another BATC publication: the 100-page 1987 *Slow Scan Companion.*

The principles of Slow Scan TV are explained in detail. Chapter 1 is a comprehensive introduction to the principles of slow scan and Chapter 2 goes into greater detail of the modes and systems used. Techniques are described in Chapter 3 which was, I felt, a little dated. Chapter 4 provides a useful review of commercial equipment available up to 1992.

Chapter 5 is a description of a slow-to-fast scan converter to enable a slow scan picture to be displayed on a monitor. This is a somewhat heroic project for all but the most enthusiastic hardware builder and most will turn to chapter 8 where some of the many computer solutions are described. Here the hardware interfaces are minimal. For transmission it is a bit different and chapters 6 and 7 describe two popular systems.

The book concludes with some useful circuits, including a pattern generator and filters and (shades of Baird) a Flying Spot Scanner for real-time transmission. All in all, there is plenty here for anyone who has an interest in the slow scan mode.



CONTEST CLASSIFIED

All rules should be read in conjunction with the General Rules published in *Contest News* January 1993

HF RESULTS

AFFILIATED SOCIETIES JAN 1994

After last year's poor band conditions, it was pleasing to see a return to normal activity levels and entries. In fact scores were well up this year and in the CW section, individual winner Peter Miles, G3KDB, almost broke the magic 300 barrier, making 298 contacts at an average rate of 74.5 per hour. SSB leader Andy Cook, G4PIQ, achieved a massive 330 at a rate of 82.5 per hour, Roger Smethers, G3NLY, and Keith Ginder, G3NAS, also topped the barrier with 323 and 309 respectively. Another welcome statistic was the appearance of over 80 G0 callsigns in the top SSB logs.

The popularity of these events is further shown by the donation of two additional trophies. The Flight Refuelling ARS Trophy is for the winning SSB team and will be awarded to Lichfield ARS, who coincidentally have donated The RSGB Lichfield Trophy for the leading individual entry in the same section. Andy Cook, G4PIQ, will receive the award this year. In the CW section, Lichfield once again take the Edgware Trophy, (who can stop these guys?) and Chris Burbanks, G3SJJ, wins the Marconi Trophy.

Band conditions can vary over the four hours of the event and geographic location also has a bearing on contact rate. GM3CFS reported no readable signals during the first hour of the contest whilst southern stations remark on the increased noise levels in the last hour. A possible change to the rules could involve delaying the start for an hour and the HFCC would welcome more comment before a decision is made.

AFS 94 marks a milestone in RSGB contests as this year all logs were checked by computer. About 50% of the entries were submitted on disk with the others being keyed in manually. It is hoped that more teams submit disk entries next year as all DOS formats are acceptable including word processor files, CT.Bin/Res, NA, SupaDupa, and G3WGV. Checking time was reduced considerably and, in future, with logs sent direct to the adjudicator, a turn-round time of less than one month from the date of the events is envisaged.

As far as antennas are concerned, the half wave dipole continues to be the favourite although height is open to debate. Centrally situated stations can probably go for 40-50ft, whereas longer haul contacts may require additional height. One successful station had an apex height of 70ft with a reflector at 20ft above ground. For those without the required supports, the old faithful G5RV still performs very well.

At this year's HF Convention in October, G4DJX and G3SJJ will be presenting a session on 'Improving Your Performance in AFS' with some useful hints and tips for entrants. Graphs of contact rate will be shown as well as discussion on antennas, ergonomics and operating technique. *G3SJJ/G3VHB*

CW SECTION

Posn		Club			Teams			Total
1	*#	Lichfield ARS A	G3KDB	G3SJJ	G3LNS	G3VHB	G3NKC	13853
2	#	Verulam ARC A	G4DJX	G3VER	G3RTE	G3JKS	G3NOH	12531
3	#	De Montford Uni A	G3RIR	G4ARI	G4EOF	G4JGV	G4BCA	11995
4		Addiscombe ARC	G3SJX	G3UFY	G4ALE	G3VYI	G3RQZ	11824
5		Mid-Beds CA	G4BJM	G4MBC	G5LP	G4ALR	G3WKL	11237
6		Crawley ARC	G3LET	G3JKF	G3GRO	G3WSC	G3TNO	9277
7		Southgate ARC A	G3RWL	G3KTZ	G3ZVW	G4SXT	G0FQT	9158
8		Chiltern DX Club A	G4BUO	G3OZF	G3MXJ	G4WVX		8941
9		Grimsby ARS A	G3TBK	G3RSD	G3RXP	G4EBK	G3JKB	8932
10		Norfolk ARC	G4ODC	G3PDH	G3LDI	G4DYC	G3JNB	8879
11		RNARS Colchester	G3GLL	G3YEC	G3YAJ	G0PSA	G0DID	8808
12		Gtr Peterborough RC	G3KHZ	G3TMA	G4KGG	G4PZQ	G4DXW	7751
13		Scunthorpe ARC A	G4JJY	G4OGB	G3KNU	G3JGB	G3PDL	7624
14		Flight Refuelling A	G4IFB	G4RFR	G3VMO	G2HLU	G0IJE	7592
15		Newbury & DARS	G3RVM/P	G3NVO	G0ORH	G4GZQ	G3ZGC	7413
16		Stockport RS A	G3KAF	G3NOM	G3SHF	G4BJU	G0HAL	7333
17		Reading & DARC A	G3XTT	G3WGV	G0OPB	G4UXG	G0TFU	7280
18		De Montford Uni B	G3SDC	G4CZB	G4ZFE	G5MY		7117
19		Sutton & Cheam RS	G4ERW	G4HSD	G3OLX	G0PNU	G0PNT	6983
20		Cheltenham CARS A	G3NKS	G4PDQ	G3XMM	G4MEM	G3CJ	6915
21		Stratford on Avon	G0OGN	G3MXH	G3XZO	G3III	G0MRH	6548
22		Surrey RCC	G6LX	G3BFP	G3MCX	G4GTO	G4FQQ	6451
23		Hereford ARS A	G4CNY	G3EPV	G0PRB	G4JSN	G0SBA	6225
24		Guildford & DARS	G3SYM	G3EIZ	G3ZDD	G8GS	G0EFO	6110
25		Leicester RS A	G3LRS	G0ORY	G3HYH	G0AIZ	G3TQF	5900
26		Echelford ARS A	G4TSH	G3KKQ	G3MCK	G4GSC	G3HBZ	5894
27		Edgware & DRS A	G3ASR	G4HMD	G4IUZ	G0IGP	G0OXH	5808
28		RNARS Portsmouth	G3LIK	G3JFF	G0MBQ	G0FOD	G0LKO	5561
29		Gloucester ARS A	G4YYR	G3MA	G4CIB	G3ZKN	G0ECJ	5465
30		Verulam ARC B	G3UJV	G3HJF	G3VJO	G4SUP		5109
31		Aberdeen ARS A	GM4SID	GM4ZUK	GM4AFF	GM3DZB	GM0MYV	4966
32		White Rose ARS	G3PSM	G3ZEM				4911
33		Central Lancs ARC	G0FDX	G4ZYN	G4PPG	G3KQY		4865
34		Yeovil ARC	G3GC	G4JBH	G3CQR	G3ICO	G3FGD	4495
35		S Manchester RC	G0LZL	G3FNM	G3VIW	G0NID	G3SVW	4395
36		RNARS M'borough	G3HKO	G3AWR	G3TLF	G4FCH		4326
37		RNARS Liverpool	G3HQH	G4HWK	GW3JI	G4PTN	G4RBE	4279
38		RNARS Nottingham	G3JZI	G4MQM	G3LNK	G3VLL	G0JNI	4221
39		RNARS Birmingham	G4SFO	G3TZM	G4IP	G8IB		4220
40		Chesham & DARS	G3VRY	G3XZG	G3NCL	G0NLX/P		4781
41		Telford & DARS	G3UKV	G4EIX	G0SGY	G2RSA		4166
42		Harwell ARS	G3PIA	G0ADH	G0GLB			4079
43		Axe Vale ARC	G3DIC	G3VW	G4WBX	G3FFH	G0GHH	3875
44		RAFARS N Luffenham	G3TCQ	G3ZDW/P	G0ORJ			3838
45		Maidenhead & DARC	G3WYK	G3LVW	G4RGK			3798
46		Clifton ARS	G3BSN	G0PPO	G3GHN	G0HUZ	G0PDZ	3717
47		Crowborough & DARS	G3TXZ	G0NOA	G0RXN	G0PNV	G0OSS	3687
48		RNARS London	G4LNA	G4FRN	G3YYF	G4CJY	G3OZY	3646
49		Southdown ARS	G3AGF	G3SVL	G3ZFE	G3DQY	G0THX	3583
50		Horsham ARC	G4TLS	G3OGP				3466
51		Aylesbury Vale RS	G3YLC	G0CUT	G3KLT			3030
52		Harwich RG	G0DVJ/P	G4EYE	G4WHK	G0STW	G4YJQ	3025
53		Cheshunt & DARC	G3TIK	G3URA	G3WFM	G4YGH		3020
54		RNARS Plymouth	G3VCN	G0JCY	G3VNG			2822
55		Bromsgrove & DARC	G3MRC	G4AAL	G4IVJ	G2CLN		2768
56		Stevenage & DARS	G4DDX	G0JKN	G0GAZ	G0RPZ	G4ISO	2666
57		Martlesham DX & CG	G4PIQ					2642
58		Anglia TV QRP	G3YLA	G3YIA	G3JQI	G4UUB	G4FOS	2583
59		RNARS Barrow	G3IZD	G3KKJ				2448
60		Hornsea ARC	G3TLI	G4IGY				2383
61		Appledore & DARS	G3GNR	G0KKG	G0JRZ			2131
62		Flight Refuelling B	G0NUM	G2BDV	G0IWZ	G4POF		2093
63		Chiltern DX Club B	G3SWH					2021
64		RNARS Lowestoft	G4BUV	G4KDL				1904
65		RNARS Swansea	GW4XQK	GW4ODN	GW0MYY	GW4KVJ		1869
66		RAFARS South West	G3HFG	G3FVC				1787
67		Farnborough & DARS	G4BJQ	G4IZB0				1753
68		Meirion ARS	GW3SB	GW0OPY	GW0MYK	GW3GKZ		1748
69		Aberdeen ARS B	GM3VEY	GM0JKF	GM4BKV			1728
70		Bromley & DARS	G3JJZ					1690
71		Southgate ARC B	G3GUL	G0ASA				1568
72		Havering & District	G3JSR					1564
73		Thames Valley ARTS	G0DAS	G3GN				1516
74		Worthing & DARC	G4OAY	G4SLE				1462
75		RNARS Rosyth	GM3UM	GM3HUN				1406
76		Leicester RS B	G0LZA	G0ATR				1372
77		Gloucester ARS B	G0HBB	G3FPB				1081
78		Cheltenham ARS B	G3JJG	G3FXA	G3XKD	G4UAZ		827
79		RNARS Portland	G4ZIY					820
80		RNARS Thurso	GM3CFS					808
81		S Manchester	G0CBJ	G0PQU				790
82		Scunthorpe ARC B	G0HDV					760
83		Echelford ARS B	G3EAO					737
84		Horndean & DARS	G0DHZ					731
85		Grimsby ARS B	G3DOT					620
86		Stockport RS B	G4FAS					570
87		Reading & DARC B	G0LHZ	2E0ACY				440
88		RAFARS Halton	G4SQC					430
89		S Birmingham RS	G0TIB					260
90		Hereford ARS B	G4GOG					50

* = RSGB Lichfield Trophy; # = Certificate of Merit

SSB SECTION

Posn		Club		Teams		Total
1	*#	Lichfield ARS A	G3NLY	G3NAS	G3VHB	9180
2	#	Lichfield ARS B	G3SJJ	G4CBQ	G3LNS	8232
3	#	Mid-Beds CA	G4MBC	G5LP	G4ALR	7553
4		Southgate ARC	G3SXT	G3SFG	G4UKR	6394
5		Halifax & DARS A	G2UG	G3IGW	G4MH	5988
6		Reading & DARC	G3WGV	G3XTT	G0OPB	5724
7		Stratford on Avon RS	G3MXH	G3XZO	G0CDO	5700
8		Hereford ARS A	G4CNY	G4MET	G3EPV	5637
9		Chiltern DX Club	G4BUO	G3OZF		5549
10		Stroud & DARS	G0ATX	G4VZR	G0OOF	5030
11		Sutton & Cheam RS	G3WHK	G3OLX	G0PNU	4958
12		Newbury & DARS A	G3UAX/P	G0ORH	G3NVO	4950
13		Leicester RS A	G3LRS	G3HYH	G4NLS	4867
14		Blackwood ARS	GW4BLE	GW0ARK	GW4HBK	4694
15		Flight Refuelling A	G3PFM	G3SQX	G0DVE	4549
16		Crawley ARC	G6RC	G3GRO	G0PVK	4547
17		Clifton ARS A	G0HUZ/P	G0PPO	G3GHN	4336
18		RAFARS N Luffenham	G3TCQ	G3ZDW/P		4329
19		Aylesbury Vale RS A	G3YLC	G0ODQ	G0GMB	3925
20		Bromsgrove & DARC	G4AAL	G4LVO	G4IVJ	3919
21		Scunthorpe ARC	G4OGB	G0NYL	G0HDV	3856
22		South Manchester RC A	G0CBJ	G3FNM	G3SVW	3757
23		Southgate ARC B	G0FQT	G0ASA	G0MEE	3730
24		Lichfield ARS C	G/OZ7SM	G0DAY	G4APV	3728
25		RC of Thanet A	G3OPL	G2IC	G0CTQ	3610
26		Harwell ARS	G3PIA	G0ADH		3387
27		Halifax & DARS B	G3NBI/P	G3RKH	G3ONQ	3331
28		Martlesham DX CG	G4PIQ			3278
29		Horndean & DARC A	G3JFF	G0FYX	G3AAT/P	3269
30		Southdown ARS A	G3SVL	G4RUL	G0DOF	3192
31		Axe Vale ARC A	G3FFH	G4OYY	G0TEB	3074
32		Flight Refuelling B	G2HLU	G4YTA	G0NUM	3053
33		Torbay ARS	G3LHJ	G3SNU	G3BIT	3050
34		Crowborough & DARS	G0RXN	G0NOA	G4DRV	3047
35		Echelford ARS	G4TSH	G3HBZ	G3WWT	3025
36		Central Lancs ARC	G0FDX	G0NEI		2941
37		Harwich RG	G0STW	G0DVJ/P	G4EYE	2940
38		Horsham ARC	G4TLS	G4LRP		2891
39		Gloucester	G3MA	G4CIB	G3ZKN	2787
40		RNARS Portsmouth	G3LIK	G3WAO/P		2761
41		Flight Refuelling C	G4IFB	G4POF	G4WEY	2634
42		Hereford ARS	G0ARF	G4SJZ	G4JSN	2624
43		RNARS London	G3YYF	G8IB	G3OZY	2485
44		Thames Valley ARTS	G0DAS	G3ENI	G3JXA	2200
45		Addiscombe	G4ALE	G0ALE		2044
46		Clifton ARS B	G0DCG/P	G0PDZ	G4RFC	2026
47		Newbury & DARS B	G3ZGC	G0HFU	G3RVM	1970
48		Preston ARS	G3DWQ	G4PLB		1887
49		Taunton ARC	G3WNI	G0EYR		1690
50		RC of Thanet B	G0IQW	G0NVC	G4GUD	1620
51		Yeovil ARC	G4JBH			1566
52		Southgate ARC C	G4JYH	G3GUL	G4IEH	1541
53		Grimsby ARS A	G4EBK	G0RUS		1402
54		RNARS Lowestoft	G4KDL			1311
55		Telford & DARS	G4EIX			1287
56		Horndean & DARC B	G0RHD	G0PSF		1260
57		Port Talbot ARS	GW4YMJ			1221
58		West Kent ARS	G0GCI			970
59		Southdown ARS B	G3DQY	G4BLS	G0EQM	960
60		RC of Thanet	G4DTA	G0FTB	G0RJJ	950
61		Torbay ARS	G3YCH	G0OXT		850
62		RNARS Swansea	GW4XQK			760
63		Axe Vale ARC B	G0GHH			710
64		Hereford ARS C	G4TUB			670
65		Verulam ARC A	G3VJO			650
66		RNARS Nottingham	G3VLL			600
67		RNARS Plymouth	G3VNG			566
68		Plymouth RC	G0TQT			540
69		Leicester RS	G0LMB			390
70		RNARS Thurso	GM3CFS			310
71		Lichfield ARS D	G3KDB	G3LNN		280
72		Aylesbury Vale RS	G3MAZ			210
73		RNARS Helensborough	GM3LGM			180

* = Flight Refuelling ARS Trophy; # = Certificate of Merit

AFS INDIVIDUAL LISTINGS

The CW and SSB individual listings for the AFS Contest will be published in September *RadCom*.

ROPOCO 1 1994

Congratulations to Fraser Robertson, G4BJM, who not only won this event but, with a perfect log, also takes the Verulam Silver Jubilee Trophy, for the highest scoring entrant with a perfect log. The standard of log keeping was generally very high, with seven logs having no errors and five with only one character wrong. In this contest, it is possible to cross check over 95% of contacts so these competitors are also to be congratulated. Of the mistakes, confusion between 'S' and 'H' was the most prevalent, closely followed by 'J' and '1'. Mention should be made of the one QRP station, G4ARI, who achieved 35 contacts in a perfect log, when running just five watts. Check logs are gratefully acknowledged from G3GMS, G3SXW, and G3XNG. G4DUS

Pos		Call	Points	Code
1	+*	G4BJM	780	4C7
2	+	G5LP	735	3C2
3	+	G3TBK	7 11	4C6
4		G3RTE	637	4C
5	*	G3HEJ	620	4C3
6	*	G4KGG	610	3C3
7		G4BWP	607	3C
8	*	G0IVZ	600	4W
		G4TLS	594	4C2
10		G4RCG	586	4C3
11		G4OGB	584	3C5
12		G3VYI	568	4W3
13		G2HLU	561	3C2
14		G4CZB	551	4C2
15		G0OPB	532	3C2
16	=	G3JYP	521	4C4
16	=	G3IZD	521	3C2
18	*	G2AFV	520	4C3
19		G3IGU	509	3W3
20		G4EBK	508	3C3
21		G3RSD	507	3C3
22		G3JJG	494	4C1
23		G3JJZ	477	3W
24		G4UXG	467	3W3
25	*	G4XPE	460	3C1
26		G4BLI	454	3C
27		G3KNU	453	3W
28		G0JQN	437	3W1
29		GW3JI	427	3C
30		GW3WWN	420	3C2
31		G3MA	419	3C
32		G0IDE	4 11	3W
33		G3LHJ	402	3W
34		G3JSR	401	3W
35		GW3SB	388	3W1
36		G3KKJ	367	3C
37		G3CQR	355	3C
38	*	G4ARI	350	1C4
39		G5MY	334	3W
40		G3VNG	330	3C
41		G0LKX	324	3C
42		G3ZDD	318	4C
43		G4BJQ	313	3C3
44		G2RSA	310	3C2
45		G3NKS	287	3C2
46		G3GMM	281	3C
47		G4KDL	258	3C2
48		G3MCK	237	3C
49		G4KTI	231	2C2
50		G4JSN	203	3C2
51		G3RTU/P	201	3G
52		G0PDZ	184	3C4
53		GM4OSS	168	3G
54		GM3UM	144	4W

\+ = Certificate winner
* = Perfect Log

HF Contests Calendar

(Overseas events in italics; rules in parentheses)

7 Aug	RoPoCo 2 (Mar 94)
6/7 Aug	*YO DX (CW/SSB)*
13/14 Aug	*WAE (CW)*
20/21 Aug	*SEANET DX SSB (Jul 94, p19)*
3/4 Sep	SSB FIELD DAY (Jun 94)
3/4 Sep	*JARL AA SSB*
4 Sep	*LZ DX CW*
Sep/Oct	QRS Cumulatives
10/11 Sep	WAE SSB
17/18 Sep	*SAC CW*
24/25 Sep	*SAC SSB*
24/25 Sep	*CQ WW RTTY*
2 Oct	21/28MHz SSB
8/9 Oct	*VK-ZL CW*
16 Oct	21/28MHz CW
29/30 Oct	*CQWW DX SSB*
12 Nov	Club Calls
11/13 Nov	*JA Int'l DX SSB*
12/13 Nov	WAE RTTY
13 Nov	*OK DX (Mixed)*
19/20 Nov	2nd 1.8MHz CW
19/21 Nov	*All Austria CW*
26/27 Nov	*CQWW DX CW*
3/4 Dec	*ARRL 160m*
11 Dec	*ARRL 10m*

VHF RESULTS

UHF/SHF - OCTOBER 1993

As discussed in the write-up of the 23cm and 13cm trophies, the paperwork we requested for both the trophies and the 24-hour event was crazy, and therefore I have placed all entrants in the results for both events. As far as I'm concerned, contests are about radio rather than bureaucracy, and this rather better reflects the levels of activity which are significantly up on last year in spite of lousy conditions. In the multi-operator section, the Windbreakers Contest Group walked away with the title in a spectacular manner by being active on all seven bands and winning each of them. Particularly impressive were their results on 10GHz with some excellent rain-scatter contacts - isn't it great to have the technology so that there are some bands where conditions actually improve when it's bucketing down! It is just a shame that they were not able to complete a QSO with an OZ station who heard them. I have to say though that the entry on 10GHz does not do justice to the level of activity on that band, and there was a bemoanable lack of activity from UK stations. One reason which has been cited is that the rules effectively do not allow 2m talkback - this situation has been reversed and will be allowed for the 1994 event. It was also good to see some narrowband activity on 24GHz, and I am sure that we will now start to see some significant happenings on this relatively unexplored piece of spectrum - who will be the first to make it across the North Sea in a 24GHz contest? As usual, certificates will go to the winners and runners-up on all bands and in all sections - congratulations to all concerned. *G4PIQ*

SINGLE OPERATOR OVERALL

Pos	Call	Loc	432MHz	1.3GHz	2.3GHz	3.4GHz	5.7GHz	10GHz	24GHz	Total
1	G4EQD	93QN	0	134	1000	1000	0	817	0	2952
2	G4DDK	02PA	677	123	30	0	0	1000	0	1831
3	G4LRT	92LJ	512	30	347	293	0	0	0	1182
4	G8ZQB	92JN	575	21	548	0	0	0	0	1144
5 =	G0MYE	91PV	1000	0	0	0	0	0	0	1000
5 =	G3XDY	02OB	0	1000	0	0	0	0	0	1000
5 =	G8KMH/P	91MI	0	0	0	0	0	0	1000	1000
5 =	G4KNZ/P	91MI	0	0	0	0	0	0	1000	1000
9	G8JXV	91VE	929	0	0	0	0	0	0	929
10	G0MLY	92AP	709	0	0	0	0	0	0	709
11	G6SPS	01IS	465	50	141	0	0	0	0	655
12	G3MEH	91QS	0	293	0	0	0	0	0	293
13	G4XUM	83SB	0	190	0	0	0	0	0	190
14	G4DEZ	01IN	0	115	0	0	0	0	0	115

MULTI OPERATOR OVERALL

Pos	Group	Loc	432MHz	1.3GHz	2.3GHz	3.4GHz	5.7GHz	10GHz	24GHz	Total
1	Windbreakers CG	01PU	1000	1000	1000	1000	1000	1000	1000	7000
2	Warrington Cntst Grp	93AD	587	677	402	404	0	0	0	2069
3	South Birmingham RS	92GB	146	155	171	268	0	0	0	740
4	Three Spires CG	01KJ	0	431	259	0	0	0	0	689
5	Spalding & DARS	92TR	0	191	91	0	0	0	0	283
6	P Croucher/M Worsfold	00EW	0	125	0	0	0	0	0	125
7	Luton VHF Group	91RU	95	0	0	0	0	0	0	95

432MHZ SINGLE OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G0MYE	127	1000	28	91PV	400	25Y	DK8VR/A	600
2	G8JXV	118	808	26	91VE	120	88Y	F6HPP/P	328
3	G0MLY	90	616	16	92AP	75	21Y	PA3BPC/P	420
4	G4DDK	86	589	8	02PA	25	19Y	DF8VK/P	469
5	G8ZQB	73	500	7	92JN	25	19Y	F6HPP/P	482
6	G4LRT	65	445	15	92LJ	400	2 x 18Y	PA3BPC/P	354
7	G6SPS	59	404	11	01IS	1	21Y	DK3FB	484

432MHZ MULTI OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G4JAR/P	4665	1000	313	01PU	400	4 x 21Y	OZ7UHF/P	821
2	G8XVJ/P	2738	587	188	93AD	400	4 x 21Y	F9OE	992
3	G8OHM/P	679	146	88	92GB	350	21Y	DK8VR/A	655
4	G4LOO/P	445	95	60	91RU	100	2 x 21Y	DK5WO	473

1296MHZ SINGLE OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G3XDY	15439	1000	63	02OB	300	8 x 23Y	DL0UL/P	715
2	G3MEH	4528	293	33	91QS	100	2 x 50QLY	DF0HS/P	469
3	G4XUM	2929	190	19	83SB	250	8 x 23Y	G4YPC/P	309
4	G4EQD	2073	134	16	93QN	80	27QLY	G4YPC/P	299
5	G4DDK	1902	123	12	02PA	40	4 x 23Y	DK1VC	434
6	G4DEZ	1778	115	15	01IN	15	55Y	DF0HS/P	375
7	G6SPS	766	50	13	01IS	16	2 x 23Y	PE0MAR/P	236
8	G4LRT	467	30	7	92LJ	75	2 x 27QLY	G3TQF	139
9	G8ZQB	327	21	4	92JN	50	27QLY	G4JAR/P	187

1296MHZ MULTI OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G4JAR/P	22357	1000	92	01PU	300	2.6m	DL2ARD/P	741
2	G6PHJ/P	15128	677	73	93AD	120	16 x 23Y + 1.5m	DK1VC	674
3	G4IEV/P	9629	431	46	01KJ	400	4m + 1.8m + 3.6m PB	DC8VJ	467
4	G4DSP/P	4280	191	24	92TR	180	2m	DF0HS/P	479
5	G3OHM/P	3468	155	25	92GB	120	2 x 55Y	F6HPP/P	456
6	G4YPC/P	2786	125	16	00EW	50	55Y	G8GXP	332

2320MHZ SINGLE OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G4EQD	597	1000	4	93QN	4	49QLY	G4JAR/P	229
2	G8ZQB	327	548	3	92JN	8	1.6m	G4JAR/P	187
3	G4LRT	207	347	3	92LJ	6	46QLY	G3CKR/P	103
4	G6SPS	84	141	2	01IS	0.4	1m	G4DSF/P	43
5	G4DDK	18	30	1	02PA	0.25	0.6m	G4JAR/P	18

2320MHZ MULTI OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G4JAR/P	5688	1000	27	01PU	50	2.6m	DF0CI	618
2	G3CKR/P	2284	402	11	93AD	10	1.5m	PE0MAR/P	431
3	G4DSF/P	1471	259	8	01KJ	30	1.8m	PA0WMX	323
4	G8ACR/P	973	171	8	92GB	25	1.2m	G4JAR/P	196
5	G4DSP/P	520	91	5	92TR	3	2m	G4JAR/P	149

3400MHZ SINGLE OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G4EQD	99	1000	1	93QN	0.5	0.6m	G0CDA/P	99
2	G4LRT	29	293	1	92LJ	0.7	1.2m	G3TQF	29

3400MHZ MULTI OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G4JAR/P	1202	1000	7	01PU	7	1.4m	PA0EZ	271
2	G0CDA/P	486	404	3	93AD	1	0.9m	G4JAR/P	262
3	G8WDT/P	322	268	2	92GB	2	20dB Horn	G4JAR/P	196

5700MHZ MULTI OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G4JAR/P	737	1000	4	01PU	20	1.4m	PA0EZ	271
-	G0CDA/P	0		0 2 X 0.5	93AD	0.05	0.9m		

10368MHZ SINGLE OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G4DDK	219	1000	3	02PA	4	0.6m	PE0MAR/P	194
2	G4EQD	179	817	1	93QN	4	0.6m	G4FCD	179

10368MHZ MULTI OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G4JAR/P	4934	1000	22	01PU	90	0.4m	DC6UW	633

24000MHZ SINGLE OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1 =	G8KMH/P	1	1000	1	91MI	1m	0.4m	G8KMH/P	1
1 =	G4KNZ/P	1	1000	1	91MI	0.5m	0.4m	G4KNZ/P	1

24000MHZ MULTI OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G4JAR/P	7	1000	1	01PU	7m	Open WG	G0TJN/P	7

23/13CM TROPHY 1993

Once again conditions were unexciting for this event but large quantities of metalwork helped the leaders to overcome nature's attempts to dull the contest - at least to some extent! The Three Spires Contest Group, G4IEV/P put up a monster 4m dish whose photograph you will have seen in March *RadCom*, along with a smaller dish and their pillbox arrays. They did comment however that, in being so impressed with the feat of getting the antenna in the air, they almost forgot that they actually had to make some QSOs to win the contest!

In their 1.3GHz multi-operator section the Hadrabs and Windbreakers, G4JAR/P, found a few more points with their single dish to win this category. However, once again this was not sufficient to take away the silverware, and John Quarmby, G3XDY, repeated his remarkable trick of winning the trophy from his fixed station. On 13cm however, the Hadrabs and Windbreakers were successful in taking the trophy by a convincing margin over the Three Spires Contest Group.

Having adjudicated this contest I am very much aware that we ask for a ridiculous amount of paperwork to cover this event and the concurrent IARU 24-hour contest, and that most people this year did not meet our stated requirements. As a result I have entered every log received for the trophies and the IARU events into both contests - I trust nobody objects. However, since this much paper is as difficult for me to manage as it is for you to produce, for the '94 event I am quite happy to receive only *one* set of logs for each band in the contest(s) covering the full 24 hours! However a note on the cover sheet of the score claimed for the 8-hour trophy contests would be appreciated. *G4PIQ*

1296MHZ MULTI OPERATOR

Pos	Callsign	Score	QSO	Loc	Pwr	Ant	Best DX	km
1	G4JAR/P	10208	47	01PU	300	2.6m	DL0JUZ	582
2	G4IEV/P	9629	46	01KJ	400	4m + 1.8m + 3.6m PB	DC8VJ	467
3	G6PHJ/P	8495	47	93AD	120	16 x 23Y + 1.5m	DF0HS	595
4	G4DSP/P	4280	24	92TR	180	2m	DF0HS/P	479
5	G4YPC/P	2786	16	00EW	50	55Y	G8GXP	332
6	G3OHM/P	2005	17	92GB	120	2 x 55Y	PE0MAR/P	382

1.3GHZ SINGLE OPERATOR

Pos	Callsign	Score	QSO	Loc	Pwr	Ant	Best DX	km
1	G3XDY	12215	51	02OB	300	8 x 23Y	DL0UL/P	715
2	G3MEH	4528	33	91QS	100	2 x 50QLY	DF0HS/P	469
3	G4XUM	2667	17	83SB	250	8 x 23Y	G4YPC/P	309
4	G4DEZ	1778	15	01IN	15	55Y	DF0HS/P	375
5	G4EQD	1461	11	93QN	80	27QLY	G4YPC/P	299
6	G6SPS	766	13	01IS	16	2 x 23Y	PE0MAR/P	236
7	G4LRT	467	7	92LJ	75	2 x 27QLY	G3TQF	139
8	G4DDK	327	5	02PA	40	4 x 23Y	G3MEH	134

2.3GHZ MULTI OPERATOR

Pos	Callsign	Score	QSO	Loc	Pwr	Ant	Best DX	km
1	G4JAR/P	3312	16	01PU	50	2.6m	DK1VC	431
2	G4DSF/P	1471	8	01KJ	30	1.8m	PA0WMX	323
3	G3CKR/P	977	6	93AD	10	1.5m	G4DSF/P	273
4	G8ACR/P	651	5	92GB	25	1.2m	G4JAR/P	196
5	G4DSP/P	520	5	92TR	3	2m	G4JAR/P	149

2.3GHZ SINGLE OPERATOR

Pos	Callsign	Score	QSO	Loc	Pwr	Ant	Best DX	km
1	G4LRT	207	3	92LJ	6	46QLY	G3CKR/P	103
2	G4EQD	193	2	93QN	4	49QLY	G3CKR/P	99
3	G6SPS	84	2	01IS	0.4	1m	G4DSF/P	43

LATE RESULTS

We apologise for the lateness of the USF/SHF Trophy and 423/13cm Trophy results which was due to the data going astray.

VHF/UHF CONTESTS CALENDAR

31 Jul	10Ghz Cums (Apr 94)
14 Aug	24Ghz Cums
21 Aug	432MHz Fixed/SWL (May 94)
28 Aug	10GHz Cums
30 Aug	144MHz CW Cums (Feb 94)
3/4 Sep	144MHz Trophy/SWL (May 94)
4 Sep	4th Back Packers 144MHz
11 Sep	24GHz Cums
14/29 Sep	144MHz CW Cums
25 Sep	70MHz Trophy/SWL (Jul 94)
25 Sep	10GHz Cums
1/2 Oct	RSGB 432MHz-24GHz (Jun 94)
2 Oct	1.3GHz Trophy/SWL (Jun 94)
2 Oct	2.3GHz Trophy/SWL (Jun 94)
1/2 Oct	IARU 432MHz-24GHz (Jun 94)
4/19 Oct	1.3 & 2.3GHz Cum (Jul 94)
9 Oct	24GHz Cums
12/27 Oct	432MHz Cum
14/31 Oct	144MHz CW Cums
30 Oct	2nd 23cm & 13cm Fixed/SWL
30 Oct	10GHz Cums
3/17 Nov	1.3 & 2.3GHz Cum (Jul 94)
5/6 Nov	144MHz CW Marconi/RSGB 24hr
6 Nov	144MHz RSGB CW 6hr
11/28 Nov	432MHz Cum
4 Dec	144MHz AFS/Fixed/SWL
5 Dec	1.3 & 2.3GHz Cum
13 Dec	432MHz Cum

DIRECTION FINDING

BANBURY QUALIFYING EVENT (TOP BAND)

Date: 14 August 1994

Map: 164 (Oxford)

Assembly: 1300 for start at 1320

Location: Car park in Culham, NGR 508949

Competitors requiring tea should notify Graham Nicholls, 64 Mascord Road, Banbury, Oxon OX16 0NB, tel: 0295 265492 no later than 7 August.

TORBAY QUALIFYING EVENT (TOP BAND)

Date: 4 September 1994

Map: 191 (Okehampton & North Dartmoor)

Assembly: 1300 for start at 1320

Location: Haytor Rock Car Park, NGR 760766

Competitors requiring tea should notify Paul Clark, 180 Roselands Drive, Paignton, Devon TQ4 7RW, tel: 0803 523599 no later than 28 August.

WALSALL VHF (2M) EVENT

Seven teams assembled for the first Walsall ARDF VHF foxhunt run to RSGB rules. The competition was run on 22 May 1994 in very wet weather. The hunt area was to the west of the A38, running between Lichfield and Burton upon Trent.

Station A, G8ZHA/P, a computer controlled automatic transmitter, housed in two ammunition boxes, hidden in dense woodland on Cannock Chase, approx 2.5 miles from the start. The fox was almost impossible to spot from further than a few feet away.

Station B, G6EOX/P, was a manned fox, located in woodland approximately eight miles from the start point.

The competitors' positions were calculated by adding together the time taken for each competitor to arrive at transmitters A and B. After the hunt some of the competitors returned to the Cannock Chase Visitors Centre for tactical discussions!

Pos	Callsign	Transmitter A	Transmitter B	Total time (mins)
1	GW1XBG	14.14	15.03	140
2	G6NVS/G7LLS	14.42	15.54	216
3	G8ZHA	14.34	16.03	217
4	G8PWE	15.08	16.36	284
5	G0INA/G0LBW	15.55	16.35	330
6	G6DEJ	-	14.55	-
7	G6HZI	-	-	-

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. Ads for CB equipment will not be accepted. 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

APRICOT PC286AT transportable computer, IBM Compat, 3Mb RAM, 43 Mb H/D, 3.5 & 5.25 F/D, Xpi Box(3 slots), DOS 6.2, WIN 3.1, Microscreen Keyboard, Mono Herc Screen, EGA & VGA Cards-colour Monitor available, printer cable: £350 ono. Epson FX80 & Canon 1152 wide carriage DM Printers: £50 each. Buyer Collects. Free S/ware, inc S Calc S Writer, W Perfect 6.0a (DOS) and comms progs. Worldport 2496 pocket fax/data Modem complete: £100 ono. G3VGH, QTHR. Phone/Fax (Huntington, York) 0904 769245.

DAIWA LA-2155H 2m Linear 5-25W i/p, 150-200w o/p. Unwanted and unused gift. £320 new accept: £240 ono. 10 months warranty. (Clacton on Sea) 0255 822265.

FREE PANDA Cub Tx 160-10m, spare valves and circuit. 1,500VA Transformer tapped 0-53v, large heatsinks, Power Transistors, large capacitors 22,000uF, enclosure with I and V Meters, other bits for High Power, low Voltage supplies. Phone Dave, G3UNA, QTHR evenings/weekends with offers. (Ruislip, Middx) 081 429 0716.

IRC'S for Sale, 40p each. CWO Please. Steve Hodgson, G0LII/ZD8LII, 6 Broughton Road, West Ayton, Scarborough, North Yorks YO13 9JW. (Scarborough) 0723 863962.

KENWOOD TM732E VHF/UHF Tcvr, hardly used: £585. Kenwood PS-430 13.8V 20A PSU, suitable TS140/680, TS430: £100. PK232MBX M/mode Data Controller: £210. Phone (Leeds) 0937 845503.

KENWOOD TS940S, Auto ATU, MC-42S Mic, SP-940 Spkr. SM-220 Station Monitor. HS-5 Headphones. LF-30A 1Kw LPF. TL-922 Linear. Daiwa NS-660P SWR/PWR Meter. Welz CT-1010 1Kw Dummy Load. SPC 1Kw ATU (H/brew from Capco Components). All items available separately, best offer secures. Everything exc condx with manuals and some boxes. Also 20ft Ali Poles and various Brackets, jointing sleeve etc. (Milton Keynes) 0908 614105.

QTH 630 ft ASL on North Downs. Wonderfull VHF/UHF site. Planning permission for Antenna Mast and 1.8m Dish. Adjoins open farmland. Four bedrooms, one en-suite. Large lounge, dining room, double garage, drive, greenhouse. Matured well stocked gardens. Close to railway stations and M2/M20/M26/M25. Regular commuter bus to London. Near Meopham, Kent, only: £85,000. Phone (Meopham) 0732 823662.

SUPERB DRAKE TR4 HF Tcvr, including RV4 Remote VFO, AC-4 PSU, all gd condx plus set new Matched 6BJ6 PA valves, 300w PEP, 150W CW, plus complete 2nd Rig as above for Spare. Two high speed Muffin extractor fans (German) 240V AC, keep above PAs very cool: £395. G3AOY, NOT QTHR. (Fareham) 0489 570552.

TRIO TS770 2m/70cm All Mode D/band Transceiver, 240V or 12V, gd condx, boxed. Phone Phil, G4UDU. (Steyning) 0903 879526.

VALVES BRAND NEW, All £1 each. EB91, ECC81/82/84, ECC91, ECL80, EF80/85/89, EF91/95, EF183/184, EL32, EL81/85, EZ81, 6BJ6, 6CB6, 6CH6, 6X4, 6X5GT. Also at £3 each: 5R4GY, 5Y3GT, 5Z4, 6BG6G, 6BK4, 6C5, 6DE4, 6DW4, 6F6, 6F13, 6F30, 6G6G, 6H6, 6J7, 6K25, 6P25, 6P28, 6F33, 12BH7, 5763, KT81, DM70. Please add £2 Postage. Cheques to:- K. Bailey, Flat 3, 177 College Road, Moseley, Birmingham, B13 9LJ.

486 SYSTEM 486DX2-50 Motherboard 256Kb Cache, 8Mb DRAM, 214Mb HDD, S3 Graphics Accelerator, 2S/IP, 102 Keyboard, Monitor extra: £700. Phone daytime (Slough) 0895 810811.

55 FOOT Self Supporting Post, mounted Tiltover Tower complete, cables winches etc: £450. G3OLU, QTHR. (Diss, Norfolk) 0953 818292.

ABSOLUTELY MINT condx, ERA Microreader Mk2, boxed: £99 ono. Carriage extra. Vik, G0ONF. (Manchester) 061 748 0641.

ACORN ARCHIMEDES A440/1, 4Mb, 47Mb HD, ARM3, Vid C enhancer, Risc OS V3.1, 5.25 Floppy Interface, immac: £600 ono. G4BLT, QTHR. (Wakefield) 0924 255515.

ALINCO DJ120E 2m H/held, hardly ever used as new with A/C, D/C chargers, Magmount Antenna, other bits: £140. (Crewkerne) 0460 77292.

ALUMINIUM Heavy Duty Scaffold Tubes 2in Dia, 19ft 3in and 17ft 9in Long: £20 and £18. Collect or pay transport. Many valve era Items. (Durham) 0207 283242.

ANTENNA ROTATOR Kenpro KR-250 c/w Control Box and manual: £65. Packer 2m ATU: £10. First class condx. Phone George. (Liverpool) 051 733 6415.

ANTENNA. ALTRON 3 ele Mini-Beam with Rotator, Control, mast guys, partly dismantled. Will go on roof rack: £125 ono. G0KCA, QTHR. (Broadstairs) 0843 863795.

ANTENNAS, pair 15 ele 2m Yagi's: £22 each (little used). SMC Polar Phaser-2 2m 'N' Plugs: £20 (never used). Scanmaster Diskone 25-1300MHz, transmit 2m, 70cm: £23 (used 6 months). All plus carriage. G6LDQ, QTHR. (Redruth) 0209 315432.

BALUN 0.5 to 60MHz 2kW SSB 50 Ohm 1.1 SWR, as new: £16. G3XSZ. (Alton) 0420 85956.

BBC MASTER 128, D/drives, Colour Monitor, Modem, Co-Processor, lots of ROMS S/ware, manuals etc: £100. Microwave Modules Linear Amp 144MHz 100 watts: £90 Kenwood SP245 SWR/Power Meter with Remote Sensor for 144MHz: £50. Pac-Comm TNC 220: £50. AMT-1: £50. Datong ASP Speech Processor: £50. Adonise Microphone AM530G: £35. G3POX. (Huntingdon) 0480 811549.

BBC-B COMPUTER, BBC Data Recorder, Microvitec Colour Monitor, Packet TNC S/ware ROM: £75. Also Mono Monitors: £10 each. Microvitec Colour Monitors: £25. Heathkit Oscilloscope 10-12u with S-3u Trace Doubler: £25. H/B BARTG Versaterm RTTY/AMTOR Unit: £35. Prefer buyer collects or arrange carriage. (Sudbury, Suffolk) 0787 371842.

BENCHER PADDLE Key: £40. Kent Paddle Key: £35. Bencher XZ 2 Audio Filter: £40. Eimac SK600 Socket: £35. All exc condx. Offers Peter, G4TFH. (London) 081 969 2720.

BUTTERNUT HF6V Vertical, 80 - 10m, gd condx, gd results. Gd reason for sale: £50. G0JEE, QTHR. (Burton-on-Trent) 0283 563667.

CHALLENGER DX-VI Antenna: £100. (Slight damage to lower section, cost £270.) G7ARB, QTHR. (Melton Mowbray) 0664 500814.

CLEARANCE. KENWOOD TM241E 2m 50w Mobile: £225. Maxcom SL70 2m H/held with Base charger: £65 or Pair £115. Tait 50MHz FM Mobile 50w: £50. New Bird 150 watt Dummy Load: £50. Cavities ASL Barrell 2m V/high 'Q': £50 each. (Spilsby) 0754 830427.

COUNTER. HOWES DFD4 used with TS520S, home brew Case: £25. RadCom/Bulletins fifties to nineties - FREE to collect. G3HLG, QTHR. (Newark) 0636 892384.

DAIWA CNA-1001 Auto ATU 500w PEP 10-80m: £100. TH3 Mk3 Thunderbird Antenna. Dismantled. Buyer collects. Offers? G3TGF, QTHR. (Heathfield) 0435 830484.

DATONG Automatic Speech Processor wired for Icom 725 including eight new rechargeable AA Batteries for Internal Power Supply, mint condx, Tx updated: £75. Also SEM Multifilter: £50. G2CVO, QTHR. (Colchester) 0206 383363.

EDDYSTONE 770R Receiver, c/w Set of new Valves: £75. Icom HS10 Headset, new in box: £10. Bird Termaline 6156 5/15/50/150Watts, GWO: £90. Telequipment D66A Scope D/beam: £30. Radio Rx 35A, ex DTI: £25. Wanted: Thruline Elements for 43A Wattmeter. (March, Cambs) 0354 741168.

EDL432P 70cms Linear: £80. Europa, Xtals installed for Packet: £30. Standard SR-C146A 2m 5chan H/held: £40. Jaybeam 2m 8ele Yagi: £20. 70cm MBM 48 ele Multibeam: £15. Army No 31 Set, Offers. All plus carriage. G0DLF. (Northants) 0604 752310.

EMOTO EV700D5X Azimuth Elevation, brand new, heavy duty Rotator. Cost over £800. Gift at: £550, delivered. Terry. (Nr Llandudno) 0754 610331.

EX-EAST GERMAN Army Command Vehicle. MOT etc Nov'94, registered PLG Box Van. With trailer containing 20 Metre sectional Alloy Mast and pair UHF Logperiodic Aerials: £4,500. (Stourbridge) 0384 877336.

FM RECEIVER MODULES. Double Conversion Superhet design. 0.5uV into 50 Ohm for 10dB S+N/N. Power, 12V at 25mA. 2x BF981, 10.7MHz Crystal filter, 455kHz Mechanical Filter, 10.245MHz crystal, 54.175MHz crystal, MC3359 IC, failed manufacturesrs performance testing. Easly re-crystalled for 2m. Supplied with circuit diagram and specification: £5 each +50p P&P. Several available. G8ZGK, QTHR. (High Wycombe) 0494 448030.

FT101EE gd condx: £200. BBC Master 128 with Disk Drive: £250. SEM Transmatch: £50. G0MCE, QTHR. (Wolverhampton) 0902 783299.

FT101Z Mk3, WARC, FM, fan, Sure Mic, vgc: £335 or Exch TS700, IFT225 or similar. G0JJG. (Stowmarket) 0449 781827 after 6pm.

FT101ZD, WARC, CW filter, FM, fan, Mic, manual, boxed: £385. FV901DM, manual: £165 ono. (Coventry) 0203 450476.

FT102 Tcvr, incl FM and CW Filters, gd condx: £400. Contact G3JDA, QTHR. (Rotherfield) 0892 852144.

FT790 Mk1 70cm M/mode Tcvr in exc condx, boxed, with Mic, set of new Nicads, carry case, leads and manual: £230. (Edinburgh) 031 657 3942.

GELOSO VALVE VFO and Dial, Tech Manual. Heathkit desk calculator, H/book, display fault. 35mm CRT (b/w) Matsushita 40HB4-0-8, wkg. Meccano No1 Clockwork Motor, new, boxed. Some Valves, SAE Lists. D/F Loop base pivot castings. Type 4 D/F Loop, coil only. WANTED: Type 3 D/F loop and staff, remote cables and controls. Mint L or N Tx/Rx and connectors. Terrestial prices please!. (Helston) 0326 280871.

GOING QRT (for a while, not for ever!). Tons of junk and bits and pieces, homebrew/commercial gear. SAE for lists. G8NEO, QTHR, 32, Long Furlong, Over, Cambridge, CB4 5SP. (Over) 0954 231079.

GOING QRT. TS940S Auto ATU MC42S: £1,150. TS50: £650. Drake MN7 ATU: £135. Daiwa PS304/2 30A PSU: £112. Claude Lyons Variac: £65. Butternut HF6V: £90. Cobwebb: £90. CN101 Diawa Pwr/Swr Meter: £45. Heatherlite handsfree Mic: £20. 2m/70cm Glass Mount: £15. Kenwood compatible Tape Recorder: £20. K2 RAG Balun: £15. Alinco Mic: £18. Many bits/pieces. SAE for list. (High Wycombe) 0494 534656.

HEATH DX40 Tx: £40. Racal RA17, perfect: £180. TS530SP, fitted 250Hz filter, VGC: £400. VFO 240: £60 ono. G4ERA, QTHR. (Hastings) 0424 812350.

HEATHKIT HR-1680 Amateur Bands 80-10m Receiver: £110. Heathkit HW-9: £105. Grundig YB-206 Rx: £35. SEM Audio Multifilter: £50. Write to EI4DZ, 16 St Mary's Crescent, Westport, Co Mayo, Eire.

HEATHKIT HW8, No Mods, Gd condx, with manual: £70. Vega VEF20G Rx, six Shortwave Bands with medium and Longwave, AM only: £15. H/brew Rx 3.5-28MHz, USB/LSB, meter, needs Headphones, Large and Heavy: £20, buyer collects. Lucien, G4SYI. (Stanmore) 081 958 9868.

HEATHKIT SB200 Linear Amp, completely rebuilt, new RS Case, redesigned Front Panel, extra cooling fans, spare valves, manual: £425. G4ZIP, QTHR. (Feltham) 081 890 4666.

HUSTLER 5 Band Vertical Antenna 10-80m, well made as new, 1 week use only, cost £150 accept: £125, incl carriage. GW4RLP, QTHR. (Caernarfon) 0286 675264.

ICOM 04E 70cm H/held, one owner from new, boxed, plus instructions, cond as new: £185. G7FKD. (Banstead) 0737 360045.

ICOM 505 6m Portable/Base Station, SSB/FM/CW M/mode Tcvr, external 12V or internal Batteries, retractable Antenna for portable use. FM board fitted, RF o/p switchable 10/3/0.5 Watts, gd condx, boxed, manual: £275 ono. G4RFC, QTHR. (Greenwich) 081 293 4989.

ICOM 725 FM and Narrow CW fitted: £600. Icom Mobile Auto Tuner plus Icom Mobile Whip with mounting: £150. Jaybeam Minimax Triband HF Beam: £250. Altron SM30 with cage, wall mounted: £275. MFJ 949 Tuner: £100. Butternut Butterfly HF5B 5 band 2 ele Beam: £100. Tonna 11xy AO13 Beam 2m: £50. 4x 19 70cm Tonna: £80. Dick. (Burgess Hill) 0444 248423.

ICOM AH-7000 wideband Diskone Antenna, 25-1300MHz c/w Aluminium Mast 17.5 ft by 2in OD and lengths URM67 Coax: £35. G3RDG. (NW London) 081 455 8831).

ICOM IC765 mint, not used much, boxed: £1,850 ono. PK232 with FAX update: £120 ono. HF Module for Yaesu 726: £120 ono. (Southampton) 0703 457292.

KENWOOD MC85 Multi Function Micophone, top of the range model, surplus to requirements. Pristine condx, manual. Ideal Dx: £99 ono. (Truro) 0872 79922.

KENWOOD TM-732E D/band Tcvr, 50w o/p. Duplex crossband and repeater modes. Detachable Display enables boot or underseat mounting. As new (never use mobile) c/w Mic, manuals and packing: £525 ono. G6HNJ, QTHR. Phone after 7pm. (Southhampton) 0489 797797.

KENWOOD TR751E 2m M/mode, Mobile bracket, Voice card, Heatherlite Mic: £450. PK232-MBX Ver 7.0 S/ware, manual, leads: £220. (Taunton) 0823 288200.

KENWOOD TS-440SAT w/PS, CW filter: £800. Drake L-7 (160-10m) Linear: £900. Kenwood YK-455C1 CW Filter: £40. GAP DX-8 HF Vertical, (unused): £180. JPS NF-60 DSP notch filter: £100. MFJ-202 noise bridge: £40. MFJ-931 artificial ground: £55. Carl. (Brackley) 0280 705676.

KENWOOD TS130S, DFC230 Digital VFO MC35, service manual, boxed, exc condx: £435. Ring daytime 0432 359210. After 5pm (Leominster) 0568 615828.

KENWOOD TS140S nice condx, with manual and Mic: £550 ono. Microset PT120 Power Supply also available. G3VPT, QTHR. (Norwich) 0603 898715.

KENWOOD TS440S, filters, ext Spkr: £575. PS-50: £95. AT-230: £95. MC-60 Desk: £45. Toyo T-200 Dummy Load: £25. Kenwood HS-5 Phones: £15. Station Complete: £795. All exc. Buyer(s) collect(s)/pay(s) carriage. Boxes, manuals. Also 38ft Mast, 2in Dia Sections: £35. (If possible will sell as complete Station). Enquiries welcome, evenings, but no offers, please. (Largs) 0475 675967.

KENWOOD TS530S new PA's last year, exc condx, bargain: £475. Matching AT230, vgc: £140. SP230 HP/LP Filter/Spkr: £40, WITH OR AFTER RIG ONLY!. Alinco DJ120E + Spkr/Mic, vgc: £140. Datong PC1 general Coverage Converter + 2/10 Converter: £80 (without: £60). G0OZK. (Stockport) 061 477 5303.

KENWOOD TS850SAT with DSP100, SP31, DRU2, IF232C and YG455CN-1 narrow CW Filter. All mint condx: £1,850. G0PRF, QTHR. (Huddersfield) 0484 640064.

KENWOOD TS950SD DSP Tcvr, extra IF Filters, exc rig, orig pkg, very little use: £1,850. G4FKR. (Winchester) 0962 880411.

KW2000A with PSU and Mic. Works well:

£135. Wanted G2DAF Rx, incomplete considered. G3WCE, QTHR. (Norwich) 0603 53331.

LINEAR AMP Model LK450, 1kW SSB, 0.8kW CW, 0.6Kw RTTY and 0.3kW AM, 1.8-30MHz QSK 3-500Z, manual, buyer must collect: £450. Ten-Tec 218 Filter: £35. Argosy 224 CW Filter: £20. Labgear E5037 TVI Filter: £1. TS430S service manual: £5. Various Ten-Tec manuals. All plus Postage. (Sheerness) 0795 873100.

MICROWAVE Mainly - Shack move. Lots of 3cm and other usefull kit. SAE for list to:- G3UFW, Pendine, Romsey Road, East Wellow, Romsey, SO51 6BG or call 0794 322224.

MILITARIA: British Army C-13 Tcvr with PSU, 1.5-12MHz: £150. Redifon HF remote Whip Matching Unit: £45. Collins TCS Transmitter: £60, Receiver : £75. TS323 VHF Freq Meter: £80. ARRL Handbook 1942: £10. Lowe Dip Oscillator: £45. National NC81X Amateur Band Receiver, restored: £100. Restored projects; RAF R1475: £50, PCR2: £25. Everything carriage extra. Data sheet on request. Teague, G3GTJ. (Castle Cary) 0963 240319.

PACKARD BELL PB286LP Laptop, 40Mb H/D, 1.44Mb 3.25 Floppy, MS-DOS. Amstrad PC1640, 20Mb H/D, 5.25 Floppy, Colour Monitor as new with S/ware. Offers. G0RZG. (Wickham Market) 0728 746741.

PACOMM HANDIPACKET Controller (mobile) with Disk programmes. Exc condx and little used. Four months old. All orig packing: £150. (Maidenhead) 0628 25010.

PHILIPS PCD300 386SX16. 2Meg RAM, 49Mb H/D, VGA, Mouse. NO Keyboard or Monitor. Can be seen working, S/ware manuals: £225. (NW London) 081 455 8831.

PYE WESTMINSTER W15FM crystals 70.475, 70.425, 70.325, 70.4875, new PA, c/w Mic and TNC lead: £50. G3UGL, QTHR. (Bedfordshire) 0234 750050.

RSGB BULLETINS and Radio Communications, 1966 to date. House move causes need to dispose of library. What Offers? Can deliver locally. Contact Neil, G4BCW, NOT QTHR. (Leicester) 0455 822476.

SANGEAN ATS 803A, Power Supply, instructions, batteries, hardly used, boxed: £85. GW4RZU, QTHR. (Haverfordwest) 0437 710544.

SILENT KEY SALE, GW4IXU. Radio Tuners: Sony ST-5570ES FM Stereo FM/AM, Sony ST-S311 FM/AM, Cambridge Audio T55, Sony ST-S310 Stereo FM/AM, Sony ST-JX230L FM-AM Stereo. Amplifiers: Sony TA-AV490 Integrated AV Amplifier. Tuner-Amplifier: Quad Tuner-Ampl. Stereo Cassette Decks: Sony TC-WR820, Sony TC420R, Sony TC-131SD Recorder. Disk Player: CDP-103. Graphic Equaliser: Sony SEO-310 7-Band, Gerrard 401 with V15. All in exc condx, with boxes and instructions. Enquiries to 0921 624525 or (Nottingham) 0602 262066.

SILENT KEY Sale, GW4IXU. Tcvr's: Yaesu FT ONE & Drake L7 Linear. Corsair(Ten-Tec). Paragon(Ten-Tec), KW(Ten-Tec). Drake Equipment: R4C Communications Rx, MS4 Spkr, Drake MN2700. World Band PLL Rx's: Sony's ICF 2001D, ICF-SW77, ICF-7600, ICF-7600DS, ICF-SW55 and ICF-SW1. Roberts RC818. Panasonic RF-B45 and RF-B65. Microphones: Sure 444D, Yaesu YM38. Others items: FDK Scanner TM568, Palomar Tuner PT340, Drake Electronic Keyer CW75, MK-703 Morse Key, Palomar R-X Noise Bridge, BNOS Type 12/45A Stab PSU, etc. All in exc condx, with boxes and instructions and operating notes for Tcvr's. Offers to 0291 624525 or (Nottingham) 0602 262066. Inspection by arrangement.

SILENT KEY Sale. Azden PCS 6000 2m Mobile Tcvr: £150. Alinco ALM203E Tcvr, Spkr/Mic, 25W PA: £150. FL3 Filter Datong: £50. (Southend) 0268 757263.

SOMMERKAMP FT2772D, FC902, SP901/P, FTV901R 2m, 6m and 70cm. Boxed with manuals, just serviced: £850. (Deal) 0304 379580.

SONY TRINICON colour Video Camera with Remote Control Zoom Lens. Composite video o/p. Suitable Amateur TV. Gd working order: £125 ono. Satellite Dish 1.8 Metre with Polar Mount for 3 inch mast and 1.3dB LNB solid Aluminium Petal construction. Dismantles for transport: £100. (Hemel Hempstead) 0442 832169.

STRUMECH TOWER two section Tiltover with ground Hinge and Rotor Cage, extents to approx 40 ft. C/w HiGain Rotator, 14 ele 2m Crossed Yagi and 70cm 18 ele Beam, all in gd condx: £350. Tatung Einstein Computers, one 80/40, one 40 column Twin D/drives, plus many Disks and literature: £30 each. All items buyer collect or carriage extra. G3PVT, QTHR. (Birmingham) 021 747 2329.

TELESCOPIC TILTOVER 30ft Mast, c/w 2m 9ele, 70cm 17 ele, 23cm 23 ele Yagis, Azimuth and Elevation Rotators. Exc condx, buyer to dismantle/collect: £350. G8NEO, QTHR. (Over) 0954 231079.

TH78E, mint, CTCSS, extra memory, extended warranty: £360 or P/Ex with adjustment for Mobile D/bander. SEM QRM Eliminator: £45. Standard C7800 70cm Mobile Rig: £100. Wanted, 9600 ready 70cm Rig. Paul. Phone/Fax (Rhyl) 0745 833847.

TRIO 520 HF Rig with CW Filter, vgc, unused since purchase: £240 ono. G1IPQ, QTHR. (Southampton) 0703 736784.

TRIO 7800 Tcvr 2m FM Mobile/Base, 25W c/w extra Adonis FX-1 car Mic: £150. 70cm Colinear and Fixing brackets. TET 3 ele HF Beam HB33SP. Offers. (Sutton) 081 395 6890.

TRIO TL-911 HF Linear Amp, vgc: £350. AMT3 Amtor/RTTY Terminal as new: £100. Psion MC400 Notebook Computer, c/w Mains PSU: £175. Samsung Mono VGA Monitor, mint: £55. Martelec Weathersat Receiver for orbiting and Geo-stationary satellites c/w one metre Dish and Turnstile Aerial, PC card and S/ware: £300. All inspect/ collect or carriage at cost. Call Dave, G0MJK. (Northampton) 0604 711647.

TRIO TR9130 2m M/mode, boxed, manual: £250. Jaybeam 6 ele 2m Quad Antenna, as new: £50. G4GTR, QTHR. (Bakewell) 0629 640475.

TRIO TS830S, YG455C CW Filter, ex condx: £520. Trio MC50 Desk Mic: £40. Trio AT200 Antenna Tuner: £60. Collect or pay carriage. (Settle) 0729 822299.

TS430S HF Tcvr, 100W, fitted FM board, 250Hz CW Filter, AM Filter, Mobile Mount, DC leads, original box, manual, etc: £500. Yaesu FT101ZD, CW Filter fitted, exc condx, handbook: £325. Buyer inspects, collects CASH only. Definatly no time wasters please. NO OFFERS. Lawerence, G4EOF. 207 Welland Park Road. (Market Harborough) 0858 461503.

TS440S with Automatic ATU, narrow CW and SSB Filters. Exc condx: £750. (Leicester) 0533 353154.

TS440S, Auto ATU + SP430 Spkr + Mic + manual, exc condx, hardly used: £800. 25Amp PSU (H/brew, built by a Pro) Fully protected: £35. TS930S workshop manual(unopened): £12.50 (Not now available). Ron, G4DIY. (St Helens) 0744 757471.

TS520 HF Tcvr, CW Filter, 12 Volt lead, manual, perfect wkg by Castle: £330. 3 ele Mini-Beam with Channel Master Rotator, gwo: £110. All items as complete station, ideal for beginner: £400. Buyer collects. Homebrew UV-light Box: £40. Taylor22 Faultfinder: £15 or Exchange LOT for GWO TS530 with CW Filter. Contact John, G4VPU, QTHR. (Whitley Bay) 091 252 2304.

TWO METRE LINEARS. DAIWA LA2080H, hardly used, 1.5-5w i/p, 30-80W o/p: £70. LA2080AJH, 2 - 100W: £40. PSU 15A: £30. 9 ele Tonna and 8 ele Jaybeam, VGC: £30 each. Collect or carriage extra. G7NFO. (Rugby) 0788 578556.

UNIVERSAL M900 Decoder, brand new £530, bargain at: £450 ono. Reason for sale. Dressler Active Antenna 50-1500MHz, first: £50. (Kenilworth) 0926 54556.

VERSATOWER, 3 piece 60ft, requires overhaul. Comes with second identical Tower for spares or repair. Includes Winches and cables: £275 ono for both. Computers; Commodore PC40 286 10MHz 40Mb HDD, 3.5(720K) & 5.25(1.2Mb) Floppys, EGA Graphics Keyboard, No Monitor: £125 ono. Amstrad PPC640 Portable Mono Screen, PSU Car Adaptor, internal Modem, 2x 3.5(720k) Floppys: £150 ono. Olivetti PC286 10Mhz, 2Mb Ram, 32Mb HDD, VGA Graphics, Keyboard, NO Monitor, Faulty Floppy drive controller: £125 ono. Unused Full Size G5RV: £10. Buyer collects and inspects. Evenings only. (Watford, Herts) 0923 676251.

VINTAGE RADIO 'My Lady Margaret' Vidor Portable, requires 90v HT, gd condx. Offers or exchange for gd quality Old Morse Key. (Canterbury) 0227 712277.

WHITE STICK Antenna: £50 ono. Five G2DIM Dipole Ally Scaffold Hardware Poles. Twelve Nylon Guys. Buyer collects, dismantles. G6KFI. (Salisbury) 0722 780396.

YAESU 101ZD, Mk 3: £430. Matching 101DM Ext VFO and 1.2Kw Linear: £450. Also Heatherlite Explorer 2KW Linear: £750. Shure 555 Mic: £30. All mint cond. Buyer inspects and collects. G4VIO, QTHR. (Co Durham) 0388 763501.

YAESU FL2100Z Linear Amp: £500. 80m Homebrew Tx/Rx: £25. H'duty 13.8v PSU: £40. 2m 14ele Beam: £25. 2m 2Way Splitter: £20. EK150 Keyer: £50. 70cms Beam: £20. 70cms Co-Linear: £20. Nigel, G4NRR. (Solihull) 021 744 8672.

YAESU FRG7700 Receiver: £275. Welz SPR Meter: £50. (West Horsley) 0483 282808.

YAESU FT101Z late model, super CW Filter, fan, service manual, very little use, vgc: £325. Kenwood TS520, CW Filter: £225. Colin J Lambert, G3TA. (Cirencester) 0285 821571.

YAESU FT101ZD HF SSB Tcvr Mk 3, many new parts: £525 ono. Yaesu FT270RH 2m, 70cm: £425 ono. Call Bob, 2E1CWE. (Telford) 0939 413734.

YAESU FT107M Tcvr, c/w 2m and 70cm Transverters, Remote VFO, ATU and Spkr, 100w, mint: £750 the lot. Trio TS940S Tcvr: £1,000. Tokyo 2m Linear, 12V: £75. Trio TM201A Mobile Tcvr: £75. Lesson Desk Power Mic: £25. 12V, 35A PSU with external Volt and Amp Meters: £55. G3RUB, QTHR. (Derby) 0773 603005.

YAESU FT221 2m Base Station (SSB/FM/CW) M/mode Tcvr, external 12V or Mains, 10W o/p, Mutek front end board fitted: £200 ono. G4RFC, QTHR. (Greenwich) 081 293 4989.

YAESU FT290, Mk1 F/C cond. Complete service, new battery, carrying case: £200. Jack. (Dorking) 0306 887057.

YAESU FT707 Tcvr, 600Hz Filter, matching PSU, FC707 Antenna Tuner, MR-7 equipment Rack, YD-148 Stand Mic and YH-55 H/phones, c/w manuals, original boxes: £550 ono, NO Split!. Also available HF-5 Vertical Antenna with HF-5R Radial kit! Offers? G4ASH, QTHR. (Leighton Buzzard) 0525 378580.

YAESU FT70G 2-30MHz 10W Manpack Tcvr: £275. AEL3030 2-16MHz 150w Tcvr: £100. Decca Voyager 1.6-4.2MHz 20w Marine Tcvr: £50. Pye SSB130 Remote HF ATU: £20. Jaybeam C5 2m Colinear: £30. Jaybeam CR23 23cm Corner Reflector(new): £10. Telebox VHF/UHF TV Tuner (video and audio o/p): £25. Two HB9CV Antennas, 2m and 70cm: £15 the pair. Buyer collects. G4VZO, NOT QTHR. (Kingswinford) 0384 287454.

YAESU FT736R, 23cms Converter: £1,500. Tokyo HyPower Amps, HL130U 70cms 120w: £315, HL180V 2m 170w: £199. Kenwood 250Hz CW Filter YG-455CN-1: £85. Alinco DJ-580E, extra battery: £360. SSB Electronics UEK-2000S S-Band Converter, unused: £199. S-Band G3JVL 88 ele Quad Loop Yagi: £70. G5400B AZ/EL Dual Controller PC Rotor Interface IF100, S/ware: £350. Various cables. (Portsmouth) 0705 786773.

YAESU FT767GX c/w 2m, 70cm and 6m Modules, MD1 Desk Mic, operating manual, boxed, gd condx: £1,300. G7BLQ, QTHR. (Elland) 0422 374500.

YAESU FT77 Tcvr with CW Filter, new Mic: £360. Local delivery. G0IGB. (Cheadle Hulme) 061 439 6813.

YAESU FT902DM Tcvr 160-10m, gd cond: £475. Chris, G4AQW. (Blandford) 0258 456391.

YAESU YF-112C CW Filter to fit FT840, new never fitted. Surplus to requirements: £45 ono. Martin, GM0JCN. (Aberdeen) 0569 731177.

WANTED

ANTIQUE WIRELESS Equipment, Crystal Sets, Horn Spkrs, Valves, Pre-war Television, Valve Hi-Fi, Books. G4ERU, 5 Luther Road, Winton, Bournemouth BH9 1LH. (Bournemouth) 0202 510400.

AP1086 Issue 1, (RAF Radio Stores Ref No's). Also Air Publications Relating to Radio, Radar Equipment. Exc price offered. Would purchace Post-War to current:- Magnetrons, Klystrons, T/R Cells, Photo-Multipliers, Thyratrons, Ignitrons, Planar - Ceramic, Microwave and Special CV Types. Required Rx Type R1355 10D/13032, unmofified also R3002-3, R3120-1, ABK-ABK1, SCR 695A, SCR 695AZ, Control Unit Type 17/18. Phone anytime. (London) 071 511 4786 or 071 790 2846 or Fax 071 511 4786.

7217 DECADE Counter chip. Ceramic Ribbed 2inch Former. EHT Transformer for KW2000 PSU or complete PSU. 1mH, 2.5mH Chokes. G4ILA. (Stockport) 061 477 6702.

CIRCUIT DIAGRAM for GEC 'COURIER' Personal Tx-Rx type RC550-TR. Will pay for photocopy and post. G1RFB, QTHR. (East Cowes, IOW) 0983 298380.

COLLINS KWM2A, Accessories, Manuals etc. Anything in this Series considered, eveny faulty. Please WHY. Terry, 7 Cavendish Drive, Clowne, Chesterfield, Derbys.

COMMUNICATIONS Receivers. G W Smith UNR30, UR-1A. Lafayette HA600. Heathkit RG1, GR64. Eddystone - all models. For Cash. Any condx. Lepino. Fax 0372 454381. (Surrey) 0374 128170.

DRAKE Commercial Receivers for my collection DSR1, DSR2, MSR1, MSR2, RR3. Any condx, working or not. Would import. Thanks G3YFK. (Shrewsbury) 0743 884858.

DRAKE Q-Multiplier and Crystal Calibrator for 2-B Rx. Also non-working Receiver for spares required. G4BZI, QTHR. (Chester) 0244 351357.

FIVE BAND Mini Beam with Rotator and Wall Mounted Telescopic Mast. Anything considered, cash waiting. Will collect. (Bransgore) 0425 628105.

FT101 OR TS520 or similar reasonably priced HF Rig. Also wanted cheap SWR/Power Meter. Dave, G0KPZ, QTHR. (Sidcup) 081 309 1295.

FT401, must be VGC, no Mods, no extras, Required. G2CG, QTHR. (Royston) 0763 243093.

FT7 Tcvr or Argonaut 509/515 or Argosy 2 or Similar QRP Tcvr. Phone (London) 071 935 7119 weekdays.

HF MULTIBAND Vertical Antenna for base station. Also HF Multiband Mobile Antenna. G3XFB, QTHR. (Stafford) 0902 850033.

ICOM IC24G, Yaesu FT730R and Kenwood TM741E D/band. Must be complete, in gd condx with handbook. Mike, G8CPH. (Ipswich) 0473 831448.

KW ATLANTA Circuit Diagram. Panda Ant Coupler with two Meters on panel. Bob, G3JJU. (Fleet) 0252 615831.

R107 RECEIVER. Rotary PSU etc for 19 Set. ATU No 5 for C12. C11 Transmitter. 52 Set Transmitter or complete Unit. Large Transmmitter WS53 or T1509 or RCA ET4336. Manuals/ Emers for Racal Syncal Packset TRA921. Substantial deposit paid as security if loaned for photocopying. Emers for WS22 likewise. Jim, G4XWD, NOT QTHR. (Norfolk) 0692 630285.

RACAL MA144C ATU. Wanted or Large Turns-Counting Dials as used on MA144C. Thanks. GM3WOJ, QTHR. (Invergordon) 0862 842762.

RACAL MODEL 836 Frequency Counter in working condx. Phone any time. (Tiverton, Devon) 0884 841663.

RACAL SSB Adaptors RA63, RA98, RA298. Panoramic Receiver RA81 RA66 must be working and clean. Exchange FT101 for Racal RA1776 RA1771 will uplift and pay cash for gd Rx. Also wanted Marine equipment, Sailor HF/VHF, Redifon MF/HF. Brian. (Greenock) 0475 783700.

RADIO ALTIMETER SCR718, ARI5393 circuit diagram and notes. Unmodified Command equipment, Tx, Modulator, Cradle, connectors, tuning cable. G4EZM, QTHR. (Blackpool) 0253 347176.

REVOX A77 TAPE Deck, quarter track. Must be fully maintained, within spec machine. GM0JKF, QTHR. (Banchory) 0330 823324.

SHURE 444D Microphone Wanted. GW4KVJ, QTHR. (Nr Cardiff) 0443 813100.

TRIO-KENWOOD GC10 General Coverage Unit, will consider purchase outside UK. Please forward details in writing. G6LDQ, QTHR. (Redruth) 0209 315432.

TS930, TS940 Working or Faulty, can collect. Colin J Lambert, G3TA. (Cirencester) 0285 821571.

WW2 GERMAN Ex-Service Equipment. Clandestine Sets Mk328, Old Brass Keys and Galvonometers, WHY?. OZ8RO. Mr Rag Otterstad, Hosterkobvej 10, DK-3460 Birkerod, Denmark. Fax, 010 45 44681514. (Copenhaegen) 010 45 42815205.

EXCHANGE

BBC B issue 7 with D/drive, Colour Monitor, Printer, clean unmarked and very little used, worked perfectly with KAM. Exchange for gd quality H/held or sell. (St Annes on Sea) 0253 782339.

EXCHANGE FT277 HF Bands, USB/LSB/CW/AM, fan, vgc, boxed, manual FOR a 70cm Tcvr M/mode 25W o/p in vgc. Ray, G1WWU. (Kings Lynn) 0553 761309.

HONDA LAWN Mower petrol engine 4 stroke, 16in Cylinder and Roller. Only used Part of one season as gd as new. Will exchange for TH78 or similar. (St Annes on Sea) 0253 782339.

YAMAHA HE8 Electone Organ 2x 49 Keyboards, Touch response, 20 pedals. Uses FM and advanced wave memory technology. Chord sequence programmer. Multi Menu. Keyboard percussion section etc. Hinged perspex dust cover, stool, music. Immaculate condx, exchange for gd HF equipment. (Tring, Herts) 0442 890821.

CLUB NEWS

DEADLINE - Items for inclusion in the October 1994 issue must be sent to HQ marked 'Club News - DIARY', to be received by 26 August 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

NORTH BRISTOL ARC - Tuition for RAE and Morse is available at every meeting. Details 0272 513573.

RSGB CITY OF BRISTOL GROUP - 30, Biasing Transistors by Ross Clare. Now meets at New Friends Hall, Purdown, Bell Hill, Stapleton, Bristol, BS16 1BG. Details 0272 672124.

SHIREHAMPTON ARC - During Summer Break and DF season, see G4AHG-2 for further information. Details 0272 770504.

SOUTH BRISTOL ARC - 3, 70cms Activity evening and committee meeting; 10, Computer Shareware Please bring some; 17, BBQ evening; 24, Astro Photography, slide presentation by Brian, G7NQJ; 31, Preparation for Bristol Radio & Computer Rally. Details 0275 834282.

WESTON-SUPER-MARE - 1, talk 'Memories of a National Serviceman' by G0SVA; 15, Workshop night. Details G8WAR, 0934 415700.

BEDFORDSHIRE

SHEFFORD & DARS - **AUGUST NO Meetings**. Next meeting early September. Details 0462 700618.

BERKSHIRE

BRACKNELL ARC - 10, VHF Contest Station Revealed by G0GJV; Sep 14, Global Networking by G1MSS. Details 0344 420577.

READING & DARC - 11, Blind RDF(Fox Hunt) in Woodford Park by Paul, G1JEJ; 25, Planning for SSB Field Day. A number of activities are planned to celebrate this anniversary. Details 0734 698274 eve.

BUCKINGHAMSHIRE

AYLESBURY VALE RS - ***August NO meeting***; Sep 7, RSGB Questions and Answers Session by Council Member Hilary Claytonsmith, G4JKS. Details 0296 81097.

CHESHAM & DARS - 3, Gen Meeting; 10, Wet string Contest 2; 17, Discussion Evening; 24, Penguin night; 31, Mobile DF Hunt. All meetings take place in the Top Floor Meeting Room at The White Hill Centre, White Hill, Chesham, Bucks at 8.15pm. Details 0494 676391.

CAMBRIDGESHIRE

CAMBRIDGE & DARC - 5, Microwave Evening; 7, Family Fun day at Longstowe; 12, Why not use the Club rigs in the Shack?; 19, Visit to CNFM at Histon (12 places); 26, Fire precautions (for the amateur) by Bob Chapman, Cambridge Fire Service. Details 0954 200072.

CENTRAL

DOLLAR ACAEMY ARC - Meets most afternoons at the Academy after 5.15pm. Details GM0LOD 0259 742126.

STIRLING & DARS - Meets every Thursday at 7.30pm in the Clubrooms, Bandeath Industrial Estate, Throsk, Nr Stirling. Morse instruction available when requested. Details 0324 636235.

CHESHIRE

CHESTER & DARS - **AUGUST - CLUB CLOSED**; Sep, 13, Video night. Details 051 608 3229.

STOCKPORT RS - 10, Lecture by The RNLI; 24, Talk 'Fibre Optic Networks' by Nynex. Details 061 439 4952.

CLWYD

RHYL & DARC - Meets every 1st and 3rd Monday of each month, WRVS Centre 116, Vale Road, Rhyl at 8pm. Details 0745 351362.

NORTH WALES R Rally C - Novice courses, Morse instruction, City & Guilds Approved Examination Centre. All radio enthusiasts are welcomed to visit. Meets each Thursday at 7.30pm, YMCA Building, Colwyn Bay, Clwyd. Details 0492 513246.

WREXHAM AR - 2, Equipment Testing evening; 16, Field night; Sep 6, Computer evening. Details from David, GW1MVL.

CO ANTRIM

CARRICKFERGUS ARG - Club meets every Tuesday at 7pm in Downshire Secondary School. Details 0960 351807.

CO ARMAGH

ARMAGH & DARC - Meets 2nd and 4th Wednesday of the month at County Armagh Golf Club, Newry Road, Armagh at 8pm. Details 0762 870423.

CORNWALL

CORNISH RAC - 4, talk 'Data Communications' by Mike. Details 0209 820118.

NEWQUAY & DARS - Meets alternate Friday. Anyone intersted in Amateur Radio is welcome to attend. Details 0726 882752.

PENZANCE RAC - Regular meetings on Mondays, also 2nd Morse Test centre, via RSGB only. Details Brian, 0736 61427.

POLDHU ARC GB2GM, GX0PZE - Meetings Tuesdays and Fridays 7.30pm. Visitors welcome to visit. HF net Wednesdays 7.30pm around 3.75MHz. Details 0326 290638.

CUMBRIA

WESTMORLAND RS - Club now reformed. Now meets 3rd Wednesday of each month at the Kendal Liberal Club. Details 0524 762201.

DERBYSHIRE

BUXTON RA - 9, Printed Circuit Boards by G0JND; 23, Operating Procedures. Lee Wood Hotel, Buxton at 8pm. Details 0298 25506.

DERBY & DARS - 3, Junk Sale; 10, Rally preparations evening; 17, Treasure Hunt, 7.30pm at Markeaton Park; 24, Open meeting(visitors & prospective members cordially invited); 31, talk 'Pressure vessels' by Jenny, G4EYM. Details 0773 856904.

NUNSFIELD HOUSE ARG - Meets every Friday at 8pm, at Nunsfield House Community Centre, Bolton Lane, Derby. Details 0332 518256.

DEVON

APPLEDORE & DARC - Meets 3rd Monday of each month at Appledore Football Clubroom at 7.30pm. Details 0237 477301.

EXETER ARS - 8, Haldon Barbecue; Sep 12, Visit to Devon and Cornwall Police HQ.. Club meets 2nd Monday in the month. Details 0392 78710.

EXMOUTH ARC - If you are in the area why not come and see us!!. Meetings held at the Scout Hut, Marpool Road, Exmouth at 7.30pm. Details 0395 279574.

PLYMOUTH RC - Summer program, (1st and 3rd Tuesdays in August). Aug 2, Natter night; 16, Aunt Sally night and business meeting; Sep 6, Start of Autumn programme, welcome to prospective new RAE candidates. Details 0752 563222.

SOUTH DEVON RC - 3, Project Night; 6/7, GB2TSR, SES at Torbay Steam Rally, Churston, Paignton. Details 0803 522995.

TORBAY ARS - Club nights every Friday at the ECC Social Club, Highweek, Newton Abbot. Details 0803 526762.

DORSET

BLACKMORE VALE ARS - 9, 2m DF Hunt; 23, Setting up of Club stand for Gillingham & Shaftsbury Show, (at Showground). ***NEW VENUE*** Now meets at Shaftesbury School, Dorset on 2nd and 4th Tuesday of each month. Details G7JIF 0963 362766.

DORSET POLICE ARS - 4, Talk/demo 'ATV' by Bob Knight, SDRS; 15, Club Projects update + Committee meeting. Club meets at Dorset Police HQ. **NEW CONTACT ADDRESS**. Details from: c/o Pc 915 Richard Newton, Eastern Control Room, Bournemouth Central Police Station, Madera Road, Bournemouth, Dorset. Tel: 0202 552099 x2031.

FLIGHT REFUELLING ARS - 7, Hamfest Preparation; 14, Hamfest Activities; 21, Vintage racing cars video; 28, Forward Planning; Sep 2, Inter Club Quiz at Bournemouth. Details 0425 653404.

SOUTH DORSET RS - Meets 1st Tuesday of every month. New members and visitors welcome. Details 0305 773860.

DYFED

ABERYSTWYTH & DARS - 7, Club members demonstrating Amateur Radio at the Ceredigion Flying Club 'Open Day', on A486 between Capel Cynon and Ffostrasol. Talk-in on S22; 25, GW0ARA on the Air; Sep 3, Across Wales Walk - Raynet Non-Disaster Event, Control at Pantycelyn, UCW. Club meets 2nd Thursday each month at 8pm, Scout Hut, Plascrug Avenue, Aberystwyth. Details 0545 580675.

EAST SUSSEX

CROWBOROUGH & DARS - 25, *NO FORMAL meeting*; Sep 22, Foxhunt(local). Details 0892 661807.

HASTINGS E & RC - 17, Annual Constructors Competition. Details 0424 830454.

SOUTHDOWN ARS - 1, Talk 'Kuwait (9K2) Experiences' by Jim, G4DRV, Chaseley at 7.30pm; Sep 5, Talk 'Phase locked loops' by Brian, G0SWH. Please enquire about RAE and Morse Classes. Details 0323 484282 or G0UOI @ GB7HAS.

WORTHING & DARC - 3, Discussion evening; 10, Antennas by G3GRO; 17, BBQ; 31, Discussion evening. Meets at 7.30 for 8pm at Parish Hall, South Street, Lancing. Details 0903 753893.

ESSEX

BRAINTREE & DARS - 1, Kite Flying and Operating; 15, QRP - Construction and operating. Club meets every 1st and 3rd Monday in the month, at Braintree Hockey Club at 8pm. Details 0376 327431.

CHELMSFORD ARS - 2, Talk 'G5RV reminiscevies' by Louis Varney, G5RV. Details 0245 256654.

HODDESDON RC - 18, Preparations for SES at Godmanchester and HF Field Day; 28/29, GB1WAS and GB2WAS on HF and 2m and Packet from Godmanchester in aid of Wood Green Animal Shelter; Sep 1, Talk 'Your questions on RSGB Committee and Novice Licence Answered' by Council Member Hilary Claytonsmith, G4JKS. All welcome to attend. Details 0920 466639.

VANGE ARS - 4, Junk Sale; 11, Natter night; 18, Rally arrangements; 25, Team Quiz. Details 0268 552606.

GLOUCESTERSHIRE

CHELTENHAM ARA - Meets 1st Friday of each month at Charlton Kings Library. Details 0242 242336.

GRAMPIAN

ABERDEEN ARS - 5, Junk Sale and Sarcon Planning; 12, Visit to 'Police Comms Department' (tbc); 19, Beetle Drive and Social evening; 26, Sarcon'94 Briefing and job assignments; Sep 2, Junk Sale. Every Friday at Queen Mother House, Claremont Place, Aberdeen. Details 0569 731177.

MORAY FIRTH ARS - Meets every Thursday at 7.30pm. Details 0343 86395.

GREATER LONDON

BROMLEY & DARS - 16, Talk 'Electron Waves' by Mark, G7LSZ. Details 081 777 0420.

COULSDON ATS - 8, BBQ at QTH of G4RWW; Sep 12, Talk 'Nuclear Electric' by Dr AR Ware, Nuclear Electric. Details 081 684 0610.

CRAY VALLEY RS - 4, natter night; 18, natter night; Sep 15, talk 'Bob's DXpedition package' by Bob Treacher. Details 081 850 1386.

CRYSTAL PALACE & DRC - 20, Evening On the Air & informal natter night; Sep 17, Talk 'EMC - Avoiding Interference' by Robin Page-Jones, G3JWI, Chairman RSGB EMC Committee. Details 081 699 5732 or 0737 552170.

EDGEWARE & DRS - 11, Summer break; 25, SSB Field Day Briefing; 2/3, SSB FD. Details 081 204 1868.

The R S of HARROW - July 29, Test Equipment evening, another chance to have your Equipment checked out; Aug 13, Proposed BBQ and River Cruise on river Lee, Broxbourne. Details 0895 632377(eve, w/end) or 071 251 2700(daytime).

SOUTHGATE ARC - 11, Annual BBQ at the Spinney; 25, DF Hunt Equipment check night; 29, Annual Bank Holiday DF Hunt. Details 081 360 2453.

SURREY RCC - 1, Club Barbecue at QTH of G3ZPB. Details 081 660 7517.

SUTTON & CHEAM RS - 4, Informal meeting; 18, (tba). Meets at Sutton United Football Club, Gander Green Lane, Sutton. Details 081 644 9945.

WIMBLEDON & DARS - **AUGUST - NO MEETING**; Sep 9, talk 'The 7th Cavalry, The POGO stick and Guide to Personal Communications' by Brian, G8DIU. Details 081 540 2180.

GREATER MANCHESTER

ECCLES & DARS - 2, Discussion 'SSB Field Day contest'; Sep 6, Lecture 'Passing the RAE in Japanese' by G4UOT. Details 061 773 7899.

SOUTH MANCHESTER RC - 5, Talk 'Human Reliability' by G8APB; 12, DF Contest; 19, TBA; 26, Night on Air. Details 061 969 1964.

TAMESIDE ARS - Now meets every Wednesday night at 7.30pm at the ATC Hut, Moorcroft Street, Droylsden, Tameside. Details from: A N Laughlan, 8 Kempton Close, Droylsden, Tameside, M43 7JL.

GWENT

NEWPORT ARS - Centre Closed till September. Details from Pat Pearl, GW7MVQ on 0633 250017(work) Fax 0633 840254.

GWYNEDD

DRAGON ARC - 1, Amateur radio Videos; 15, Talk 'An evening down the band' by John, GW3VVC; Sep 5, 'The Anglesey DX cluster' by Tony, GW4VEQ. Details 0248 600963.

PORTHMADOG & DARS - 18, Ladies night. Details 0766 770546.

HAMPSHIRE

ANDOVER RAC - RAE classes each meeting at 7pm. Meets at Wildhearn Village Hall, 1st and 3rd Tuesdays of each month. Details 0264 773547 evenings.

BASINGSTOKE ARC - 1, Talk 'Radio Tracking of Wildlife'; 31, 2m DF Competition: OS175 - Fox. Dave, G4NIP; Sep 5, Construction evening and Challenge. Details 0256 25517.

FARNBOROUGH & DRS - 10, Talk -(subject to be announced); 24, SSB Field Day Preview. Details 0252 715765.

HASTINGS E & RC - 17, Annual bring your Thingy Competition. Details 0424 830454.

HORNDEAN & DARC - 4, Talk 'Digital Signal Processing' by Nigel, G7CAW; Sep 1, Practical Wireless Magazine by the Editor, Rob Mannion, G3XFD. Meets at Horndean Community School, room X5, Barton Cross, (off Catherington Lane), Horndean. Details 0705 472846.

ITCHEN VALLEY ARC - **AUGUST - NO MEETING** but weekly Net will run. Details 0703 732997.

WATERSIDE ARS - **AUGUST - NO MEETING**; Sep 27, Talk 'Royal Signals ARS' by Mike, G0SWY, 7.30pm, Hyde Community Centre. Details 0703 783170.

HEREFORD AND WORCESTER

BROMSGROVE ARS - 9, EMC Discussion/Problems; 23, DF Hunt (on foot). Details 0527 542266.

HEREFORD ARS - Club meets on 1st and 3rd Friday of each month. Details G4MET, QTHR.

REDDITCH RC - 11, Club's 160m Project and natter night. Club meets 2nd Thursday each month. WRVS Centre, Ludlow Road (opposite Liberal Club) at 8pm. Details 0789 762041.

HERTFORDSHIRE

CHESHUNT & DARC - 3, Junk Sale; 7, Woburn Rally; 10, Members Forum and natter nite; 17, Talk 'Starting up in Amateur Radio'(part 1) by John, G3WFM; 24, Natter nite; 31, Talk 'Starting up in Amateur Radio'(part 2) by John, G3WFM. Details 0992 464795.

DACORUM ARTS - ***CHANGE OF VENUE*** Now meets 1st and 3rd Tuesdays, 7.30pm at Girl Guide Meeting Rooms (next to British Legion), Queensway, Hemel Hempstead, Herts. Details 0582 766973.

HODDESDON RC - 4, Natter nite; 18, Informal + Preparations for SE station; 28/29 Sponsored SES for Wood Green Animal Shelters, Godmanchester, Cambs - HF and VHF. Details G7OCI 0920 466639.

STEVENAGE & DARS - 2, Natter night - CW practice - HF/VHF on Air; 9, Project Night, how are the projects going?; 16, Talk 'RF Filters and the New Novice Transceivers' by John, G8MVH of AKD; 23, Talk 'Franks Theory!!' by Frank, G3OVT; 30, Video evening, see G7HFD for the Video Directory. Details Neil, 2E1ASZ on 0438 350882.

HUMBERSIDE

GRIMSBY ARS - 4, A Test Gear evening,(bring yours along too) by Adrian, G1BRB; 11, DF Hunt - last of the season; 18, AMSAT UK Satellite update by G4CUO. Details 0472 825899.

ISLE OF WIGHT

BRICKFIELDS ARS and Vintage Wireless Museum - 1st Monday of every month, Bring & buy nights; Every Tuesday of week Novice Training & Construction evenings by Mike, G0SEB 7.30pm to 10pm. Morse classes to be run as and when required; The Clubs Isle of Wight County Award is now Available, details Dennis, 2E1BND. Details G1VGM at GB7IOW.

KENT

DARENTH VALLEY RS - 10, Video night; 24, Back to Basics. Details 0474 703322.

DOVER RC - No Meetings; July 27 until the start of Autumn term at Duke of Yorks School. During term time, club meets Wednesday evenings 6.30-10pm. Novice, full RAE and Morse classes. All ages (over 8) welcome. Details 0304 825030.

EAST KENT RS - **AUGUST - NO MEETING**; Sep 1, Talk 'My trip to South America - operating as HK4ET' by Jose, G3ZZZ. Details 0227 743070.

MAIDSTONE YMCA ARS - 26, Open Night, cheese and wine (Keith 0634 831504 for RAE info. Enrolment on Sept 9); 30, Dummy Morse Tests. Details 0622 832259.

MEDWAY AR & TS - 14, Visit to Duxford Air Museum (provisional); 19, Raynet Video by Alan, G1OMH. Meets every Friday, other evenings include construction and Morse as required plus Novice help. Details 0634 685585/201462.

SEVENOAKS & DARS - **AUGUST - NO MEETING**; Sep 19, 'Communications' by Eve Fuller, Editor of Sevenoaks Chronicle. Details from The Secretary, Sevenoaks & DARS, c/o Council Offices, Argyle Road, Sevenoaks, Kent TN13 1HG.

LANCASHIRE

DARWEN ARC - Club meets every 3rd Wednesday of the month at 8pm at Darwen Catholic Club. Details Bill, G2AKK 0254 703767.

FYLDE ARS - 9, DF Hunt; 23, Informal. Details 0772 635464.

ROCHDALE & DARS - Meetings held every Monday, except Bank Hols at The Cemetry Hotel, Bury Road. Details 0706 376204.

THORNTON CLEVELEYS ARS - 1, Operating evening GB0XXV; 8, Auction; 15, Construction / Fix-it night; 22, Two ten minute talks; 29, Bank Holiday - No Meeting. Details G4BFH, QTHR.

LEICESTERSHIRE

LOUGHBOROUGH & DARC - 2, DF 160 Metres; 9, John's Submarine at Charnwood Water; 16, HF at Wymswold; 23, NoA at Hindleys College, Shepshed; 30, Visit to Deans Lane, VHF + HF etc. Details 218259.

LINCOLNSHIRE

LINCOLN SHORTWAVE C - Meets every Wednesday at the city Engineers Club, Waterside South at 8pm. Details 0427 788356.

LOUTH & DARS - British Legion Hall, Louth at 7pm. Details Neil, 0472 388261.

SPILSBY ARS - **Change of date of monthly meeting**. Now held at The White Hart Hotel, Spilsby, 1st Thursday in month at 7.45pm. Details 0790 52712.

LOTHIAN

LOTHIANS RS - **JULY and AUGUST - Summer Break**; Sep 14, Presidents Address. Details Colin, GM4HWO, QTHR or general enquiries to the club Secretary, Dick, GM4DTH, QTHR.

MERSEYSIDE

LIVERPOOL & DARS - 2, Home-brew Night; 9, GX3AHD On the Air; 16, RF Power Measurements by G8FHD; 23, RAE Post Mortem, 30, Surplus Sale. Details Ian, G4WWX, QTHR.

NORTH SEFTON ARC - Meets 2nd Wednesday of each month. Details 0704 579017 or Fax 0704 570089.

WIRRAL & DARC - 24, UHF DF Hunt, 8pm at Heswall Lay-by. Details 051 677 0210.

MID-GLAMORGAN

MID-GLAMORGAN ARG - would like to invite

EVENTS DIARY CONTINUES ON PAGE 88

RSGB National Mobile Rally

SUNDAY 7 AUGUST 1994 OPEN 10AM

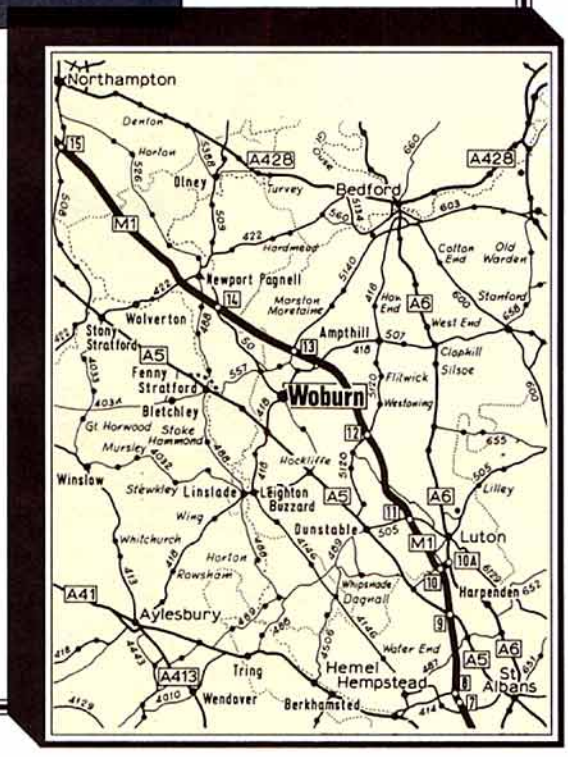
WOBURN ABBEY, BEDFORDSHIRE

HOW TO GET TO THE WOBURN RALLY

Via the M1 - leave the M1 from north or south at junction 13, not 12 as signposted, and then follow signposts through Husborne Crawley to Woburn Abbey.

Avoid routes signposted to "The Wild Animal Kingdom" or "Game Reserve". The rally takes place in Woburn Park, and correct routes are signposted to "Woburn Park" or "The Abbey". Also watch for RSGB signs.

(COACH PARK SITE AVAILABLE)



- **LARGE TRADE EXHIBITION (23,000 SQ FT)**
- **LARGE RSGB BOOKSTALL**
- **ALL UNDER COVER**

The RSGB makes no charge for entrance to the rally but all visitors must pay for entrance to Woburn Park, in which the rally takes place, at £5 per vehicle (including passengers), or £2.50 per vehicle (with single occupant).

Limited overnight caravan stay at £4 per night. Booking forms available from Norman Miller, G3MVV.

All the normal Woburn attractions will be available at small extra charges. Various bars and cafes are available nearby.

All enquiries regarding this event should be made to Norman Miller, G3MVV, 180 Warley Hill, Brentwood, Essex, CM14 5HF; Tel: 0277 225563.

EVENTS DIARY

EVENTS DIARY CONTINUES FROM PAGE 86

people who are interested in amateur radio with a view of forming a new Amateur Radio Club in the Bridgend area. The criteria to encourage people to improve their knowledge of radio by construction, modifications and talks etc. To look at all aspects of the hobby, depending on needs with view to hold Novice, RAE courses and Morse practice. Any one interested, contact Roger, GW3XJC on 0656 733729 or Tom, GW0TOM on 0656 736954.

NORFOLK

DEREHAM ARC - 11, VHF Field Day exploits; Sep 8, Possible trip to Lynford Hall - AR Collection. Details 0362 691099.
ARC FAKENHAM - 2, talk 'Satellites' by Pat, G3IOR. Meets on 1st Tuesday of every month at Trinity Church Room, Hempton at 7.30pm. All welcome. Details 0485 528633.
NORFOLK ARC - 3, Fox Hunt; 10, Night on Air: Construction QRP: Morse practice; 17, Talk 'Science for All' by Arnold, G3PTB; 24, Construction QRP, Morse practive, Night on Air. **NEW CONTACT** Now Mike, G4EOL. Details 0603 789792.

NORTHAMPTON

KETTERING & DARS - Club meets every Tuesday at Electricity Sports & Social Club, Eskdale Street, Kettering at 7.30pm. Details Len, G0RDV 0536 514544.

NOTTINGHAMSHIRE

ARC of NOTTINGHAM - 4, Forum & Night on Air; 11, Talk 'Frequency Conversion' by Mike, G2SP; 18, Fox Hunt No 5; 25, Construction/Activity Night. Details 0602 501733.
MANSFIELD ARS - 8, Talk 'Amateur Television' by Barry, G6LIC. Meets at The Polish Catholic Club, Off Windmill Lane, Woodhouse Road, Mansfield at 7.30pm; 12/13, SES GB4ASH, Ashfield Show, Sutton-in-Ashfield, Notts - family show. Details 0623 423697.
NOTTINGHAM RAYNET ARC - Details 0602 400111 9am to 5pm then 0602 260391 after 6.30pm.
SOUTH NOTTINGHAM ARC - 5, Radio Orienteering in Wollaton Park with David, G7MMQ; 7, fourth Fox Hunt, meet at Highbank; 12, Club natter night(venue tba later); 19, Visit to Nunsfield House ARC; 26, On Air/P at Black Rock picnic site; 28, fifth Fox Hunt, meet at Highbank. Details 0509 672734.

NORTH YORKSHIRE

HAMBLETON ARS - Meetings at Allertonshire School, Northallerton. 7.30 to 9.30pm. Details 0609 776608.

OXFORDSHIRE

VALE OF WHITE HORSE ARS - 2, Talk. Meets 1st Tuesday of every month at The Fox, Steventon at 8pm. Visitors Welcome. Details 0235 531559.

SHROPSHIRE

SALOP ARS - 4, Natter night, 8pm; 11, Notice to members of the AGM(nominations, info, agenda.); 18, Natter night; 25, Rally Group meeting, 8pm. Details 0743 361935.
TELFORD & DARS - 3, Station on Air; 10, Visit; 17, Fax and SSTV using a PC. Meetings take place Dawley Bank Community Centre, Telford at 7.30pm. Details (Telford) 588878.

SOMERSET

TAUNTON & DARC - **AUGUST - Holiday Month. All Friday meetings will be informal**. Meets every Friday in 'The Basement' County Hall, The Crescent, Taunton at 7.30pm. Club Net, Wednesdays, 2100UTC, 3.750MHz+/-.Details 0823 680778.
WINCANTON ARC - 15, Family skittles evening at Guys Marsh - details from Roger, G6TER, 0747 822202; 16 and 30, Providing Communications (all day) for Sparkford and Blackmore Vale Pony Club; Sep 5, Guest speakers, RIS and SSL. Details 0963 34360.
YEOVIL ARC - 4, Talk 'Choosing passive Components' by G3MYM; 11, 'A complete Home Brew QRP station' by G0FUW; 18, 'Strange happenings on Amateur Radio' by G3KSK; 25, Club Station on Air and committee meeting. Venue: The Red Cross HQ, Grove Ave., Yeovil. Details 0258 473845.

SOUTH GLAMORGAN

CARDIFF RSGB Group - 8, Open Forum:- Aerials? Details from GW4HWR on 0222 810368.

SOUTH YORKSHIRE

SHEFFIELD ARC - ***NEW VENUE*** Now meets at The Club 197, Brook Hill, located in the Sheffield University Lecturers Social Club, opposite the main Universaty buildings. 1, Talk 'Crime Prevention' by PC Robinson; 8, Committee meeting(due to Bank Hols at end of month); 15, Round 4 inter club contest eliminator; 19, Family day out at Skegness; 22, Brains trust, come and talk about your Radio problems with the panel on AR subjects; 29, NO MEETING; Sep 5, DF Comp with Dronfield RC. Details 0742 446282.

STRATHCLYDE

MID-LANARK ARS - Lecture and chat nights, RAE and Morse classes, every Friday at 7.30pm, at Newarthill Community & Education Centre, High Street, Newarthill, Motherwell. Details GM7FXK, QTHR.
PAISLEY (YMCA) ARC - RAE/Morse classes, run on Tuesdays. Details Stuart, GM0UKD 0505 335195.

SUFFOLK

FELIXSTOWE & DARS - 8, ESWR Post Mortem; 22, Talk 'Is there life below 500kHz?' by Neil, G0ORG(ops); Sep 5, Night on Air(ops). Detail 0394 273507(evenings).
IPSWICH RC - 3, Talk 'Artifically Intelligent Machines' by Jonathan, G0DVJ; 7, 2nd Sunday afternoon 2 metre Foxhunt; 17, Talk 'The New GB3IH Repeater' by Iain, G0OZS; 31, Morse Practice. All meetings start at 7.30pm, at The Rose and Crown. Details 0473 742072.
SUDBURY & DRA - 2, Talk on Aerials by Mike, G4GGC; 16, natter night; Sep 6, AGM at Wells Hall Old School. Details 0787 313212.

SURREY

REIGATE ATS - 19, Lecture 'Audio and accoustics' by Brian, G3OYU. Club meets at Tilgates, Bletchingley at 8pm. Details 0342 325322.

TAYSIDE

DUNDEE ARC - College closes for summer recess. Details from GM4FSB, QTHR.
STRATHMORE & DARC - ***CHANGE OF VENUE***. Now meets at 2231 (Forfar) Squadron, Air Training Corp, 1 Lochside Road, Forfar, Angus every Wednesday at 7.30pm. Details Alan, GM4JCM, QTHR.

TYNE AND WEAR

HAZELLRIGG ARC - Meets every Monday, Hazellrigg Community Centre at 7pm. Classes for Morse, Novice and talks on various subjects held on last Monday in the month. Details 091 264 4608 after 6pm.

WARWICKSHIRE

STRATFORD U AVON & DARS - August - Summer break, no meetings; Sep 12, Opening night and 'Dayton'94' by Herb, OZ7SM and George, G3LNS. **NEW SECRETARY** Martin Rhodes, G3XZO. Club meets 2nd & 4th Mondays of each month at the Home Guard Club, Main Street, Tiddington, Stratford upon Avon at 7.30pm. Details 0789 740073.

WEST MIDLANDS

ALDRIDGE & BARR BEACON ARC - 15, Talk 'Novice Licence' by Chris, G0MLY. Meets 1st & 3rd Mondays in the month. Details 0922 36162.
COVENTRY ARS - 5, Portable Night on Air at Hartshill Hayes Country Park; 12, Night on Air; 19, Social night at H & J, Corley Moor; 26, Night on Air. Usually meet every Friday at 8pm at Baden Powel House, 121 St Nicholas St., Radford, Coventry. Visitors welcome. Details (G1ORG at GB7COV) or Tel: 0203 311468.
MIDLAND ARS - Every Wednesday, RAE & Morse classes; Every Thursday 'Night on the Air'; 2nd and 4th Monday in month, PC night; Last Friday in month Atari night. Details John, G0LAI 021 628 7632.
SOLIHULL ARS - **NEW SECRETARY** Paul Gaskin, G8AYY, QTHR. Details 021 783 2996.
SOUTH BIRMINGHAM RS - 3, Natter night, 8pm at HQ. Details 021 458 1603.
STOURBRIDGE & DARS - **AUGUST - NO MEETINGS**; Sep 5, On Air night & natter night. Details 0384 374354.
WEST BROMWICH CENTRAL RC - 28/29 SES GB6SS, Sandwell August Bank Holiday Show and Extravaganza, King George V playing fields, Sandwell Farm. Details Ian Leitch, G0PAI 0902 353522 ext 2093(office).

WEST SUSSEX

CHICHESTER & DARC - 2, and 16, Club meetings at St Pancras Hall, St Pancras, Chichester at 7.30pm. Details on 0243 573541.
HORSHAM ARC - 4, Open Forum. Details 073784 2150.

EVENTS DIARY CONTINUES ON PAGE 91

SILENT KEYS

WE HAVE BEEN advised of the deaths of the following radio amateurs:

G0FTF	Mr F T Furner	10.04.94
G0FUJ	Mr E J Gould	13.05.94
G0HPI	Mr R F T Blackmore	29.06.93
G0IYR	Mr S Catton	
G0KNA	Mr H Wright	
G1DXI	Mr I Cripps	19.04.94
G3AEP	Mr R P Mackrell	13.05.94
G3EJZ	Mr J W Cobb	29.04.94
G3GWT	Mr G Taylor	04.06.94
G3PWL	Mr T Hill	11.06.94
G4JOZ	Mr C C E Frearson	May 94
G4WQE	Mr T E Smith	
G4XLX	Mr M M Bain	27.05.94
G4ZA	Mr E W Anderson	
G5ND	Mr H G Newland	08.05.94
G6NZ	Mr L E Newnham	18.06.94
G8GKV	Mr E H Downer	22.04.94
G8KII	Mr R F Bingham	30.03.94
G8UR	Mr S Russ	26.03.94
GD0STL	Mr D J Brand	12.05.94
GM1PVM	Mr R S Rayner	
GW0PUE	Mr K V Evans	17.05.94
GW4IXU	Mr W Page	May 94

Leonard Eugene Newnham, G6NZ

LEN NEWNHAM, G6NZ, died on 18 June, 1994, aged 89 after a protracted illness, which culminated in him having a heart attack.

Len became interested in wireless during the First World War as a child. In his teens he bought and sold surplus government stocks of valves in order to pay for his education at college. He was first licensed in 1921.

During World War II he served in the Royal Air Force and attained the rank of Squadron Leader. Based at Cranwell he wrote training manuals for wireless mechanics and set up the radio school which became the basis for instructing radio operators during the war years and beyond. In 1945 he was sent to Germany by the Ministry of Defence as part of a mission to investigate German radar.

After the war Len became Headmaster of Eastney Boys School, where he remained for 17 years.

His love of amateur radio meant that he was heavily involved with the early days of the RSGB, having joined in 1925. He served on Council for 23 years and was President in 1958. In 1953 he helped set up Raynet, writing the first *Raynet Manual*. His international work included attending the 1959 ITU World Administrative Radio Conference in Geneva which lasted three months, and attending the triennial IARU Conferences until 1972.

In 1970 he was appointed as Historian and Consultant to Mullards, and was also Consultant to the BBC for their 50th Anniversary celebrations in 1972.

Len was a member of seven RSGB committees and a member of the Frequency Advisory Board. During his term of office on the Finance and Staff Committee, Lambda Investment Co Ltd was formed under his chairmanship and, from shares sold to members, the RSGB was able to move out of rented premises at Little Russell Street and into its own HQ at 35 Doughty Street in London.

Len was a member of the City and Guilds Advisory Committee for 20 years. He held RAE classes in Portsmouth for over 45 years and also arranged for disabled people to take the RAE in their own homes until very recently. As one colleague on Council put it: "He energetically worked for, and on behalf of, the Radio Society". The RSGB and amateur radio in general has lost a valued colleague and friend.

Len leaves a wife, Margaret, G4HSV, son Grahame, G7EOH, and stepdaughter, Hazel.

EVENTS DIARY CONTINUES FROM PAGE 88

WORTHING & DARC - 3, Discussion Evening; 10, Talk 'Antennas' by G3GRO; 17, BBQ; 31, Discussion Evening. Meets at 7.30 for 8pm at Parish Hall, South Street, Lancing. Details 0903 753893.

WEST YORKSHIRE

HALIFAX & DARS - 16, Talk 'Novice Licence' by Esde, G0AEC; Sep 20, AGM. Details 202306.
KEIGHLEY ARS - 4, Natter night; 11, Fox Hunt; 18, Natter night; 25, Talk 'Simple Electronic Circuits' by G8XVL. Meets every Thursday at 8pm. Details 0274 496222.
SPEN VALLEY ARS - 4, Swindon Cup Construction competition, judged by Jim, G4MH; 18, Treasure Hunt by Tony, G1GTQ; Sep 1, Microwaves, the Easy Way by Dave, G0DJA. Details 0924 497767.

WILTSHIRE

CHIPPENHAM & DARC - Meets Tuesdays 7.45pm, Sea Cadet HQ, Chippenham. Details Jon, G4LGZ 0225 743352.
TROWBRIDGE & DARC - 3, Talk 'Yagi Antennas' by Dave, G3ZXX, 8pm; 17, Social. Details 0225 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'.

7 AUGUST

RSGB WOBURN Rally - Woburn Abbey, Bedfordshire. Open 10am. All under cover. Large trade exhibition, RSGB Bookstall and Enquiries and members mart. Details from Norman Miller, G3MVV, 0277 225563.

14 AUGUST

DERBY & DARS Annual Radio Rally - Littleover Community School, Pastures Hill, Littleover, Derby. On the A5250, just north of junction with A38, on southern outskirts of Derby. Usual attractions, including monster Junk Sale. Details Martin, G3SEJ 0332 556875.
FLIGHT REFUELLING ARS HAMFEST'94 - Flight Refuelling Sports Ground, Merley, Wimborne. Doors open 10am - 5pm. Features the usual trader stands, bring and buy, craft exhibitors, car boot sale and field events. Overnight camping facilities available for Saturday 13th. Talk-in on S22. Details Richard, G4VCQ 0202 691021.

21 AUGUST

5th GREAT EASTERN Rally - (organised by the Kings Lynn ARC) - Cattle Market, Hardwick Narrows, Kings Lynn. Off the A10/A47 roundabout. Doors open 10am, 9.45 for disabled visitors. Features indoor area with major national exhibitors, outdoor car boot area, a bring and buy and refreshments available. Easy access for disabled, all on one level. All entry and table prices same as 1993. Details Ian, G0BMS on 0553 765614.
SOUTHEND Rally - Rocheway Centre, Rochford, Essex. Doors open 10am. Features trade stands and weather permitting, a bootsale for radio, computer and electronic equipment will also be on site on the sports field. The event is organised the Southend and District Radio Society for the benefit of the local community. To enable the club to put on display at other local events. Talk-in on S22. Details Tel: 0702 353676 or Fax 0702 602271.
WEST MANCHESTER Radio Clubs 'RED ROSE RALLY' - Bolton Sports & Exhibition Centre, Silverwell Street, Bolton, (town centre). Doors open 11am, 10.30 for disabled visitors. Event features the usual trade stands(over 75), societies, a bring and buy etc, all at pavement level, with facilities for the disabled. Refreshments available all day. Details Dave, G1IOO 0204 24104(evenings only).

26-29 AUGUST (FRI-MON)

THE AMATEUR RADIO Caravan & Camping Club Bank Holiday Rally - Tatershall, Lincs. A limited number of pitches available for visitors interested in combining Camping and Amateur Radio. Closing date for applications is Saturday the 13th August. Details and booking forms from Membership Secretary, Alan, G4LWA, QTHR, Tel: 0494 531755.

27-29 AUGUST (SAT-MON)

COMPUTER FAIR 1994, includes a Radio Rally & Electronic Fair - The Show Grounds, (the site of ex Walsall Airport), Aldridge, West Midlands. Situated off the main A454, Aldridge to Walsall road, some 4 miles from A5, or 5 miles from M6, jn 7. Summer spectacular with vatious shows, displays etc. Details 0543 372807 (after 5pm or anytime weekends).

28 AUGUST

THE EAST COAST Amateur Radio and Computer Rally - Clacton Leisure Centre, Vista Road, Clacton-on-Sea, Essex. Doors open 10.30am to 4pm. Features trade stands, including radio, computers and software, accessories, antennas, second hand gear and a bring and buy. Cafeteria and bar open from 11am. Talk-in on S22 and SU22. Details 0473 272002 or Fax 0473 272008.
GALASHIELS & District Amateur Radio Society Open Day - Focus Centre, Livingstone Place, Galashiels. Doors open 11am till 4.30pm. All the usual activities trade stands, bring and buy, club stalls, raffle and refreshments. New attraction a bring and sell, have a stand of your own - phone for details. Refreshments available. Details John, GM0AMB, QTHR Tel: 0835 822686.
THE FOURTH GLOUCESTER Radio Rally - Nass Lane, Quedgeley, Gloucester. Off the old Bristol road, look for the signs. From 9am to 4pm. Features bring and buy stall, car boot sale, flea market stalls. Overnight parking. Small and large plots available, details from Mike, 0452 503786.
30th TORBAY Rally - **New Larger Venue** Clenon Valley Leisure Centre, Paignton, Devon. Doors open 10am. Event features more trade stands, bring and buy, special interest displays, use of leisure facilities, restaurant and bar. For the family, four minutes walk away, there is a boating lake, beach, steam railway and flume water park. Details John, G3YCH, 0803 842178.

29 AUGUST (MON)

HUNTINGDONSHIRE ARS Annual Bank Holiday Monday Rally - Town Centre venue at St Germain Street, Huntingdon, Cambridgeshire. Easy to find, just drive round the ring road!. Starts at 10am. All pitches and car parking on hard standing. Pitches five pounds per car, nine for transit van or car & trailer. Hot and cold refreshments available. Talk-in on S22 or via GB3OV on 433.125MHz (Local repeater). Details David, G7DIU 0480 431333.
SCARBOROUGH Radio Electronics and Computer Fair - The Spa, South Foreshore, Scarborough. Details Ross, G4NZ, 0723 514767.

3 SEPTEMBER

ANNUAL WIGHT WIRELESS RALLY - Wireless Museum, Arreton Manor, near Newport, Isle of Wight. Half way between Newport and Sandown on A3056. Doors open 11am to 5pm. Features trade stands and a bring and buy sale. No charge for admission to the Wireless Museum or the extensive gardens, lawns and gardens but there will be a collection for the Radio Invalid and Blind Club. Refreshments will be available. Talk-in on S22. The event to be indoors if its rains. Details G3KPO, QTHR or 0983 567665.

4 SEPTEMBER

BRISTOL Radio Rally (Incorporting Bristol Computer & Electronics Market) - Brunel Centre, Temple Meads Railway Station, Bristol. Doors open 10.30am, 10.15 for disabled visitors. Features over 40 trade stands, large bring and buy, and under £25 bring and buy. Refreshments available. Details G4YZR 0275 834282.
PRESTON Amateur Radio Society Annual Rally - ***NOW CANCELLED*** Details George 0772 718175.
TELFORD Radio Rally - Telford Exhibition Centre (the newer halls), Telford, Shropshire. Doors open 10.30am, venute as first class facilities for disabled visitors. Features many trade stands, both big and small ones, RSGB Bookstall and Enquiries, many special interest groups and clubs stands, a flea market, Novice feature and a bring and buy. Refreshments available, with a sitting area. Details Peter, G4LSA 0785 284388 or John, G0GTN 0743 249943.
VANGE Amateur Radio Society Rally - Details Stuart, G1VWB 0375 859632.

11 SEPTEMBER

BRITISH AMATEUR Radio Teledata Group Rally (BARTG) - Sandown Exhibition Centre, Sandown Park Racecourse, Esher, Surrey. Easy access from M25, jun 10 and not far from M3, M4 and M40. Doors open 10.30am. Features many exhibitors and special interest groups, covering radios, computers, peripherals, software, books, aerials, kits, components, test equipment and with emphasis on Data Communications. Refreshment available. Details Peter, G8VXY 021 453 2676 or write: 38 Mitten Avenue, Rubery, Rednal, Birmingham B45 0JB.
CRANFIELD AMATEUR Radio Car Boot Sale - Cranfield Airfield, Bedfordshire. Nr M1, jn 13/14. Doors open 9.30am to 4pm. Cost of pitch £7 in advance, £10 on the day, no advance booking after 3 Sept. Payment to Milton Keynes And DARS, c/o 2 Ousebank Way, Stoney Stratford, MK11 1LB. Talk-in on S22. Details from Mike, G0FMC 0908 566796, Ray, G1LRU 0908 660798.
13th LINCOLN SHORT WAVE Club 'HAMFEST' - Lincolnshire Showground and Exhibition Centre, 4 miles north of Lincoln on the A15, Lincoln to Scunthorpe road. Doors open 10.30am. All the usual trade stands, large bring and buy stall. Refreshments available. Lots of attractions for the whole family. Talk-in on S22. Free parking and children under 14 free. Caravans welcome by prior arrangements. Details Sue, 0522 525431.

17 SEPTEMBER

SCOTTISH AMATEUR RADIO CONVENTION (SARCON) - Cults Community Centre, Cults, Aberdeen. Doors open 10.30am. Trade, computer and special Interest Group stands, bring and buy and a Lecture programme. Convention dinner and accommodation details on request. The centre has ample parking area and also facilities for the disabled. Talk-in on S22. Details GM0JCN, Tel: 0569 731177.

20-25 SEPTEMBER

LIVE'94, Earls Court, Olympia. Details Justine Hodges, RSGB HQ.

25 SEPTEMBER

36th HARLOW Amateur Radio and Computer Show - The Harlow Sports Centre, Harlow. Easy access off M11 jn 7, A414, fully signposted route. Doors open 10.30am. This years event has extra floor space and more entrances will be used. Features many trade stands and a bring and buy area. Full catering and lounge bar facilities available in the complex. Talk-in on S22 and SU22 by G6UT. Details Mike, 0850 487863 or Ken 0279 426647(home).
THE THREE COUNTIES Rally - Three Counties Show Ground, Malvern, Worcestershire. Features a large selection of trade stands, usual bring and buy and possibly some lectures on Amateur Radio topics. On site catering facilities and other events at the Show Ground on the day. Details G4PQZ 0905 773181.
NORTH WAKEFIELD Radio Club Rally - Outwood Grange School, Outwood, Wakefield. 1 mile from Jn 41, M1 and Jn 29, M62. Features trade stands covering all the usual radio and computer interests, local radio groups and a bring and buy. RSGB Morse test on demand - member to bring 2 passport size photos. Details G4RCG 0924 362144 or G0EVT 0924 825443.
PETERBOROUGH Radio & Electronics Society East of England Rally - Peterborough Showground. Easy access from A1, A605 and A47. Doors open 10.30am, 10am for disabled visitors. Event features trade stands, radio car boot plus other local attractions, acres of free parking. Full catering and bar. Talk-in on S22 via G3DQW. Bookings and further details from Ted, G0REM 0733 66471.
SDX CLUSTER Support Group Junk Sale - Community Centre, Maryhill Road, Glasgow. Facilities for disabled. Ample car parking. Tea rooms open to provide hot/cold drinks and also light snacks. Talk-in on S22. Details John, GM0OPS 041 638 7670 or via packet to GB7SAN.

2 OCTOBER

BLACKWOOD & District Amateur Radio Society Rally - Community College, Oakdale, near Blackwood, Gwent. Doors open 10.30am. Features traders, bring and buy one pound per item or job-lot and raffles. Talk-in on S22. Details Norman, GW0MAW 0495 227550.
GREAT LUMLEY RADIO Rally (organised by Great Lumley AR & E Society) - Great Lumley, near Chester-le-Street, C. Durham. Doors open 11am, 10.30 for disabled visitors. Trade stands, varied selection, bring and buy. Refreshments available. Details Barry, G1JDP 091 388 5936.

7-9 OCTOBER (FRI-SUN)

RSGB INTERNATIONAL HF & IOTA CONVENTION and IOTA's 30th Birthday Party - Details G3NUG. Tel/fax 0442 62929.
WORLD ASSOCIATION of Christian Radio Amateurs and Listeners Conference - Liverpool. Bookings contact G4EZU 0474 533686.

8/9 OCTOBER

THE ALL IRELAND INTERNATIONAL Radio & Hobbies Exhibition - St Patrick Hall, Cathedral Road, Armagh. A two day exhibition by Armagh & DARC and Dundalk RC. Details GI8RLE 0762 870423, Mobile 0374 122213.

9 OCTOBER

KIDDERMINSTER & DARS Rally - Stourport on Severn High School, Minster Road, Stourport on Severn, Worchestershire. Usual traders, bring and buy. Refreshments available and talk-in on S22. Details G8JTL 0384 894019, G4HFP 0299 823818 or G0RJP 0299 822206.
THE COMPUTERCATIONS'94, Amateur Radio and Computer Rally - Hillhead Campsite, Kingswear Road, Brixham, Devon. Doors open 10am. Features trade stands covering computer and radio, bring and buy, raffle. Refreshments available. Talk-in on S22. Overnight camping available, details from Bill, G6ZRM 0803 522216.

15-16 OCTOBER

Jamboree on the Air (JOTA)

21/22 OCTOBER (FRI/SAT)

LEICESTER Amateur Radio Show - Granby Halls, Leicester. Doors open both days at 10am, 9.30 for disabled. Large trade presence, special group interests section. Refreshment available. Talk-in on 2m and 70cms. Details Frank, G4PDZ 0533 871086.

22 OCTOBER

RSGB OPEN REGIONAL Meeting - Bristol. Details Julian Gannaway, G3YGF, QTHR.

30 OCTOBER

HORNSEA ARC (East Yorkshire) Radio Rally - The Floral Hall, Hornsea. Doors open 11am, 10.30 for disabled visitors. Event features trade stands, bring and buy, special interest groups, ATV etc. Refreshments. Talk-in on S22. Details Duncan Heathershaw on 0964 532588.

5/6 NOVEMBER

NORTH WALES Radio Rally - Details Tony, GW0NSR 0492 513246.

6 NOVEMBER

14th NORTH DEVON Rally - Details G8MXI, QTHR.
TYNE AND WEAR REPEATER Group Auction - Details Brian, G8FBQ, QTHR 091 388 2913.

12 NOVEMBER (SAT)

THE ALL MICRO Show - Details 0473 272002.

13 NOVEMBER

BARNSLEY & DARC 4th Amateur Radio Rally - **NEW VENUE** The Metrodome Complex, Barnsley Town Centre. Details G4LUE, QTHR or tel: 0226 716339 6-8pm, except Monday 6-7pm only.
MARS-STOCKLAND Radio/Computer Rally - Details Norman, G8BHE 021 422 9787 or Peter, G6DRN 021 443 1189 evenings.

20 NOVEMBER

BISHOP AUCKLAND Radio & Computer Annual Rally - Details G0PRQ 0388 766264.

27 NOVEMBER

BRIDGEND & DARC Radio Rally - Details Mike, GW7NIS 0656 722199 or Don, GW3RVG 0656 860434.
WEST MANCHESTER Radio Clubs 'WINTER RALLY' - Bolton Sports & Exhibition Centre, Bolton, (town centre). Details G1IOO 0204 24104(evenings only).

3 DECEMBER

RSGB AGM, London.

4 DECEMBER

LEEDS AND DARS Christmas Radio Electronic and Computer Rally - Details Phil, G6HGT 0532 680006.

11 DECEMBER

VERULAM CHRISTMAS Rally - **NEW VENUE** Watford Leisure Centre, Horseshoe Lane, Garston, Watford, Herts. Details from Walter, G3PMF on 0923 262180.

5 FEBRUARY 1995

SOUTH ESSEX ARS Radio Rally - Details 0268 693786 or 0268 755350.

19 FEBRUARY

RSGB VHF CONVENTION - Details G3MVV 0277 225563.

25 FEBRUARY

9th TYNESIDE ARS RALLY - Details Stuart G0BEV 091 281 0999.

19 MARCH

NORBRECK Amateur Radio Electronic and Computing Exhibition - Details Peter, G6CGF 051 630 5790.

14 MAY

MARS/DRAYTON MANOR Radio and Computer Rally - Details Norman, G8BHE 021 422 9787(evenings).

21 MAY

11th YEOVIL QRP & Construction Convention - Details G3CQR on 01935 813054.

6 AUGUST

RSGB WOBURN Rally - Woburn Abbey, Bedfordshire. Details from Norman Miller, G3MVV, 0277 225563.

GB CALLS

The list below shows all special event stations licensed for operation during this month and up to 29 August. It was taken from the HQ computer on 8 July. These callsigns are valid for use from the date given but the period of operation may vary from 1-28 days.

AUGUST

1	GB150YM	150 Years YMCA
	GB2CIJ	Cambridgeshire Int Jamboree
	GB2GMM	Guglielmo Marconi Memorial
	GB4VAL	Valley Flying Training School
	GB5RW	River Wye
3	GB0LIS	Lancs International Scouting
	GB2MRI	Marconi Rathlin Island
4	GB5GC	Gun Crew
5	GB2EVG	Edzell Village Gala
	GB2TSR	Torbay Steam Rally
6	GB0GAS	Guides and Scouts
	GB0SFM	Stornoway Fishermen's Mission
	GB2NHR	Norton Hill Railway
7	GB2DF	Dornoch Firth
	GB4TGG	Tiverton Girl Guides
11	GB4ASH	Ashfield Show
12	GB2YFT	Yeovil Festival Transport
15	GB0XXV	25th Anniversary Year
13	GB0DM	Dale Morgan
	GB2TS	Tollerton Show
	GB4ATC	Air Training Corps
20	GB2HP	Holyrood Palace
	GB2QE	Queen Elizabeth
	GB2SR	Stelar Radio
	GB800DON	Doncaster 800 Yrs Festival
26	GB1WAS	Wood Green Animal Shelters
	GB2FI	Flat Holm Island
	GB2RCC	Radio and Caravan Club
	GB2WAS	Wood Green Animal Shelter
27	GB0GR	Goodwin Radio
	GB2BF	Beauly Firth
	GB2CF	Cromarty Firth
	GB2CHA	Children's Hospitals Appeal
	GB2DF	Dornoch Firth
	GB2FC	Firth of Clyde
	GB2FL	Firth of Lorn
	GB2FM	Moray Firth
	GB2FT	Firth of Tay
	GB2FW	Wide Firth
	GB2NHR	Norton Hill Railway
	GB4CHA	Children's Hospitals Appeal
	GB4HSC	Humberside Scout Communication
	GB5DT	Droitwich Transmitter
	GB0ECR	East Coast Rally
	GB2NJA	Prefix to Club's Own Callsign
	GB4ICA	International Caravaning Assoc
	GB6SS	Sandwell Show
29	GB0NFD	Normandy Fun Day

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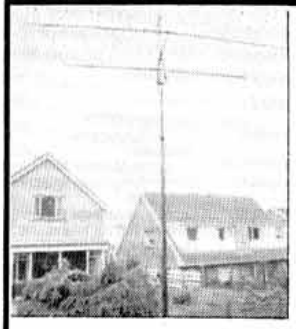

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The LAST WORD

NOWT FOR NOWT

I'm sure that G3FDW's log-yagi (*RadCom*, July) works well - his performance in contests and from home is testimony to this. However, I don't believe it works as well as Mike thinks.

My initial reaction was a Yorkshireman's innate suspicion of any offer of 'summat for nowt' - in this case, the offer of high gain without the mechanical penalties of a larger conventional yagi. The log-yagi idea has been around for a very long time, at least 20 years and there have been several magazine articles, always claiming high gain for its size.

Previous generations of amateur antenna articles have been based very strongly on faith and opinion, often with very little real justification. As W2PV put it, the yagi 'wants' to work; almost any variation on the yagi theme will produce an antenna that 'beams up' and shows an encouraging amount of gain. But accurate measurements of gain and patterns are notoriously difficult. With the best will in the world, errors of several dB are common in amateur measurements. This isn't due to lack of time, competence or commitment, but simply because we amateurs cannot create a suitable test environment.

Mike's efforts to measure the performance of the log-yagis do him credit but the *RadCom* technical reviewers ought to have pointed out that the Kraus formula just doesn't work for estimating gain at VHF and below. The formula explicitly assumes that the antenna emits a sharp-edged cone of radiation with no sidelobes. It works well for lasers and searchlights, and reasonably well for microwave 'pencil-beam' antennas; but it doesn't work for any antennas at VHF or below, because these antennas always have very rounded major lobes and significant sidelobes. It's extremely dodgy to equate the -3dB points with the beamwidth of a sharp cone of radiation, and to ignore sidelobes and all other radiation outside of that assumed cone. As a result, the Kraus formula will *always* overestimate the gain of short yagis and similar antennas, often by 2dB or more.

Also, it cannot be assumed that the horizontal and vertical beamwidths are equal. This only starts to become true for yagis of 8, 9, 10 wavelengths or more, and the log-yagi is no exception. Nowadays we can also test antenna performance using computer techniques, with accuracy comparable to professional test range measurements and far outstripping amateur measurements. Computer plots of the 70MHz log-yagi show that the horizontal and vertical patterns are vastly different, and if the true vertical beamwidth is inserted into the Kraus formula the estimated gain drops considerably.

The antenna described is mounted above ground and this affects the vertical pattern. It is true that mounting the antenna above correctly-sloping ground will bring the main lobe down to 0°, but this will not make the horizontal and vertical beamwidths equal (as assumed). The plot for the 70MHz log-yagi mounted at the 'correct' height over sloping ground [1] shows that the main lobe fires off horizontally - but the vertical pattern still bears hardly any relationship to the free-space pattern, and none at all to the horizontal pattern.

So what is the true gain? To compare like with like, let's concentrate on free-space gain. The computed free-space gain of the log-yagi is a bit less than 8dBd, which may be somewhat underestimated but is pretty typical of yagis of that size. In other words, the claimed 1.5dB gain advantage of a log-yagi over a conventional yagi of similar boom length has disappeared.

For the same boom length, at least as much *verifiable* gain and a similar pattern can be obtained from an optimized 4- or 5-element yagi, and with even less wind-load than the log-yagi. Note that I said an *optimized* yagi [2], not guess-work reprinted from 30 years ago!

Apart from their advantages in terms of SWR bandwidth (which are not relevant to DXing on any VHF/UHF band) there seem to be a number of problems with multi-driven antennas of all types. One is the number of elements required, which results in a greater windload and weight than a conventional yagi on the same boom. The other problem is that when you adjust the phasing lines to match the impedance, you are also altering the power distribution between the driven elements, which affects both the gain and the pattern in a rather unpredictable way. The advantage with a single-drive antenna is that matching the driven element does not affect any other aspect of the antenna.

I hate to dampen anyone's enthusiasm, but I feel that on this occasion, the *RadCom* review panel has let the author and the readers down by letting sincerely held but over-optimistic performance claims reach the printed page.

Ian White G3SEK

PS: G3FDW and I have been friends for many years and we're still in correspondence on this topic!

[1] 'Moxon Slopes at VHF', G3FDW, *RadCom*, May 88.

[2] *The VHF/UHF DX Book*, Chapter 9.

APPALLED

The correspondence columns of RadCom in May and June have progressively appalled me. At one time the majority of radio amateurs were proud not only of their operating ability but also their grasp of things technical and were eager to take on board new ideas and concepts. Correspondence between 1957 and 1966 in *The RSGB Bulletin* and occasionally since, on the G5RV and its variants spring immediately to mind. SSB, the DDRR and many other topics have been met with varying interest but to suggest that the two-part article by G2AJV was an elaborate hoax just about takes the biscuit and says a lot about amateur radio today.

I consider that G2AJV made a highly technical subject very readable - as only a true expert can. He also addressed a problem that must face many amateurs who live in flats or have limited garden space; and he provided some practical constructional advice as well. Now it is up to others in the amateur population to take it further. Is that not what amateur radio is about?

Bob Henley G3IHR

[This month's The Last Word *is devoted to technical matters - Ed.]*

FIRST RATE

I thought G2AJV's article on the double toroidal antennas was first rate, as I have a particular interest in unusual and experimental antennas. It's a pity that G0PAN and G3YEP/DU5 (*The Last Word*, June and July) didn't spend a little time to construct one before rushing indignantly into print. My 80m vertical version in a small shed well covered by trees and some 60m from the shack regularly makes 5/9+20 in middle Europe with 100W and shows an SWR of <1:1.3 over 200kHz of the band, without the tuner.

It also has a resonance on 18.15MHz which produced an EI station at good strength on an otherwise dead band. I found it easiest to resonate it for 80m with small adjustable wire sprogs at the corners of the top capacitance hat. My 20 metre version is not quite so active (slightly less well resonant) but is still useful without the tuner, though of course 2 S points down on the full size beam. All credit to G2AJV for producing an interesting antenna which will be of considerable value for those with limited real estate.

Greg Munton G4XMS

TOROID WIND-UP

When I first saw the toroid antenna article I must confess to being a bit sceptical, but after reading it, realised that it was too well put together to be a 'wind up'. It occurred to me, therefore, that the idea was worth playing with. I accordingly made one for 70cm, not only did it work very well, it was also not very critical.

I made several more, all wrong, to evaluate the design, they all worked with a tolerable SWR better than the rubber duck on my handhelds. May I say, therefore, that the projects kept me interested for a long while and cost very little. Personally, I found this more useful, from any stand-point, than a two-page item on an out of this world, bells and whistles radio. My wife liked it too, it meant I did not spend anything on it. Is this not what amateur radio is about?

R P Mew G6HKF

TOROID AND TESTED

I am thankful for some interesting articles: 'G2AJV Toroidal Antenna', *RadCom*, April, May). However, while having much respect for Prof Jennison, I feel that the described mode of radiation needs to be questioned.

Prof Jennison accepts the conventional approximation that negligible magnetic flux escapes from the toroid, but he describes radiation from his aerials as being due to a displacement current passing through the centre of the toroid.

The two faces of the toroid are at a PD corresponding to one turn of winding voltage (the voltage between the top and bottom plates, shown in Fig 1 in the article, when unconnected and very close to windings). Hence it is true that a displacement current will flow as shown in Fig 4. But the two ends of the winding have a voltage between them that is higher than the plate voltage by a factor N, the number of turns. So the capacitance through free space of the two faces of the toroid (Fig 4) is shunted by the capacitance between the winding ends multiplied by N^2.

If the winding tuning capacitor is radiationless as Fig 1 then it is difficult to drive displacement current in the mode explained because the toroid couples into free space at a low impedance point (1 turn).

If alternatively the winding tuning capacitor consists of radiating wires and capacitance hats, as shown in some other diagrams and pictures, then their radiation will dominate that of the toroid because of their greater spacing, greater capacitance and the N^2 factor.

I have made an aerial of the type shown in Fig 1 and compared it with a conventional tuned loop of the same approximate size, the toroid is about 20dB down on the loop, but even here most of the radiation is due to the E field at the end of the winding (distinguishable because of polarisation). Some of the physical structures described look as though they may work perfectly well. But I do not believe that the described mode of radiation is responsible for them working well.

P D Brooking G4SHH

[We asked Prof Jennison for his comments on the above; he replied as follows:]

A straight solenoid resonated with configured end plates will radiate in the manner described by G4SHH but he has omitted the Maxwell magic that occurs in a toroid. The primary process in a toroidal coil makes use of the displacement current generated by the overall curvature of the magnetic field: dD/dt = Curl H -j. Here the curling magnetic field is that around the torus as a whole and not that from the constituent wires.

The displacement current, dD/dt, is strongest where H is most tightly curled, near the inner radius and, if the coil is resonant, it will also be greatest where the field is strongest. This gives rise to extremely high potentials on the insulated free plates and, with respect, not the miniscule value that G4SHH states.

Nevertheless, as G4SHH is aware, an alternative approach is by the use of vector potential. It was a comment by Richard Feynman that the external presence of vector potential should enable one to pass a single wire through a torus and extract the energy between its ends in the remote distance, that prompted my early investigations into the phenomenon in the late 1970s. This led to my first transmitting antennas which did not have the end plates connected to the torus. They were resonated by a separate circuit. This was very efficient but only suitable for spot frequencies. I then measured the relative phase on the terminals of the torus and on plates at various separations. This led to a less complicated compromise in which the plates really act as a high voltage tuning capacitor (one can use short rods if one wishes).

Vector potential is not easy to visualise whereas displacement current is quite homely; one can almost see it! That is why the title under which I originally submitted my article was 'Maxwell Magic'. This was changed by the editors, but Maxwell was the true inventor of this antenna system which completely encapsulates his equation and his brilliant prediction of the propagation of a displacement current from the Curl of the magnetic field.

Incidentally, the LC ratio of all these antennas governs the equivalent radiation resistance at the input. Increase L and decrease C for higher resistance at resonance.

Roger C Jennison G2AJV

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ADVERTISERS INDEX

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ADVANCED HANDHELD TECHNOLOGY

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Handheld Transceiver

IC-T21 2m FM handheld
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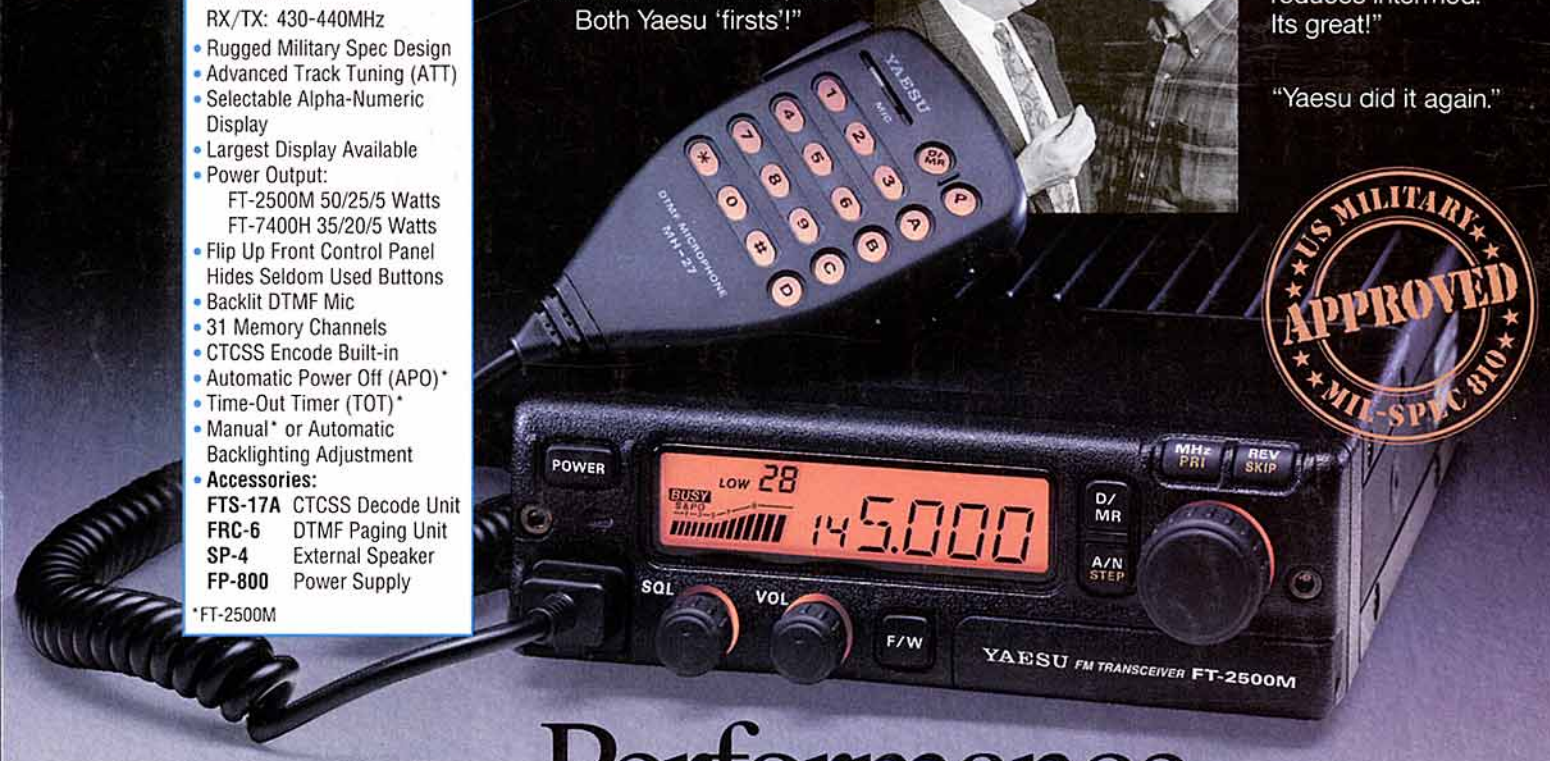

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