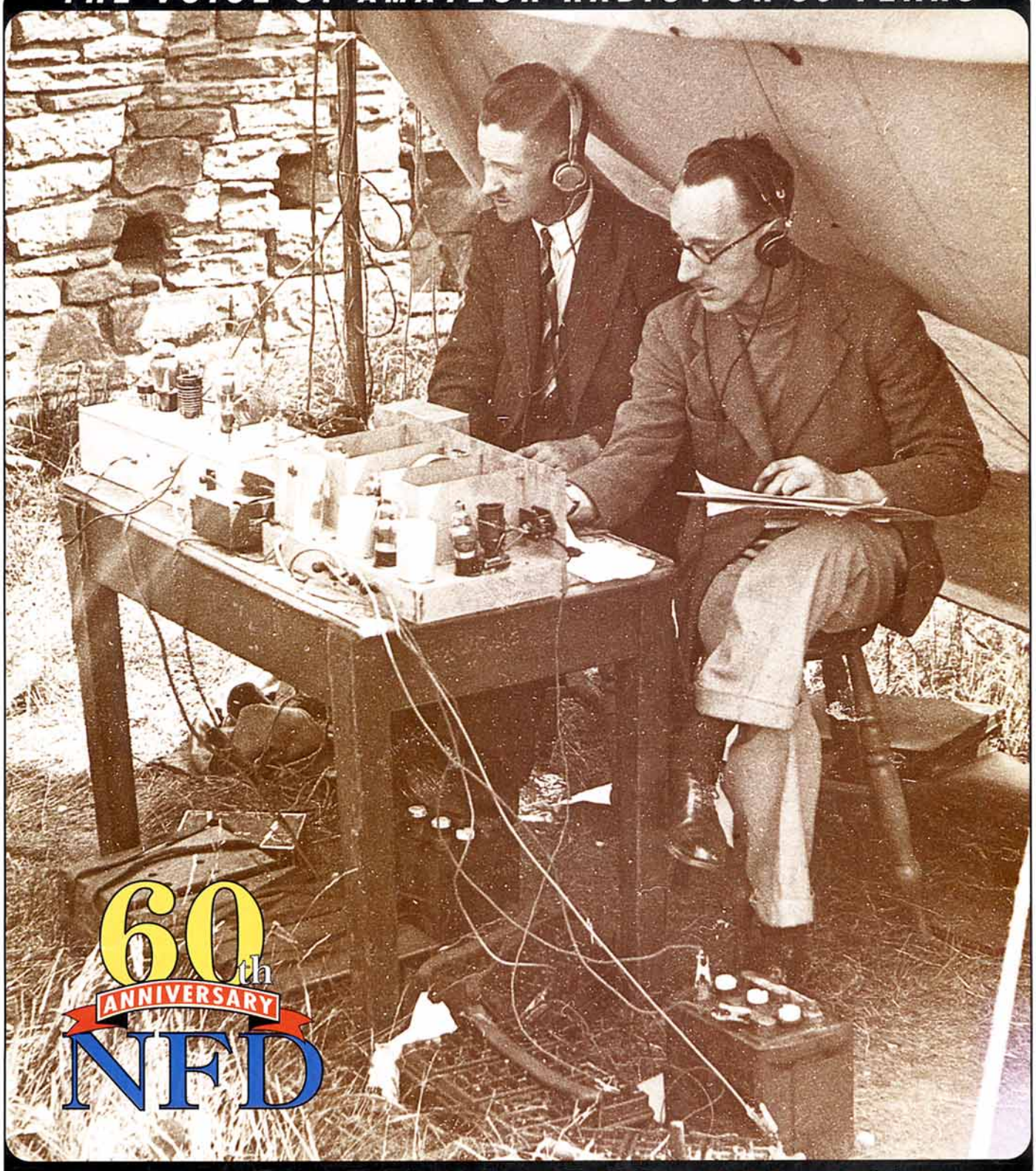
Radio Communication

The Journal of the Radio Society of Great Britain

November 1993

Volume 69 No 11

THE VOICE OF AMATEUR RADIO FOR 80 YEARS

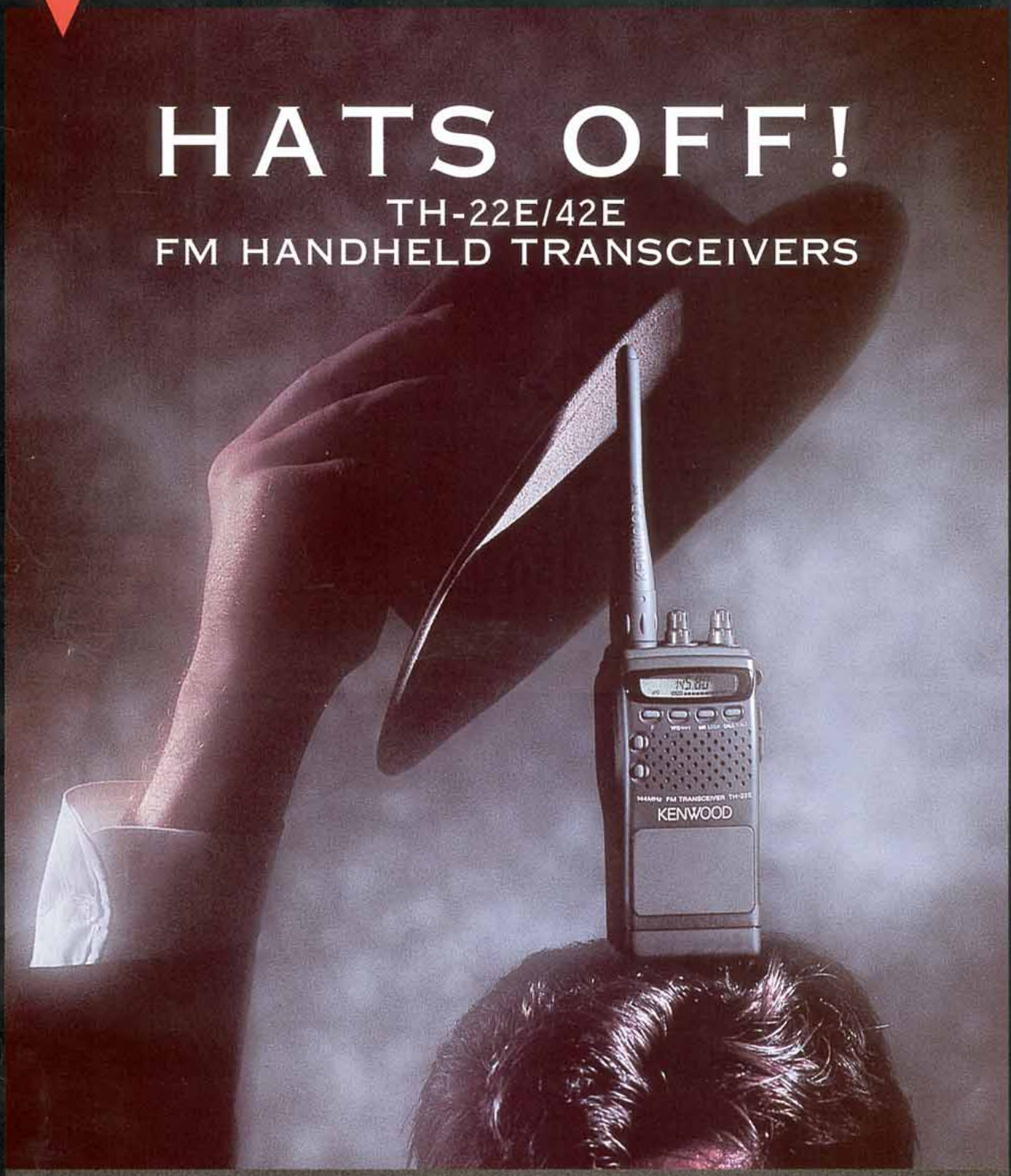


1993 National Field Day. Full Report: page 81

THE THREE POINTS OF THE KENWOOD TRIANGLE REPRESENT ADVANCED TECHNOLOGY, QUALITY AND STYLE

HATS OFF!

TH-22E/42E
FM HANDHELD TRANSCEIVERS



The news is out. And it's too exciting to keep under your hat.

Kenwood's new TH-22E (144MHz) and TH-42E (430 MHz) redefine hand-held communications, with a palm-size format and impressive performance.

They're small and light enough to carry anywhere, but offer over 5 watts output (with a 9.6V battery) and long hours between charges. The secret's in the FET power module, a world first in this class for sophisticated power management.

Other features? From the user friendly menu system to the 40 EEPROM memory channels, Kenwood's new handheld FM transceivers offer numerous category-leading features and first-class performance. So it's hats off to Kenwood – the transceivers that cap the rest.

KENWOOD

HOME AUDIO, CAR AUDIO, COMMUNICATIONS EQUIPMENT, TEST AND MEASURING INSTRUMENTS, TELECOMMUNICATIONS

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Radio Communication

NEWS AND REPORTS

TECHNICAL FEATURES

COVER PICTURE:
The District 2 14MHz station of G8GU and G2PC operating in the 1933 NFD near Huddersfield. Turn to page 81 to see how it's done nowadays.

Photograph supplied by G4JKS.

REGULAR ARTICLES

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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ANNUAL SUBSCRIPTION RATES
Corporate Members: UK and Overseas (*Radio Communication* sent by surface post): **£32.00.** Airmail rates on request.
UK associate member under 18: £16.00. Family member: £14.00
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

The IARU Conference

THE REPORT OF this conference and its importance can be read on pages 28-30. As an observer I was impressed by the degree of respect that was shown to the RSGB, produced by the competence and professionalism embodied in the approach of our delegation.

For many, IARU has little meaning, and yet the importance of a unified international approach to areas ranging from spectrum regulation - having bands at all, to standardisation issues such as emission limits for domestic equipments - cannot be overestimated. The amount of work that is involved is enormous, with meetings back to back far into the night. Even observers do not get away easily, being in demand to act as secretaries!

The importance attached to the conference can be judged by the 'external' attendees, who included Jean Jipguet, the Deputy Director General of the ITU, David Court of the European Radiocommunications Office, and J Richter of DGXIII of the European Commission. For the amateur service to carry on into the 21st century in any form requires the support of such professional organisations, and this can only be achieved at an international level.

The work involved in organising the conference should not be forgotten, and UBA, the Belgian Society, did an excellent job in this respect. These conferences produce long-term policies; so much so that it will soon be time for the RSGB to start planning papers for the next one in Israel in 1996, where the shape of amateur radio will be established for the new millennium.

Peter E Chadwick, G3RZP
President

NEWS & REPORTS

- ON4CLM WILL operate from 29 Oct to 7 Nov on 3.5, 7, 14, 21, 28 and 144MHz SSB and CW (plus FM on 145.475MHz), to commemorate the part played by the Canadian Army in the liberation of Knokke. An award is available for working (or hearing) the station.
- THE RAIBC (Northern Ireland Area) has a new address: FREEPOST BT 1769, Belfast BT15 3BR. The group converts your spare gift tokens, petrol vouchers, air miles, cigarette tokens etc into cash to help disabled amateurs in GI.
- USING THE CALL IW2EYZ/UB5, two Italian amateurs are providing the communications for a convoy of 151 lorries sent from Milan to the Ukraine containing food, school equipment and mercy relief supplies.
- UHF REPEATER GB3HN, Hitchin, Herts, (RB11) has returned to service after a long period of absence for a rebuild. Reports to G3ZQI, QTHR.
- ON4UBA COMMEMORATES WWI armistice day by operating over the three days 10 – 12 November on most HF bands and 2m.
- NEXT YEAR'S AMSAT-UK Colloquium has been booked for 28 –31 July at the University of Surrey.
- 1993 IS THE 50th anniversary of the Drake Company which currently manufactures the R-8 receiver.

1994-96 Council Election

THIS MONTH your *RadCom* has been sent out with a separate 20-page *Annual Report*. Included as a supplement to the *Annual Report* are eight pages of election material. This comprises: Candidates' statements, an election Voting Form and a Proxy Form; you will need to cut the forms out of the supplement in order to use them. There's also the Agenda for this year's EGM. The only loose insert is the pre-paid voting envelope. Any Corporate Member who is missing the *Annual Report* or the envelope should contact Belinda Gannon at RSGB HQ urgently.

Amateur Radio 'The Space Age Hobby' Gets an Airing at Massive Consumer Electronics Show

RSGB Goes Live at Olympia

NEARLY TWO-hundred-thousand members of the public had a chance to see amateur radio in action at London's Olympia in September. The RSGB put on a stand at the five-day spectacular LIVE '93, the largest exhibition attended by the Society for over 40 years. The stand had the theme "Amateur Radio the Space Age Hobby".

Justin Johnson, G0KSC, (who was responsible for the GB0OSH station at Great Ormond St Hospital) was asked to provide displays of amateur radio equipment and several operational stations. His team included: G7ABL, G4ZPE, G1OGY, G0BDC, G6OQJ, G0PAE and G1BTF, many of whom took time off work to spend several days promoting amateur radio.

Justin said afterwards: "An extremely large number of the visitors to the exhibition visited our stand, with a large number expressing interest in amateur radio. Many people said they just didn't know where or how to become a 'ham', and to my surprise this statement came from all ages.

"There were many questions on the Novice and Full licences, and about such things as packet and slow scan. But by far the most common question was 'How do I get my licence back?"

The show was very much about 'hands on' experiences so the public were encouraged to use the Morse key, twiddle knobs, and pass greetings messages over the air. Three stations were operational: HF, VHF and UHF packet. The data communications demonstration proved to be the most popular, with Chris Hewitt, G0PAE, constantly surrounded by inquisitive visitors.

LIVE '93 featured many big names and even bigger crowds.

CONTINUED ON PAGE SIX

The 60ft long RSGB stand comprised an eye-catching central display and two 'hands on' equipment areas. It was situated next to one of the cafeterias.

1994 Presidential Installation

THE SOCIETY'S 1994 President Mr I D Suart, GM4AUP, will be installed at an evening reception and dinner on Saturday 15 January 1994 (8.00 for 8.30pm). The venue is the Bothwell Suite, Forte Crest Hotel, Bothwell Street, Glasgow G2 7EN.

Tickets for this prestigious event are £20 per head. Members wishing to attend should apply to Belinda Gannon at RSGB HQ by Friday 17 December, who can also arrange overnight accommodation if required. Please mention any special dietary requirements when applying for tickets.

RSGB Goes Live at Olympia

continued from page 5

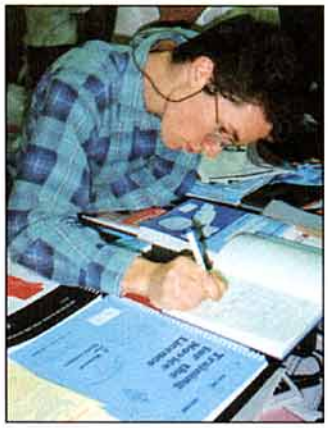
Reported Justin: "The visitors were impressed that we could work North and South America, Central Africa and Asia using 'just a bit of wire' (a dipole on the roof of the hall)."

By far the most exciting contact was with a UA who turned out to live within two streets of some Russians who were visiting the stand at the time!

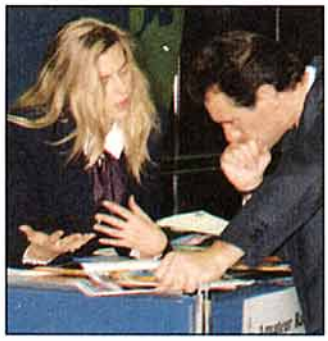
Also on the stand was Berkshire's Senior Novice Instructor, Peter Swynford, G0PUB, who brought with him a couple of Novices, 2E1BZE and 2E1BZG. Whilst Peter explained amateur radio to the visitors, the Novices helped out on the demonstration stations.

Many of those who came up to the stand were already amateurs and 150 of them signed the visitors book. Their calls including EA, G, GM, GW, K9, SV, EI, TF, VK6, VP5, Z21, 2E1, 4N5, 9H1 and several SWLs.

Stand organiser Justine Hodges (HQ's Marketing Coordinator) reported "a surprising amount of interest" with RSGB members being "pleased to see us there". The stand was staffed on a rota basis but one member of staff, Sylvia Manco, braved the full five days. She commented: "There was great interest in amateur radio. Also many electronics students were enquiring about technical books".



Garrick Twinney, G7LFW, signs in.



Staff member Lynnette Crawshaw speaks to a visitor.

The RSGB would like to thank Besprint Services, Siskin Electronics Ltd and C M Howes Communications for their support. Thanks also to the volunteers, many of whom brought along their own gear to use and demonstrate.

HQ's Novice Licence expert Sylvia Manco shows off some of the Society's information sheets, assisted by one of the keener visitors. They are standing in front of the stand's centre-piece, an 8ft globe.

Enthusiastic members of the public queued to go on the air. Here Mike, G4ZPE, gives a youngster his first taste of amateur radio, whilst Alan, G7ABL, talks to visiting Novice Instructor Ken Smith, G3JIX (centre). Dave, G0BDC, operates a third station at the rear of the display.

RADIO SOCIETY OF GREAT BRITAIN

A Company Limited by Guarantee (Registered in England No 216431)

Lambda House, Cranborne Road, Potters Bar, Herts. EN6 3JE

Notice is hereby given that the 67th Annual General Meeting of the Radio Society of Great Britain will be held at the University of Manchester Institute of Science and Technology on **Saturday 4 December 1993 at 2pm.**

AGENDA

1 To receive and, if approved, confirm the minutes of the 66th Annual General Meeting as previously circulated (Resolution 1).

2 To receive and consider the accounts for the year ending 30 June 1993 and the reports of the Council and auditors thereon.

3 To announce the names of members to serve on the Council for the year 1994.

4 To call for volunteer scrutineers for the 1995 Council elections.

5 To re-appoint the auditors Messrs Peter Goddard & Co and to authorise Council to fix their remuneration (Resolution 2).

NOTES

(a) Members attending should be in possession of their membership card as proof of identity.

(b) Members are asked to attend no later than 1.45pm. Doors will be open at 12 noon.

(c) A Society bookstall will be open from 12 noon.

(d) The Society will make available for sale an audio tape recording of the proceedings. The use of video recording equipment will not be permitted at the meeting.

(e) Members entitled to attend and vote at the meeting may appoint a proxy to attend and, on a poll, vote on his or her behalf. The proxy need not be a member of the Society but is not allowed to speak at the meeting other than to join in the demand for a poll.

By Order of the Council – J C Hall, Company Secretary, 1 October 1993

REFRESHMENTS

EXTRAORDINARY GENERAL MEETING (see Annual Report for details)

OPEN MEETING AGENDA

1 Presentation of awards
2 President's Address
3 Open forum

NOTE

During the open forum Council members, committee chairmen, senior staff and officers of the Society will be available to answer questions. It would assist the Chairman in conducting the business of this part of the meeting if questions could be submitted in writing in advance of the meeting to the Company Secretary or set out on forms provided on the day. A limited number of written questions from members not present at the meeting may also be accepted if time permits.

Monday's team of HQ staff and volunteers: (L to r) Back - Chris Hewitt, G0PAE; Sylvia Manco; Justine Hodges; Mike Wheaton, G4ZPE; Fiorina Sinapi; Alan Goodwin, G7ABL. Front - Dave Gilligan, G1OGY; and Derek Lund.

Chris, G0PAE (centre), is almost hidden behind the visitors crowding round his data communications display.

Emergency Column

THE *EMERGENCY* Column, which has been written for some time by Ronnie Cowan, GM4SRL, will from February's *RadCom* be the responsibility of the RSGB Emergency Communications Officer.

This reflects the recent changes in the structure of the emergency service provided by UK radio amateurs.

The Society wishes to thank Ronnie for his contribution to the magazine over a period of three and a half years.

New Emergency Communications Officer

THE NEW RSGB Emergency Communications Officer is Mr G Reilly-Cooper, G0MAM, PO Box 98, Northwich, Cheshire, CW9 5SZ.

*QST*s wanted

JOHN CRABBE, G3WFM, honorary curator of the HQ Library, requires the following *QSTs* to complete the Society's collection: Jan - Jun 68, Jul - Dec 69, Feb 71, Dec 73, Jan 74, Mar 74, Aug 78 and Aug 90. If anyone can help, please call John who is at HQ on Tuesdays and Thursdays 1300 –1700 when he opens the Library and Shack to visitors.

Marriage licences: Stuart, G4KUR, was married to Valerie, 2E1ACG, on 2 August by the Reverend Phyl Fanning, G6UFI, at Lyndon Methodist Church, Solihull.

BARTG Annual Meeting

THE ANNUAL General Meeting of the British Amateur Radio Teledata Group will be held on Saturday, 13 November at 2.00pm. The venue is The Green Wine Bar and Restaurant, The Green, Mere Green Road, Four Oaks, Sutton Coldfield.

The agenda includes discussion on "the direction for BARTG and data comms for the next few years", and a report on "highlights and hiccups of 1993".

Refreshments will be provided and the restaurant is available for a pre-meeting lunch at what BARTG describes as "a very reasonable price". There will also be a bookstall with a selection of amateur radio and computing publications.

Organiser Ian Brothwell, G4EAN, says it would help him to judge the number of chairs, coffees etc to provide if those intending to come would let him know on 0602 262360, or via packet to G4EAN @GB7DAD.

Police Hunt Serial Numbers

THE INTERNATIONAL Police Association Radio Club is holding its Annual HF Contest over the weekend 6/7 November: CW on the Saturday, SSB on the Sunday. Times are 0000–0200; 0700 – 0900 and 1500 – 1700 GMT. Bands are 3.5, 7, 14, 21 and 28MHz. Call "CQ IPA Contest" and exchange RS(T), serial number (from 001) and whether you are an IPA member. Further details from G3PGA, QTHR.

RSARS at North Wales Rally

THE ROYAL Signals ARS will have stands 13 and 14a at the North Wales Radio and Electronics Show to be held 6/7 November at the Aberconwy Centre, Llandudno. The call GB4RSL (Royal Signals Llandudno) will be in use at this event. For the rest of the month GB4RSL will be aired from a location in South Glamorgan.

● A BRAILLE attachment to his computer allows blind operator SM0RCG to operate packet radio.

Committee Vacancy

THE EMC COMMITTEE has a vacancy for a member with a knowledge of telephone systems. Membership of the committee involves attending evening meetings held in central London approximately once a month. The post is voluntary, but travelling and similar out-of-pocket expenses are recoverable.

Candidates should fulfil the following requirements:

Good knowledge of telephone and associated equipment; a wide experience of amateur radio, including interference problems; and enjoy trouble-shooting and be able to liaise with commercial organisations on behalf of the committee.

If you would like to assist the Society in the difficult but rewarding field of EMC, please write giving brief details to the chairman of the EMC Committee, c/o RSGB Headquarters, Lambda House, Cranborne Road, Potters Bar, Herts, EN6 3JE.

● NEWLY FORMED IS the Qatar Amateur Radio Society. It is supported by the Qatar Public Telecommunications Corporation.

Siskin Helps Sarajevo Communicate

SISKIN ELECTRONICS has donated a state-of-the-art multimode data controller to a group of radio amateurs in Sarajevo so that vital information can be passed to the outside world.

Siskin's Director Phil Bridges, G6DLJ, received a desperate plea from the amateurs in the former Yugoslavia via Amnesty International. He was very moved by the stories of appalling hardship endured by these amateurs who provide the only means of communication in and out of the besieged city.

A letter from two Sarajevo students, currently in Dublin, says: "We want to bring you gratitude from our friends in Sarajevo who are not yet in a position to do it themselves. People in Sarajevo are in great need for communication with the rest of the world, beside bread, medical help and peace.

"With the great help of Phil Bridges of Siskin Electronics . . . . and Amnesty International, thousands will be able to send and receive messages, very often messages of life importance . . . . Another fissure in the isolation and blockade in which Sarajevo has lived for 18 difficult and inhuman months has been made."

Martin's Bank

AFTER THREE successful years at his corner shop in Ealing, West London, Martin Lynch will be moving to much larger premises 500 yards away. Having served his time as an employee in the amateur radio retail trade for many years, Martin branched out on his own in 1990, and has gone from strength to strength.

The new shop, some six times the size of 'number 286', was formerly a bank, most recently owned by Barclays but previously by an independent bank called Martins! The additional space will be used to expand the equipment displays with separate areas for HF, VHF, datacomms and receivers, as well the latest in books and magazines.

The storage facility is second to none with 18" thick steel-lined walls and 12" thick fire and assault resistant doors which take two people to open and close them. Martin figures his stock should be a little safer in what is, of course, the old bank vault.

Part of the shop is dedicated to "customer care", including a lounge area with colour TV magazines and a Lego box for those members of the family who don't share your passion for radios.

Additional attractions include a late night shopping day plus Morse and Novice courses. The whole emphasis of the new Lynch showroom is to offer a family atmosphere to match the recent increase Martin has seen in young people and husband-and-wife teams interested in the hobby.

The new shop at 140-142 Northfields Avenue, Ealing, opens on 1 November, with a party on Saturday the 6th to which you are all cordially invited!

Martin Lynch, G4HKS, receives the key to his new premises from Richard Palfreeman of Northfields Estates.

BARAC Go Portable on Sca Fell Pike

ON SATURDAY, 31 July, members of the Bishop Auckland ARC braved the elements and took to the hills. Their intention was to scale Cumbria's Sca Fell Pike, England's highest mountain at 3,210ft, to operate GB0SFP.

The plan had been to camp overnight on the mountain but the experienced hill walkers advised against it. This proved to be good advice as even at the base camp it was difficult to erect tents in the wind and rain.

During the night the weather worsened and the horizontal rain provided an ideal alarm clock at 0600. G0OCB, attempted fried bacon which turned into boiled ham in the rain.

Eventually, the skies cleared so the team decided to go. Base camp was set up by G0MLP, G0PWK, G0IKX, G0MEI and G4XHP, who provided radio links to the climbers. The climbing party, 2E0AAJ, G1XNI, G0OCB, G7ESX, G7ESY and G0PRQ, set off at 1000 carrying a transceiver, linear, fibreglass mast, aerial and 12V battery apiece.

Three hours later the party reached the summit, having rarely seen much more than 5 metres in any direction during their journey. The temperature was 7°C with a 30MPH wind and regular showers. During the time spent atop Sca Fell, more than 100 people appeared out of the murk, stared puzzled at the eccentric group, and disappeared again.

CQ calls on S20 brought unlimited replies and QSOs were made at more than one a minute. After a very cold hour it was time for the descent. This took a mere two and a half hours, gravity being on the group's side.

BARAC plans to tackle Ben Nevis next year. Like the Sca Fell expedition, it will be very carefully planned and carried out by the large group, all of whom deserve credit for this year's success.

The whole GB0SCP team deserve credit for a safe and successful expedition: (left to right) Front row – Derek, G4XHP; Bryant, G0IKX; Sean, G0PWK. Back row – Ken, G0MLP; Steve, G7ESX; John-Paul, 2E0AAJ; Nick, G1XNI; Mike, G0PRQ; Michael; John, G0MEI; Ian, G7ESY and Bob, G0OCB.

Pepys Reviews the *Call Book*

"...WE PUT into practice my new way of the Callbooke, which will be of great use". Samuel Pepys wrote that in his Diary in December 1662. We couldn't have put it better ourselves. See page 94/95 to see how to get the 1994 *RSGB Call Book*, just published.

Repeaters

ON 28 SEPTEMBER, the Society mailed to all keepers of voice and TV repeaters information concerning the issuing of the new Notices of Variation. If you are a repeater keeper and have not received this correspondence from the Society, please contact Fiorina Sinapi at RSGB Headquarters on 0707 659015.

Lt Cdr Biddlecombe presents the RSGB with a plaque on the occasion of the opening of the new Royal Naval Amateur Radio Society HQ at *HMS Collingwood* on 30 July. Accepting the gift is RSGB General Manager, Peter Kirby, G0TWW, who is himself a member of the RNARS.

New RLO

THE NEW RSGB Liaison Officer (RLO) for South Glamorgan is Mike Adcock, GW8CMU, 7 Channel Close, Rhoose, Barry, South Glamorgan CF62 3EH, telephone 0446 711426. RLOs hold a wide range of information and they are available to help any RSGB member seeking advice.

Writing for *RadCom*

THE SOCIETY IS always seeking good technical articles for publication. Although all types of article are considered, the ones most needed are short (a couple of pages) construction projects. VHF projects – aerials, transmitters, receivers, converters, test gear etc – are in greatest demand.

If you have such a project, write for a *Style Guide* to RadCom, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE. All construction articles are paid for on publication.

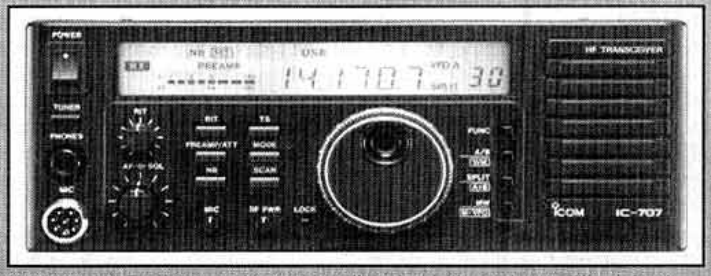
BRIGHTEN UP THOSE LONG WINTER EVENINGS WITH A NEW BASE STATION FROM

RADIO HAMSTORES

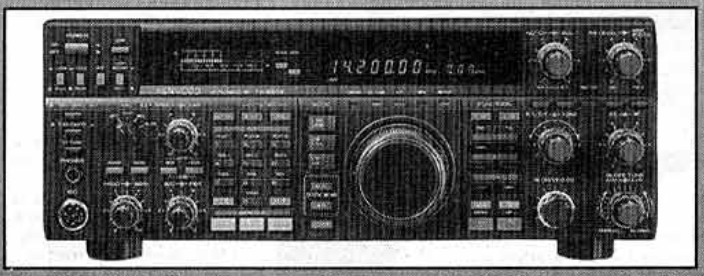
ICOM IC-737 This compact HF transceiver has met with rave reviews (Sept. RadComm) utilizes state-of-the-art digital technology to introduce for the first time; memo pad, DBSR, auto-antenna selector and quick-split functions. These new functions will excite HF beginners who want to take the next step up and users keen on portable or mobile operations. With a choice of CW filters, the IC-737 is an ideal transceiver for taking on the DX world.

ICOM IC-970 Enjoy incomparable 144, 430 and optional 1200MHz all-mode operation with the futuristic IC-970E. This transceiver incorporates today's finest digital technology for unsurpassed multi-band performance, it includes a DDS system to guarantee fast PLL lockup times, plus simultaneous dual-band receiving and 99 memory channels for each band! Satellite communication is made easy with the in-built frequency tracking function.

ICOM IC-275H The IC-275 is a compact 144MHz transceiver equipped with the features demanded by today's serious operator. The transceiver includes a highly sensitive receiver and full 100 watt output power. The advanced IC-275 is also equipped with Icom's DDS (Direct Digital Synthesizer) System. 99 memory channels, a variety of scan functions and built-in notch filter and speech compressor for effective DX'ing.



ICOM IC-707 The key words are operating simplicity and versatility. a front panel-mounted loudspeaker enables installation into panels with no loss of audio quality. Well spaced switches help avoid accidental input and, provide the simplest operation. Controls have been kept to a minimum while the large, easy-to-read display shows all necessary information. This transceiver is ideal for novices *and* experienced HF operators alike.



KENWOOD TS-850S Enjoy operating this HF transceiver from Kenwood. The TS-850S boasts a superb specification that includes built-in or optional auto-antenna tuning, an Advanced Intercept Point System for enhanced dynamic range, 100 memory channels with 3 scan modes, DDS and a digital PLL System to permit ultra-fine 1Hz tuning. There is also an optional DSP-100 signal processor. The TS-850S covers the 160m~10m Ham bands and has a 100kHz~30MHz general coverage receiver.

YAESU FT-736R This transceiver from Yaesu incorporates up to 4 band modules covering the 50, 144, 430 and 1200MHz Ham bands.The standard model provides 25 watts RF power output on the 144 and 430/440MHz bands in SSB, CW and FM modes with any 2 of the remaining 3 bands as options (10 watts output on the 50 and1200MHz bands). An 8-bit CMOS main micro-processor and 4-bit I/o coprocessor provide exceptional digital integration and control.

ICOM have reduced the prices of selected popular models and made it even easier for you to own a radio by the market leader. But don't forget HAMSTORES also stock AEA, AKD, Alinco, AOR, Barenco, Comet, Cushcraft, Davis, Dee Comm, Diamond, JRC, Kenwood, Lowe, Microset, MFJ, RSGB Books, Toyo, Yaesu and Yupiteru, so whatever you want HAMSTORES will have it! Low deposit, interest-free credit is available on most radio purchases.

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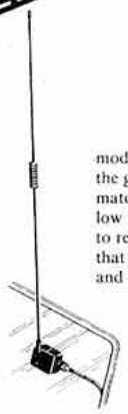

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PAQ144-440 2m/70cm **£39.95**
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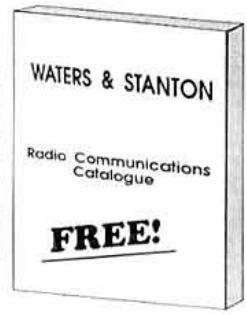
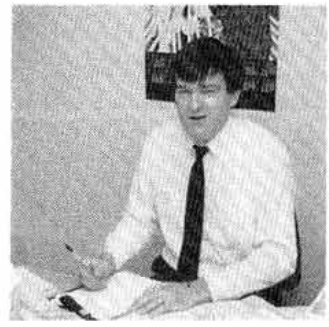


Mark's Message

There is nothing I like better than selling. It makes me feel good. I'm always ready to give you a good deal because I know that if I do you'll come back to me again. And that makes me feel good because I can sell to you again! We have got some super products and everything we stock is factory fresh with no grey imports. You get the full UK warranty from us. Everything we sell is serviced by us, on the premises. That means a quick turn-round and a professional job. Have you seen some of the service departments of our competitors? Neither have they! I head a sales team here that is technically knowledgeable about all the products we handle. Probably more knowledgeable than me. If I can't answer your questions then I know a man who can! If you are buying a transceiver or receiver I can usually do a deal that is fair to you whilst enabling me to give you the after sales service that is second to none! Give me a ring and make me feel good!

G0GBY



2m 30W Mobile for £59!

P335

This amplifier converts your 2m FM handheld into a 30W output mobile or base system.

- ★ RF sensing
- ★ 1.6W Input
- ★ Ideal for FM
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- ★ 12-14V DC
- ★ 74 x 50 x 24mm

This is a well made unit which we have purchased at a silly price. We have limited stocks at this price and you have a full 12 months UK warranty. Ask us nicely and we'll send it post free!

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MFJ-203 Dip Meter £99.95

- * 1.8 - 30MHz
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The "203" is a brand new idea in dip meters. It uses a single probe for complete coverage of 1.8 - 30MHz. None of the old vices of dip meters! Handbook tells you how to measure resonance, velocity factors, capacitance, inductance, circuit Q and other parameters.

HF Mobile Aerials

Low - Low - Prices!

NEW!

These single-band fibre-glass antennas are imported direct by us from the USA. They have a fibre-glass bottom section and stainless steel top adjustable whip. Highly efficient and with ⅜" stud thread. We can supply matching bases or PL-259 adaptor.

PHF-10/15 or 20m Antenna **£19.95**
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ALINCO - - - factory fresh from the importers!

NEW!

DJ-G1

2m Tx Dual-Band Rx
With Spectrum Display

80 memories, 2 Watts on ni-cads, 5 Watts on 12V. But the unique feature is the Spectrum Display. The bargraph shows the strength of the signal you are receiving plus the strength of signals on the 3 channels either side. Watch a spectrum display of the activity as you tune the band. It's the most amazing handheld we have seen!

DJ-180E

2m Budget Class Rig

- **10 memories (Expandable)**
- **Auto Power Off**
- **Scanning & wide-band Rx**
- **Rotary Control**
- **Ni-cads & Charger**

You won't purchase a better quality rig at this price. Derived from their commercial design, this rig is tough and reliable. Ideal as a second rig or/and appealing to those who don't want all the frills (and the expense). Get the adaptor and you can make it into a 5 Watt mobile! And if 2 metres gets boring or goes quiet, you can always listen between 130MHz and 174MHz to pass the time. Get the full details now.

DJ-580SP

2M/70cms

BEAT PRICE INCREASE! CALL NOW!

- **Full CTCSS**
- **Wide-Band Rx**
- **42 Memories**
- **Full Duplex**

The DJ-580SP is the latest feature-packed handheld from ALINCO. You get ALINCO tough engineering and excellent reliability. You even get AM airband receive. No corners have been cut with the DJ-580SP and to add to its pedigree, it has been selected by many groups for RAYNET operation. No doubt because of its auto repeater mode. Get the facts today and find out more about this lovely rig.

DR-130E 2m Mobile

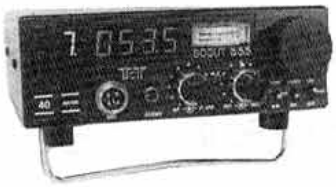
- **50 Watts Output**
- **20 Memories**
- **CTCSS Encoder**
- **Time Out Feature**
- **Channel or Freq. Display**
- **Compact size**

This is the newest mobile rig to come from ALINCO and with 50 Watts output it really does pack a punch. Its simple front panel belies its many features yet making operation safer. You can switch between frequency display or channel numbers; nice for "on the move" operation. Frequency control is by rotary control or up/down buttons on the mic. Repeater access is taken care of by the 1750Hz tone with reverse repeater in an instant. And if you get tired of 2 metres you can always listen to the segment 130MHz - 17MHz. Everything you need to mount and operate the rig is supplied. Just connect 13.8V.

ELECTRONICS
OF HAM RADIO PRODUCTS

0702 206835 or 204965

Ten-Tec Scout £589



SSB/CW 1.8MHz - 30MHz Capability!

* 5 - 50Watts Output SSB/CW
* Plug-in Band Modules (40m included)
* Variable Xtal Filter 500Hz - 2.4kHz
* VSWR, Power & S-meter
* Full Break-in * Built-in Speaker
* 100Hz resolution 12 Volt operation

Just arrived from USA. It's the cheapest HF rig with the famous Ten-Tec Pedigree. Just pay for the bands you want. Extra band modules £39.95. Measuring 2.5" x 7.25" x 9.75" it is ideal for mobile, base or portable. Only available direct from us. Plus a full 12 month UK backed warranty.

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Price Crusher!

* 20 Memories
* 2 Watts Output
* Wide-band Rx
* Key-pad entry
* Full scanning

ADI - 2m & 70cms Hand-helds

£199 (2m Version)

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70cms model £219

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Factory Direct Price

Combined ear-piece and microphone

Comes with PTT control box and clip. Models for most modern hand-helds. Quote model when ordering.

Mobile?

We used one with a handheld and the quality was superb. Hands-free and low car noise. The performance will amaze you.

WANTED

We want good clean modern used equipment and will pay cash or offer a part-exchange deal. Just telephone us for a quote.

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The Best!

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£89.95

SX-100 1.6 - 60MHz 3kW	**£124.95**
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SX-400 140 - 525MHz 200W	**£104.95**
SX-600 1.8 - 525MHz 200W	**£154.95**

For details of the full range including the automatic models, send for our catalogue.

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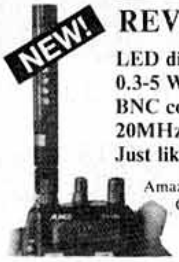

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LED display Power
0.3-5 Watts
BNC connector
20MHz - 1300MHz
Just like Rubber Duck

£34.95

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Amazing device. Just plug into any handheld, CB or cellular phone to read the power. Levels are 0.3/0.5/1/2/3/5W.

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The only ones you can mount vertically without loss!

for FM Beams

144-WH5, 5 el, 2m	**£29.95**
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ROTATOR AR-300XL

Bargains £59.95

240V AC/12V control
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Direct Bearings
Ideal for VHF & TV

SAVE even more!

Order an AR-300XL plus any Tonna or Maspro Aerial and get a further **£10 reduction** on this price! Ends 1st Dec 1993.

Special Offer! ~~£169.95~~

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Carriage £5 extra

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LIMITED STOCKS!

Ni-cad Powered	1MHz - 2300MHz
AC Charger	100Hz resolution
Telescopic aerial	LED Readout
	90 x 100 x 25mm

Reads 2m handheld at 150ft! Very limited stocks. Phone today.

MFJ-1278 Data Controller

10 Modes World Leader £339

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The most advanced and best value product of its kind on the market. Ideal for TX or just receive, you will be enthralled for days with the capabilities of this item. All you need to add is an IBM PC, receiver or transceiver, and software. Some modes can be operated using shareware, but for all the modes you need the 1289 software pack for **£69.95.**

1kW 50 Ohm Load

£39.95!

MFJ-250X

Just fill with transformer or vegetable oil, and you have a really robust load. 1MHz - 400MHz with SO-239. Will withstand 1kW for ten minutes!

A Full Featured ATU £71.95

1.8 - 30MHz
End Fed
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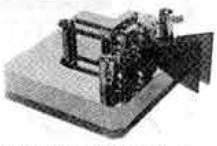
OFFER: MFJ-901B

If it doesn't work with your antenna we'll take it back within 10 days! That's confidence.

SPECIAL PURCHASE

SAVE £40!



It's a copy of the famous BENCHER keyer from USA. But this one comes from Taiwan. It's superb quality, heavy chromed and a great investment. We can sell you the Bencher for £99.95 or this one for £59.95.

MFJ-564 £59.95

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VISA Access

HF NEWS

JOHN ALLAWAY G3FKM
10 Knightlow Road, Birmingham
B17 8QB

I APOLOGISE to the reader who complained [*The Last Word*, October] that several columns, including this, are all really depositories for archive material and that the *real* news is going out in the *RSGB DX News Sheet*. He is – of course – quite right! A monthly magazine column can never be totally up to date if only on account of the fact that its preparation and printing takes time. In my opinion our own *RSGB DX News Sheet* ranks with the best in the world and no true blue HF DXer should ever be without it. [See *Book Case* pages for how to order – *Ed*]

David Bowers, RS34754, visited Beijing recently and read the English language official newspaper *China Daily*. In it he found an article entitled "Fiddling, tinkering, tuning: Joys of a ham". It described a contact between BA1CY and BV6RE which it said would not have been possible until the last year. Twenty two veteran operators were allowed to set up private stations on a trial basis a year ago – and interestingly a requirement is that they had to pass a test in English.

Encouraging to see that the press in China finds amateur radio interesting enough to write about – and in a quite accurate way too.

AWARDS

THE POLSKA AWARD

For confirmed contacts with Polish provinces since 1 June 1975. Three classes – Class 1 = 49 provinces, Class 2 = 35 provinces, and Class 3 = 20 provinces.

UBA SWL CHAMPION

Available to everyone who has received confirmed listener reports from 100 DXCC countries (including all continents) together with all Belgian provinces and an additional twenty Belgian stations. Listeners should send a list certified by two persons. Licensed amateurs may apply under the same conditions or if 20 reports from Belgium have been received and confirmed. In the latter case a declaration that all were answered should be enclosed. Send application with five IRCs to Brenda Casteleyn, ON1AKU, Ferd. Coosemansstraat 32, B-2600 Berchem, Belgium.

UBA SWL MASTER

For those who already have the UBA SWL Champion Award. It requires much more and I can supply photocopies of the rules (SASE please).

THE AC-15-Z AWARD

For confirmed communication with at least 23 countries or call areas in *CQ* zone 15 since 1 January 1955. These are HA, HV, I, IS, IT, OE (two call areas), OH (three call areas), OJ0, SP (four call areas), TK, T7, UA2, YL, LY, OK, OM, YU (three call areas), ZA, and 9H. The contacts with the four Polish call areas are mandatory.

WORKED 21ST MERIDIAN (W-21-M)

For confirmed contact with at least 16 countries situated on the 21st East meridian. These are: A2, D2, HA, JW, OH, OH0, OK, SM, SP, SV, TL, TT, UA2, YL, ES, YL, YO, YU, ZS, V5, 5A, and 9Q.

For these awards issued by PZK please send a certified list of QSLs (certified by two other licensed amateurs) plus 10 IRCs to Awards Manager, ZG PZK, skr.poczt. 320, 00-950 Warsaw, Poland.

DX NEWS

ARRL HAS ANNOUNCED that the following operations have now been accepted for DXCC. The dates are those from which QSLs will be valid: 5R8DC – 13.10.92, 5R8DD – 14.10.92, 5R8DE – 4.9.92, 5R8DF – 4.9.92, 5R8DH – 4.11.92, 5R8DI – 4.11.92, 5R8DL – 9.11.92, 5R8DM – 5.11.92, KP1/W5IJU – 23.3.93, T5/DF5UX – 1.3.93, T5/DL1VJ – 1.3.93, T5/DL8YR – 20.4.93, T5/KJ6QO – 11.3.93, T5THW – 1.3.93, TT8AKX – 16.1.93. The DXAC seems to be undecided about the recommended effective date for the reinstatement of Eritrea to the DXCC list and the matter has been referred to the ARRL Awards Committee.

Long Island DX Bulletin says that 9G1RQ, in **Ghana**, is often near 14.240kHz at 1000 and on 21.295MHz at 1500. 9G1SB uses both CW and SSB anywhere between 21.005 and 21.250MHz during the 2100 to 0100 time slot. SM3HLL, who was recently active as T5HLL, is now on the air from **Ethiopia** as ET3BH. T5/N3HQW should be on from **Somalia** by now and will be there for six months or so. OE3DKS is in **Burkina Faso** and has the callsign XT2DK – he expects to be there until April 1994. Peter, XT2BW, was due to return at the end of August and should be there until December. If you are looking for a contact with **Lesotho** it might be an idea to search the area between 21.010 and 21.025MHz for 7P8SR – preferably between 1030 and 1400. From **Malawi** 7Q7XX has continued to be active on many bands. He is said to follow a pattern which is 0100 – 0200 14MHz CW, 043 14.195MHz, 1500 – 1700 21.010MHz, and 220 10.101MHz. 7Q7ZZ seems to like 18.120MHz around 0930, 21.230MHz at 1500 and 21.330MHz at 1700. 5V7JB, in **Togo**, is KB4UTH and is there on a long time basis.

The *RSGB DX News Sheet* reports that EX0A, EX0M, EX0O, and EX0Y will operate from **Iran** as EX0A/EP, EX0M/EP, and 9D8UW from 1 October until 1 November. DL7VOG and two others are also hoping to visit Iran and be on the air from 21 November until 1 December. OH3MIG/4U was expected to be operational from the Golan Heights until late December. *DXPRESS* gives a report that an orthopaedic surgeon who has been invited to teach surgery in **Bhutan** may be allowed to get on the air. This is expected to take place early in 1994. Martti Laine, better known as OH2BH, has arrived in **Hong Kong** for a two year assignment. He should be heard as VR2BH and will probably be very active as soon as he is settled in.

Worked 21st Meridian: An unusual concept for an award, see text.

It seems that one of the three operators who took part in the recent 5A0RR expedition is Said who might be in **Libya** for up to two years. He now has an FT-990, an FL-7000 and a Mosley antenna – he is a good CW operator but his SSB operating might be limited.

According to *RSGB DX News Sheet* the government of South Africa is about to hand over the administration of Walvis Bay and certain offshore islands to Namibia. This would lead to the deletion of Walvis Bay from the DXCC list – and if the offshore islands include Penguin Is it too would lose its DXCC status. AA7NO, KF7AY, and N7BG of the Central Arizona DX Association will be in **The Gambia** for the CW section of the CQ WW DX Contest at the end of October and will be on as C56V. Before and after they will operate as C56/home call on CW and SSB on 3.5 to 28MHz (including WARC bands).

DXPRESS says that callsigns in the XE0 series are now being issued to Mexican novices who are able to operate on CW from 7.0 to 7.05MHz and on SSB from 7.05 to 7.1MHz.

OX3MZ, in **Greenland**, is said to have a good signal on 7.005MHz CW around 2200 al-

continued on page 16 ▶

The Polska Award for QSOs with Polish provinces.

HF NEWS

continued from page 13

most daily. WC5P and KH6DFW should be on Christmas Island in **East Kiribati** again from 24 to 29 November using the callsigns T32BE and T32BI respectively. Dave Miller, NZ9E, has written to say that he is now acting as QSL manager for Irma Christian, VR6ID. Anyone who sent a card to Irma's former manager KB6ISL/KI7HO in the last few months and has not received a reply is invited to contact Dave.

The authorities in the **Cook Islands** are now issuing calls with three suffix letters (ZK1AA-) to visitors.

EXPEDITION

G4UOL IS VISITING the **Isle of Man** again this year for an all-CW operation. He will be signing GD4UOL between 19 November and 5 December and as usual about 10kHz above the CW band edges. On the WARC bands he will be found one or two kHz up from the bottom. Equipment is a TS930S with three element yagi and slopers and an end fed long wire. If you would like to fix a sked ring Steve Muster on 0702 334014.

IOTA DIRECTORY

THE 1993 *IOTA Directory* has been updated to include the 44 new island reference numbers issued since April 1992 and the 129 since May 1991 when the last major revision took place. It runs to 60 pages and contains the new IOTA logos. Copies are available direct from RSGB IOTA Director Roger Balister, G3KMA, La Quinta, Mimbridge, Chobham, Woking, Surrey GU24 8AR, price £6.00, US$10, or 15 IRCs to European destinations and £7.00, US$12, or 18 IRCs to the rest of the world. Certain foreign language editions are available (or will be very soon.) French from F6AJA (Les Nouvelles DX), Italian from I8IYW (Diamond DX Club), German from DK1RV, and Polish from SP6TPM. [Also available from RSGB; see *Book Case* pages – *Ed*].

DK0WCY

G2RX HAS KINDLY provided me with detailed information concerning this beacon which is located in Germany some 20km south of the Danish border and transmits on 10.144MHz. The transmitter is crystal controlled with 30W output into a triangular horizontal loop antenna 6m above ground. It transmits "DK0WCY BEACON" which is repeated continuously until aurora propagation is noted on VHF in northern Germany when it sends an appropriate message – "Aurora" or "Strong aurora". At every five minutes it transmits a more comprehensive message an example of which might be: "Info 1 November 1056z = warning strong proton event, strong polar cap absorption = R 82 = Flux 124 = Boulder AK = 26 = Wingst AK 37 K9 = forecast sunact low to moderate = magfield strong storm = swf low to moderate = HF conditions moderate to bad +". "R" indicates relative sunspot number; "flux" = solar flux at 10 cm as measured at Penticton, Canada; Boulder AK = daily index of earth magnetic field measured at Boulder, Colorado; Wingst AK = the same but measured at Wingst in Germany; K = three hours period index of magnetic activity (Wingst); Sunact = state of sun activity; Magfield = state of magnetic field; SWF = probability of short wave fadeout; HF conds = state of HF conditions; NA = not available; SSC = sudden storm commencement. It is planned to modify the software so that the beacon will also transmit the date and time when a sudden storm began and the clock will be synchronised with the DCF77 time signal transmitter so that transmissions will start exactly every five minutes. The SWF is being transmitted followed by a number which stands for the percentage probability (so "SWF 1" means one per cent) but may change back to "very low" or "high".

INDIA

YOU MAY have noticed an increase in the number of VUs on the bands recently. Sangat Singh, 9M2SS (who is a director of IARU Region 3) gave me a detailed list extracted from that published by the Madras ARS in late 1991. Amateurs counted by *state* are as follows : Andhra Pradesh = 554, Arunachal Pradesh = 2, Assam = 18, Bihar = 87, Chandigarah = 6, Delhi = 216, Goa = 9, Gujarat = 272, Himachal Pradesh = 140, Haryana = 16, Jammu & Kashmir = 6, Karnataka = 964, Kerala = 644, Madhya Pradesh = 140, Maharashtra = 522, Meghalaya = 4, Nagaland = 1, Orissa = 7, Pondicherry = 11, Punjab = 26, Rajasthan = 34, Tamilnadu = 1422, Uttar Pradesh = 104, and West Bengal = 227. In addition those in *cities* total: Bangalore = 627, Madras = 576, Bombay = 349, New Delhi = 185, Coimbatore = 158, Hyderabad = 155, Ahmedabad = 136, Calcutta = 115, Pune = 103, Cochin = 94, Vijayawada = 84, Trivandrum = 83, Salem = 77, Karaikudi = 73, Srinivasnagar = 72, Mysore = 67, Kharagpur = 65, Trichur = 61, Vishakapatnam = 60, and Erode = 48. This makes a total of 8,484.

BAND REPORTS

Although many readers note the falling off in propagation on the HF bands the logs show that there is still a lot of very nice DX available - but it has to be searched for. Thank you to G2HKU, G3GVV, G3IZD, G3KKJ, G3YRM, G4DJC, G4MUM, G4OBK, G0KDS, and to the UK DX Cluster via G4PDQ for providing log extracts. Stations listed in italics were using CW:

1.8MHz
0000 *9K2MU*
0400 *PY0TM*
1900 *FK8CP*
2000 *Z21HS*
2100 *OH3JF/OH0, UA9YQB, VQ9QM*
2200 *A22MN, G4VXE/TF/P, ZD8Z, 4X4NJ, 9G1XA*
2300 *UJ8JMM, UL7OB.*

10MHz
0700 *KL7Y, VK*
1700 *JT7/UB0YW, VQ9QM*
1800 *C91J, V85XF, YB6AVE, ZS9/DJ2ZS/P*
1900 *DP0GVN, T5/OZ1FJB, 4K9C, 9N1BD*
2000 *CY9R, FK8GJ, HV3SJ, 5H3FOE, 9G1XA*
2100 *HL1IUA, ZS6DM, ZA1E*
2200 *D2EYE, E31A, FM5WD, FS/F2YT, S92SS, 7Q7XX.*

14MHz
0600 *AH6JF*, D2SA, ET3DX, FO5NL, KH3AF, AH6DR/KH7, TU5BT, 3C1TR
0800 A35HX, AH9B, FK8CP, *FO8SUG, KH8MNP*, ZK1XR, ZK3DM, 9G1SB
0900 AH6ML/NH9, FO4OK, KC6CEX/WH9, *3D2KM*, 4K4/UA0KBZ
1500 *US0RR, YB9BO*, NU2L/VE8, XV7TH
1700 AH6E, FR5ZQ/J, *V85XF*, XU3RLD, YI1DZ, ZS8MI, 9N1AP
1900 A71A, EP2MHB, G4UAV/HS0, XX9AS, 6O0A
2000 FK8GM
2100 E31A, TR8LVP, V2/G4DIY, NU2L/VE8.

18MHz
0700 *3D2CK*
0900 *AH9B*, ZB2JL, ZK3DM, 7X2DG
1000 *NL7RK*, T30NJ, V63AO, V73EX, ZB2JL, *3D2CK*, 9G1GA
1400 *BZ4DHI*, FJ/I4UFH, *KC6WP, S21ZG, XU6WV*, 4U1ITU
1600 *A73CH, D68CA*, FH5CB, *V8SXF*, VU2DST, ZS8MI
1700 ET3SID, *KH6/K6BPQ*, KL7XD, TA8ZA, 5Z4FO, 9M2CM
1800 *D2EYE, E31A, FS/I4ALU, PA3CXC/ST0, T5/OZ1UJB*
2000 AL7I, J28CN, PJ2MI, PY0TM, V31ML, *VP2MH.*

21MHz
0900 BY3AE, FO4OK, *V85XF, 3D2AC*, 6O0A
1000 *JT7/UB0YU*, H44MN, KH0AC, XU3RLD, 3D2CK/P
1200 BO2AA/BV3, BY5QFB, P29KDJ, V63OM, V73C, V73EX
1400 A22EX, *D68CA*, HL9DG, *V85XF*, XX9AS, YI1MH, 9M8TA, 9N1WL
1500 C91AJ, D2SA, ET3YU, S21B, ZS8MI, 9M8BL, 9V1UU
1700 A71A, ET3SID, *5R8DG*, 9G1NS
1800 J28RD, VP8CEH, ZD9BV, ZS9/DJ2ZS/P, 9G1SB.

1993 WARC BANDS TABLE

	10MHz	18MHz	24MHz	Total
G3KKJ	**123**	**175**	**146**	**444**
G3IZD	100	149	115	364
G3IAR	112	136	76	324
G4XRV	108	101	21	230
G0MHC	55	113	55	223
G2AFV	87	86	48	221
G4OBK	73	92	23	188
GJ4GG	36	60	39	135
G4MUW	2	69	40	111
G3IQF	45	41	17	103
G0KDS	2	75	3	80
G4CMZ	17	–	–	17

CONTESTS

CQ WW DX CONTEST (CW)

0000 27 November – 2400 28 November

Rules of this were given last month.

The results of the **1992 CQ WW DX Contest (SSB): G0KPW** came world second in the multi-operator multi-transmitter category and won a trophy for being top European. **G3NAS** came world fifth (and third European) on 3.5MHz, and **GW4BLE** and **GM0ECO** European third and eighth in the all-band single-operator class. The late **G3FXB** was European sixth on 14MHz, and **G3KMA** was world sixth on 1.8MHz. In the low power section **GJ/CT3GBA** was world ninth in the all-band class and **GW8GT** world fifth in the multi-multi class. Individual scores were: **(All band) GW4BLE** 5,806,410; **GM0ECO** 3,674,904; **G3LZQ** 1,156,974; GM3BCL 1,054,680; ***GJ/CT3GBA*** 755,145; *GI0SAP*

652,503; *G4XKR* 472,609; ***GD4EIP* 488,348;** G3IAR 226,008; G4PDQ 185,640; G3UFY 139,854; ***G0KTN*** 127,197; ***G3XVF*** 93,350; G0FEH 54,365; ***G3ICG*** 53,192; *GM4CUX* 52,596; ***G4NXG/M*** 17,328 and *G4ZKJ* 5,976. On 28MHz: **G4PKP** scored 509,172 points; G0AEV 405,383; *G4XTA* 171,217 and G4JFS 36,772. On 21MHz: **G4CNY** scored 917,792; *G3MXH* 101,430 and G0FOS 35,175. On 14MHz: **G3FXB** scored 1,125,168; GW0ARK 539,487; **GD4GWQ** 56,964 and G0KKZ 24,771. 7MHz scores were: **GI0KOW** 346,970 and G4OBK 4,675. 3.5MHz scores: **G3NAS** 155,040; and on 1.8MHz: **G3KMA** 30,822. Stations in the low power section are listed in italics.

HOMEBREW AND OLDTIME EQUIPMENT PARTY

1300 – 1700 21 November

1300 to 1500 – operate between 7.010 and 7.040MHz and from 1500 until 1700 between 3.510 and 3.560MHz. Call "CQ HOT". CW only with less than 100W input using (Class A) transmitter and receiver home built or more than 25 years old, (Class B) Receiver *or* transmitter ditto, and (Class C) QRP (below 10W) with transmitter home built or more than 25 years old. Exchange RST and serial number (starting from 001 on each band) plus class. QSOs between Class A and A, A and C, and C and C count three points; between B and A, and B and C two points; and between B and B one point. Include a description of equipment used and mail logs by 15 December to Dr Hartmut Weber, DJ7ST, Schlesierweg 13, D-38228 Salzgitter, Germany. In the 1992 event (Class A) G3VTT came fifth with 147 points, G3VDL 11th with 100, and G3YFF 21st with 36. In Class C G2HLU was ninth with 72 points, G4ARI 14th with 54, G3NNK 16th with 50, and G3DNF 18th with 48.

In the 1992 Helvetia Contest, UK scores were as follows: G4IQM (M) 25,137; G3ESF (C) 18,240; G5LP (M) 7,770; GM3ITN (M) 5,610 and GM0GNT (C) 4,416. The letters show which section was entered.

PROPAGATION

G8KG REMARKS that it seems we are heading for an early minimum to the present cycle and goes on: "As Cycle 22 enters its eighth year the present picture is one of steady decline. At the middle of September the 27-day average solar flux had fallen for 190 days from 144 to 86 sfu. Looking at the recent position in more detail, the daily flux measurements had been below 100 sfu for 30 days while the first half of September saw only two days with values above 80 sfu. This fall is not so steep and dramatic as the one in the first half of 1992 but if it continues or merely levels out the prediction of sunspot numbers in the high 40s this winter begins to look optimistic. However, the previous steep fall was followed by a recovery in the second half of 1992 and it is at least possible that something similar will happen again.

The period under review included two spells of stormy magnetic conditions but for the most part geomagnetic activity was low with the Boulder A index often 10 or below. With solar activity so low the best HF conditions were to be found on the lower bands with the pattern of openings on 14MHz reminiscent of those on 28MHz during the peak years."

THANKS

TO ALL WHO remembered the early deadline and also to the editors of *DXPRESS* (PA3FQA), the *Long Island DX Bulletin* (W2IYX), the *EA DX Boletin* (EA1QF), *RSGB DX News Sheet* (G4DYO), and the *Lynx DX Bulletin* (EA2KL). Please send everything to reach me for the **January** column no later than **19 November.**

QTH CORNER

ET3RP	F6GZA, Villa Menelik, les 5 Cantons, Loriolldu Comtat, F-84200 Carpentras, France.
GD4UOL	S Muster, Flat 4, 60 Genesta Rd, Westcliffe on Sea, Essex SS0 8DB.
G4VXE/TF	Tim Kirby, PO Box 23, Tewkesbury, Glos.
UC QSL Bureau	Belarus Radio Club, PO Box 469, Minsk, 220050, Belarus.
VR2BH	via KA6V.
VR6ID	Dave Miller, NZ9E, 7462 Lawler Avenue, Niles, IL 60714-3108, USA.
ZD9SXW	G3SXW, R K Western, 7 Field Close, Chessington, Surrey KT9 2QD.
ZS9/OZ1EYE	OZ1ACB, Allis Lang Andersen, Kagsaavej 34, DK-2730 Herlev, Denmark.
9G1XA	Randall K.Martin, K0EU, 11480 W 45th Pl, Wheatridge, CO 80033, USA.

VHF/UHF NEWS

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

REGULAR listeners to the *GB2RS* News Broadcasts will know that solar activity is declining rapidly. On 10 and 11 September, no sunspots were recorded in the USA and Europe, for the first time since July 1987. Meudon reported zero on the 14th and solar flux values were hovering in the low 80s in the first half of the month. Geomagnetic activity was up at times and triggered off an aurora on the 13th.

DX OPERATIONS

SCOTLAND

Clive O'Hennessey, GW4VVX (GWT), describes his home QTH as an RF disaster area, so looks forward to occasional operation from IO78 square in Sutherland. He was QRV from IO78WA as GB2XS – XS being the European QTH Locator equivalent of IO78 – for two weeks in mid-August, taking in the Perseids meteor shower.

Previous experience has shown that many MS partners fail to show up for pre-arranged skeds, so now he only takes skeds off the 20m VHF net. These are usually completed quickly, so little time is wasted. The first Perseids peak was noted 1500-1700 on 11 August when the east/west path was best. Reflections were good, but short, from 2020 and 9A1CCY was worked at last in a 30s burst after several attempts in previous trips.

The best burst lasted 70s bringing SSB completions with DL6NAA, DG3FK, DL8AKI, DL9NSA and DL0HJ on his published random QRG of 144.222MHz. Good reflections continued till about 0300 on the 12th; thereafter there were many pings but few bursts long enough for SSB contacts. From 1300 till 2400 reflections were good again. While working an EA in IN91, Clive got an RS53 tropo report from an F in IN97 via the VHF net, for his first continental tropo QSO in many years of activity from GB2XS. On the 16th, 1730-2245, there was a fast-moving aurora which resulted in QSOs with many near European stations. Towards the end, only LA and OY stations were heard. He ran 150W to a single 9-ele Yagi on 2m. On 6m he caught a brief Es opening from 1730 on 14 August, using just 10W and a dipole. The squares tally was at least 54 and he plans to be QRV as GM4VVX/P (IO78) for the CW contest on 6/7 November.

JERSEY

According to Gervald Frykman, G0GNF, The Warwick School has a thriving amateur radio society. 12 pupils have passed the NRAE, one is now a G7, there are seven B and one A licensees. The highlight of the year was the fourth amateur radio camp, held at Crabbe on the NW coast of Jersey. They operated on 6m, 2m and 70cm, making extensive use of the GB3GU repeater in Guernsey on RB13. They were able to access many UHF repeaters on the south coast of England.

On 15 August, using an FT-690 and HB9CV antenna on 6m, they caught an Es opening, working into SP, 9A, S5, I and OK. This leads to a claim for the first 6m novice operation from Jersey by David, 2J1BZW/P and Joseph, 2J1CAW/P. They also took a complete 2m packet station, using the JSY2 node and the Guernsey BBS, GB7GUR, but connection to the mainland proved unreliable.

ICELAND

The most ambitious DXpedition was the Five Bells Group's second trip to Iceland from 31 July to 12 August. The team comprised David Johnson, G4DHF, Keith Tatnall, G4ODA, Tim Kirby, G4VXE, John Flowers, G0JLF and Chris Phillipson, G8IJC. The two locations were a holiday accommodation at Stafafell (IP24NK) and the portable site at IP34FV on 11/12 August.

They had a 500W permit for 144 and 432MHz at the fixed location and a 25W one for 50MHz, subject to an operating curfew. Equipment included a TS-850S with transverters, FT-736, home-built 0.35dB preamps, an 80-ele colinear group for 144MHz, eight 21-ele Yagis for 432MHz and a 5-ele Yagi for 50MHz. They ran real-time computer logging using G3WGV's Turbolog software, and real-time Moon tracking with VK3UM's program.

On 6m from IP24NK there were no major Es openings, but they worked into parts of LA and SM most evenings around 1700 via some form of scatter propagation; some Gs were contacted by

this mode. They wonder if the auroral QSOs on 4 August were the first from TF? Later that evening there was auroral-E propagation into G when all beacons were well audible. Over 170 QSOs were completed by G4VXE/TF/P on SSB, CW, and SSB MS. G4ODA/TF/P made over 50 QSOs. From IP34FV, G0JLF/TF/P made 35 contacts, mostly SSB MS, on 12 August, while G4ODA/TF/P had 31 QSOs. From IP24NK, 2m MS reflections in the week prior to the Perseids peak were weak and short. Even so, QSOs were completed by G0JLF and G4DHF with the better equipped Europeans, all on CW except for G4SSO (IO91) at 1100 on 6 August. David made six EME contacts and also worked GM4ZAP/P (IO89) and GM4ILS (IO87) via aurora 1706-1725 on the 4th. The main 2m MS activity was from IP34FV.

Between 2150 on the 11th and 0356 on the 12th, G4DHF/TF/P completed 127 SSB QSOs. Activity was so high that it sounded more like an Es opening, sometimes favouring DL, at others F, G, ON or PA. 70cm EME operation from Stafafell ". . . . was both highly exciting and frustrating in the extreme." They had to contend with the Moon almost at apogee, high ionospheric activity and adverse Faraday rotation for days.

On the VHF net, stations often reported their signals were returning vertically polarized. On at least two occasions, stations were heard before Iceland moonrise and DL9KR was worked 20min before it rose; enhanced refraction over a sea path? 22 stations were worked off the Moon by G4DHF/TF/P. So once again we have to congratulate the Five Bells Group for a brilliant effort and, as David suggests, ". . . . we have now taken TF off the most rare VHF countries list." So where to next? Jan Mayen or even Greenland?

TRANSATLANTIC TESTS

FOLLOWING LAST MONTH'S section on transatlantic tests, Chris Bartram, G4DGU (DVN), wrote about the experiments carried out by a group in 1979 and 1980 from coastal sites in West Cornwall and North Devon. Members of the group included G3SEK, G4DEZ, G4JKN, G4SJP, G8AGU and G8MXI, their partner being VE1ASJ. The tests were conducted during the Perseids meteor shower.

Chris wrote: "We certainly heard signals, and I even have a QSL card from Andy claiming a contact, although it wasn't as far as I was concerned. I continue to believe that during the Perseids, and possibly other major showers, multi-hop MS propagation exists and can be exploited at amateur power levels." He mentioned the claimed European 144MHz MS record QSO between GW4CQT and UW6MA, at around 3300km, a tape recording of which he has heard, and sees; ". . . . no reason to doubt is validity." He suggests several reasons why transatlantic contacts have not been made.

1) There are few operators with suitable equipment and experience who are prepared to try.
2) Coastal operators in North America and Europe prefer to beam inland rather than spend hours trying to work a very marginal path.
3) The 'belief' that MS only works to ranges of around 2000km, and,
4) the different MS protocols, the North American ones making it easier to claim a QSO.

Chris concludes: "I believe that, with the single-minded dedication being shown by G4CQM and his Canadian confederates, there is every possibility that a full contact could take place. A convincing demonstration of extended MS propagation could also be a worthwhile project for DXpedition groups . . . ." With the possibility of a very good Perseids shower next year, that is a good suggestion.

BEACON NEWS

JOHN WILSON, G3UUT, the IARU Region 1 Beacon Coordinator, has advised that the signal from headquarters beacon GB3NHQ on 50.050MHz is 2.5dB down. This is due to a longer cable run following some alterations. Several readers reported hearing SV9SIX. According to the October issue of *Six News*, it became operational on 20 August and runs 30W ERP to a vertical dipole on 50.010MHz from KM25NH.

MOONBOUNCE

NONE OF THE regular British contributors sent in any activity reports this month. In his 'The World Above 50MHz' column in the October issue of *QST*, Emil Pocock, W3EP, points out that satellite operators may like to try the mode during the ARRL EME Contests, by attempting to work VE3ONT – see page 18 in the October *RadCom* for times and frequencies. The 46m dish at the Algonquin Radio Observatory has a gain of 34dBi at 144MHz, 43dBi at 432MHz and 53dBi at 1.3GHz and members of the Toronto VHF Society have been invited to use it.

Al Katz's, K2UYH, September *432 and Above EME News* reports 70cm EME activity growing at an excellent rate. Al mentions the welcome activity by the Five Bells Group, as reported above. At K2UYH he has had squirrel trouble – a dray, with two babies, in the feed antenna! They have chewed through his control cables and have even had a go at the coaxial feeder (I've had that problem at G3FPK).

The second leg of the ARRL EME Contest is on 6/7 November, which coincides with the Marconi Memorial CW event in Europe.

PUBLICATIONS

THE SEPTEMBER issue of *The VHF-UHF DXer* includes the usual band reports. G4VXE, who has compiled the 50MHz piece, is now in Toronto for six months. In his 'Tech Slot' Sam Jewell, G4DDK, describes the receive converter part of 'The DX-er 50' which is a complete 28/50MHz transverter. Fed up with making PCBs, he has used 'ugly' or ground plane construction. Pages 3 and 14 were blank in my copy. The editor of this monthly publication is Dave Hardy, G8ROU, whose address is in the *RSGB Call Book* – or QTHR, as they say.

The October *Six News* is a bumper 60-page issue with a comprehensive selection of excellent articles and information. The design for an optimized 5-ele Yagi for 6m by Brian Beezley, K6STI, is featured, copiously illustrated with polar plots. UKSMG Chairman Geoff Brown, GJ4ICD, suggests a few ideas to promote activity on the band in quiet periods, such as an MS contest in August, December or January, or a tropo contest at one point per kilometre.

FIRSTS

PAT ALLELY, GW3KJW, and John Morris, GM4ANB, are compiling records of VHF/UHF 'firsts' and the VHF Committee suggested extracts be published so that these claims can be challenged, if incorrect. This month, it's the old 5m band in 1948. G6ZQ – OK2MV 1310 on 5/5; G6YU – FA8BG 7/6; G2ADR – I1DA/I1WX 1930 on 25/5; G3AVF – GC8OK 29/8; GI5SJ/P-GM3BDA 1/8 and GI5SJ/P – SM5VL 1/8. Additions welcome. Next month, space permitting, I propose to feature 4m from the 1960s when CN8s, Fs, FAs (now 7X), PXs (now C3) and TFs had the band.

ANNUAL VHF/UHF TABLE JANUARY TO DECEMBER 1993

	50MHz		70MHz		144MHz		430MHz		1.3GHz		Total
Callsign	Cty	Ctr	Cty	Ctr	Cty	Ctr	Cty	Ctr	Cty	Ctr	Points
G6HKM	57	56	–	–	72	29	40	12	16	8	290
G0TRB	54	31	22	3	26	6	38	10	–	–	190
G3FDW	31	32	47	6	45	6	–	–	–	–	167
G0EHV	–	–	30	4	54	14	25	8	–	–	135
G3FIJ	1	16	24	3	41	11	22	8	1	1	128
G1SWH	6	14	23	5	37	14	19	3	2	2	125
GW6VZW	65	57	–	–	–	–	–	–	–	–	122
GI4OWA	16	35	–	–	45	25	–	–	–	–	121
G7EWL	27	21	3	1	46	9	8	4	–	–	119
G8XTJ	23	32	–	–	45	9	–	–	–	–	109
G1UGH	11	32	–	–	44	14	–	–	–	–	101
GW0PZT	–	–	–	–	66	30	–	–	–	–	96
G4OUT	–	–	32	6	44	11	–	–	–	–	93
G3UOL	2	1	–	–	59	13	–	–	–	–	75
G3FPK	–	–	–	–	31	12	–	–	–	–	43
GU4HUY	–	–	–	–	27	10	–	–	–	–	37
G6ODT	–	–	–	–	4	1	24	7	–	–	36
G7CLY	8	8	–	–	9	3	2	1	–	–	25
G3YHF	–	–	–	–	–	–	17	5	–	–	22
G1JDU	1	18	–	–	–	–	–	–	–	–	19

British counties are those listed on page 65 in the January 1993 *RadCom*; 77 in all. Up to three different stations allowed in all 12 GM regions. Do not include EI counties. Countries are the current DXCC ones plus IT9. Deadline for the next appearance is **25 November**.

METEOR SCATTER

THE LEONIDS Meteor Stream will be active 14 – 21 November and the predicted visual peak is around 2000GMT on the 17th at solar longitude (LS) 235.7°. The radiant is above a mid-UK horizon from 2230 to 1430. Best times are: NE/SW 0130 – 0700 and around 1100; E/W 0400 – 0900; NW/SE around 0200 and 0600 – 1200; N/S 0300-0500 and 0800 – 1300. The Zenithal Hourly Rate (ZHR) is expected to increase annually till a possible storm between 1998 and 2000, so this shower is worth a try.

50MHZ

E-LAYER PROPAGATION was prevalent up to 5 September, after which little DX was reported. The last transequatorial propagation (TEP) to the south seems to have been on 24 August when 7Q7RM and the V51VHF beacon were copied from 1816 for about 12min. In late August, Terry Chaplin, G1UGH (SFK), worked 9A on the 25th; ES, OZ and SM1LPU (JO96) on the 26th; EH1 on the 28th; YT1, OM3, OH8MT (KP24), OH1, RU1A (KO48) and SM0 on the 29th and OE6, S5, IK2 and I5 next day. CT1BUN was contacted on 5 September.

Ken Osborne, G4IGO (SOM), has worked 61 countries so far this year with another five heard. Since 1986 he has amassed about 540 squares in over 135 countries and 63 fields and thinks he may be the first UK station to work SV9 on both 6m and 2m. He has heard the V51 beacon regularly on MS, linking to the F-layer or TEP path just out of his range.

G4UPS continued his daily CW skeds with G3CCH around 0800 with very consistent results. He regularly works SM7AED at the same time and wonders how many similar paths there are. Is anyone else running regular DX skeds of this type? If so, please write. Ela Martyr, G6HKM (ESX), has received RSGB 100 Counties Award, number 8, and also has the UKSMG's version of it. At 0249 on 12 August, an MS QSO with HB9QQ brought her first legal Swiss contact. GJ4ICD added seven more squares to his total, including SV9ANJ (KM25) for a new country and first from Jersey, and SM3RPQ (JP74).

Paul Baker, GW6VZW (GWT), lists some nice Es QSOs in the last week of August. New squares were EH4CAV/P (IM98), SM3RPP (JP74), LA/G7BED/M (JP30), SM6RRQ (JO69) and RU1A. The last DX was on 5 September including EH9IB, CN8ST and 9H5EE from 0900. Some of the original 82 Spanish 50MHz permit holders have changed their callsigns, according to EA2LU and reported in *Six News*. These include EH2BL (ex-EH2BLR), EH3EO (ex-EH3DZG), EH3KE (ex-EH3DVR), EH7CD (ex-EH7EHE) and EH7CO (ex-EH7FHS). On HF they sign EA plus their new suffix.

At this year's RSGB VHF Convention, Ian White, G3SEK (centre), received the 1962 VHF Committee Cup from VHFC Chairman Peter Burden, G3UBX (right), and RSGB President Peter Chadwick, G3RZP. The trophy was for leading the team which produced the *VHF/UHF DX Book*, several of whom were at the Convention: (Back Row, left to right) Geoff Grayer, G3NAQ; Sam Jewell, G4DDK; Dave Robinson, G4FRE; Dave Powis, G4HUP; and Trevor Preece, G3TRP (Publisher). The *VHF/UHF DX Book* is now available from RSGB Sales. (See *VHF/UHF News* February 93 for a review).

70MHZ

THE ONLY report this month was from David Warr, G4RQI (YSW), who was disappointed with the low level of activity during the Perseids shower. He heard a few short bursts from GM4SEU/P but didn't work Gerry. There were plenty of reflections from continental broadcast stations in excess of 10s, though.

Activity in West Yorkshire has increased recently with three stations permanently active – G3SEG in Pontefract, G4JCL in Huddersfield and David in Castleford. G4RQI is QRV most evenings, 1900-2200, on CW and SSB with 10W to a 5-ele Yagi. A new station this month was G3WKS (GLR), while G3APY (NOT), G3JON (YSS), GW3MHW (PWS) and GW3HBR are regulars. Best activity is on Tuesday evenings. The GW3MHW beacon in IO82IP on 70.052MHz is a useful indicator of conditions, whereas GB3MCB and GB3REB can be in the noise for days. EI4RF is usually S4 – 5 on an average day. Excluding contests, David has worked 50 different callsigns in the past 18 months, 60% being G3 and G4, but only a quarter 'B' licensees. He wonders if the apparent bias in favour of 'A' licensees is because they have HF transceivers and transvert from the 28MHz band. 'B' licensees would probably use a dedicated 144MHz transceiver making the transverter approach more difficult.

144MHZ

IAN CORNES, G4OUT (SFD), participated in the first leg of the CW Cumulative Contest on 31 August. Activity was reasonable and he worked 24 stations. Best DX were F6CBH (JN19), 482km; GM0GMD (IO86), 396km; EI6GU (IO63) 295km, while GW0GPQ (IO71) was a new square. The last leg is on 1 November.

G6HKM completed on MS on 12 August with G4DHF/TF/P for a new country and square. Ela made 363 QSOs in the Trophy Contest on 4/5 September. During August Shane Hogarth, G7EWL (NHM), spent a couple of weeks in Romania working on a children's summer camp in the Transylvanian Alps. He operated from YO0RAR, mainly on the HF bands, but used 2m FM a little through a nearby repeater. He met and stayed with Adrian, YO3APJ, from Bucharest who is QRV on the band with an FT-757 and Microwave Modules transverter. He has a 13-ele Yagi on top of a nine storey apartment block and hopes to get a 6m permit soon.

Gerry Elliott, GI4OWA (LDR), reports lots of tropo activity in the 27 August to 1 September period, but no real DX was worked. In the Trophy Contest he worked three new squares, thanks to F6DKJ/P (JN16), F6FZS (IN93) and F6KPQ/P (IN87), plus many other Fs and all the usual British stations. Lyn Leach, GW8JLY (GNS), operated in the contest and mentioned EA2LU/P (IN93) and LX/PA3FPS/P (JO30). On 18 September he switched on at 1144 to hear IC8FAX (JN70CN) calling: "QRZ DX" so he worked him straight away. The opening lasted another two minutes during which GW4ZQV (GWT) also made it. The IC8 peaked to S9-plus-20dB and Lyn thinks it was an Es opening rather than a long meteor burst.

There was no evidence of DX on Band 1 TV or Band 2 FM broadcast; nobody mentioned any Es on 6m, either. Back in 1986 there was a surprise Es opening on 20 September to much of Yugoslavia and Hungary, with some OE, OK and YO stations for good measure. Activity was centred on JN95 and stations in a 300,000 square kilometre area were workable from G and GW. Prior to that, the last Es opening recorded had been on 4 August to the same area.

Joe Ludlow, GW3ZTH (GNM), has been out portable from IO81FP using his new PA comprising four 300W broadband modules using Gemini MOSFETs. This gives 390W at the antenna. Peak power consumption is 55A at 24V. Joe operated in the Trophy Contest for two hours on 4 September and for a further six hours next day. He concludes that the site is not a contest winner, mainly for geographical reasons. Conditions on the morning of the 5th were exceptionally good to Spain and southern France; EA2LU/P was over S9 on all beam headings and EA1BFZ/P (IN81) and ED2RCF/P (IN83) were also worked. HB9S/P and HB9MM/P in JN36 were contacted by chance. But Joe's best DX, EA3KU (JN12IK), was worked from home with his 5-ele Yagi at 15ft AGL, just before he left for the portable site.

SIGN OFF

THERE WAS NO UHF news this month. Is anybody doing anything on 70cm apart from using repeaters and packet radio? If so, please let us know. The deadline for the **January** issue is **25 November** and for **February** it is **30 December**. The fax/answerphone number is now 081 763 9457, the BT Gold mailbox is 76:MSX021, and the CompuServe ID is 70630, 603 with access from Internet 70630.603@compuserve.com.

HF F-LAYER PROPAGATION PREDICTIONS FOR NOVEMBER 1993

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	....47764....	....68871...	....89995...	...199997...	...588885..	5427665689 64	9865333468 99	++42....3+++
MALTA	....45441...	....67663...	....89887 1..	...199993..	11.5877898 2.	6748655689 86	9986322368 99	+++3....3+++
GIBRALTAR	.....3321...	....26543...	....58877 1..	....788883..	....888898 2.	4535765679 84	9988533358 99	++++2...25++
ICELAND	.....32....	.....2552...	.....5885...	....189982..	....588896..	22..7767896 2	8854644567 88	++++3..235++
** ASIA								
OSAKA	....2.....	....4.....	....72.....	....84.....	...3762111..	1..3533456 43	....2111477 3	.....45.
HONGKONG	....662....	....784....	...28871....	...38874....	...2666643..	1...3334685 4	1...1111478 5	.....4+2
BANGKOK	....7872....	...189841...	...389874...	...368886...	...1366783..	3...1334686 5	2....1.1478 7	.....4+4
SINGAPORE	...17875....	...289871...	...479884...	...468887...	...1366784 11	2....3346865	1....1.1478 6	.....4+3
NEW DELHI	...17761....	...288 83...	...47886....	...567871...	1.1235675 111	632..2346666	72.....1478 8	4.....4++
TEHERAN	...18775....	...388871...	...688884...	...767887...	2125346685 21	8642113468 77	872....1478 8	+4.....45+
COLOMBO	...17876....	...388882...	...468895...	...447888 1..	11.1146685 21	52...1346 77	51....1478 8	2.....4++
BAHRAIN	...28765....	...388871...	...677884...	...656887 1..	3224235686 32	8741..346 888	862....1478 8	+4.....45+
CYPRUS	...188772...	...299985...	...699998 1..	...8888994..	4437666798 43	9975334579 98	9962 1.125788	++3....25++
ADEN	...287672...	...388884...	...666897 1..	1..6447884 1.	5123114688 54	9641..136 888	862....1378 8	+4.....45+
** OCEANIA								
SUVA/S	.....21.....	.....143....	.....476 1...	....16774...	....566773..	....533464..	...2211142..	.....
SUVA/L	....21.....	....431..11.	.1..7642.431	12.2876426 52	1125765567 31	..1553235 41.	...22..132..	.....
WELLINGTON/S	....231....	....1553....	....3786 1...	....68884...	....766771..	...2533464 1..	...1211142..	.....
WELLINGTON/L	.....	.....	....21...111	111.52...332	1122753235 42	..1353235 41.	...12..131..	.....
SYDNEY/S	....6444....	....8766....	...2988 83...	....488886...	...4766783..	...1533467 2.	....21.1451.	.....2..
SYDNEY/L	.....	....11.....	....331...2.	....6521.151	..1.7644266 2	...1532357 31	....21.1341.	.....
PERTH	...16652....	...388742...	...578875...	...4688881..	1..2366685 11	1...1334687 4	14762	.....43.
HONOLULU	.....	.....	.....1..	.....13..	....211.551.	.22.5332641.	.1443111 31..	..23.....
** AFRICA								
SEYCHELLES	...145672...	...356884...	...556897 1..	1..4447894 1.	5322114688 54	962...1368 99	83.....1378 8	+.....45+
MAURITIUS	...157673...	...378885...	...566898 2..	1..4446895 1.	5412114688 65	851...1368 99	72.....1378 8	4.....4++
NAIROBI	...177774...	...287886 1..	...566798 31.	11.6445896 31	6623112689 76	9841...368 99	872....1378 8	+4.....4+5
HARARE	....34676...	...1567882..	...4566895 2.	22.5444798 52	7723111589 97	9841...258 99	862.....368 8	+4.....4++
CAPETOWN	....24787 1..	....4678831.	.1.2566797 31	33.4544688 64	7725211368 98	9852.....379 9	873.....148 8	+4.....5+
LAGOS	....78788 2..	....8888941.	11.1866797 41	34.3754589 74	7836521269 98	9985 2...379 9	8873.....158 8	5+5.....2++
ASCENSION Is	....47657 3..	....6876851.	.1..8766784 1	231.8544687 4	7854621137 98	9997 3...48 9	88851....168	+++2.....3+
DAKAR	....48878 3..	....6888851.	....8866884 1	121.8654787 3	6762742147 98	9997 41..158 9	87862....278	55+3.....4+
LAS PALMAS	....38777 2..	....5988 84..	....8998972.	.1..9888895 1	4543876679 96	9998643357 99	9897411125 89	+++4.....2++
** S.AMERICA								
Sth SHETLAND	....13345 3..	....3556651.	....6777777 31	121.8776665 3	5652765334 55	5676532..124	3444 2.....1	..2.....
FALKLAND Is	....14467 3..	....2667851.	....5876663 1	121.7865455 3	5762763212 56	7886531...24	5776 2.....2	2443.....
R DE JANEIRO	.....5334 3..	....1754551.	....3865673.	111.6744466 3	5661752113 67	999652....47	8886 2.....15	+++3.....2
BUENOS AIRES	.....3336 3..	....2655751.	....5876663.	.11.7864455 2	4661763112 46	899653....25	7886 21....2	4++3.....
LIMA	.....8773..	.....98751.	.....87652.	1854441	224.1452113 4	7884432....4	6886 21....1	3++3.....
BOGOTA	.....7773..	.....88751.	.....87663.	2854441	223.1552114 4	7783433...15	787631....2	4553.....
** N. AMERICA								
BARBADOS	.....28773..	.....487751.	....786663.	7744551	223.2651126 5	8884532...37	8876 31....15	+543.....2
JAMAICA	.....5763..	.....7875..	.....87662.	....1864 44.	112.1463124 3	7772533...25	7876 31....3	5553.....
BERMUDA	.....6773..	.....18885..	....3887 72.	....5866 75.	112.1663346 4	7772433 1.147	8886 31....15	+553.....2
NEW YORK	.....3662..	.....5884..	.....78872.	....2787 74.	111..4654563	6761333312 46	8885 31....14	5553.....2
MEXICO	.....662..	.....874..	.....18751.	.....28643.	111.3.563122	5761523 3...2	4885 31.1....	.5+3.....
MONTREAL	.....3662..	.....5874..	.....7887 1.	....2787 74.	111..5665662	6661333323 46	8885 31.1...15	5553.....2
DENVER	.....31..	.....162..	.....4851.	.....6862.	11..1.166441	565.4124312 3	4884 31.1....1	.5+3.....
LOS ANGELES	.....2...	.....52..	.....74..	.....2851.	.1..1..56421	365.4214311 2	2684 3111 1...	.3+3.....
VANCOUVER	.....	.....1..	.....23..	.....551.	.1.....27631	464.3213533 2	3674 3111 21.1	.353.....
FAIRBANKS	.....	.....	.....	.....12..	.1..2223562.	452.5334664 3	3454 3111 3322	..33.....

The provisional mean sunspot number for September 1993 issued by the Sunspot Data Centre, Brussels was 21.7. The maximum daily sunspot number was 52 on 28 September and the minimum was 9 on 10, 12, 15 September. The predicted smoothed sunspot numbers for November, December and January, are respectively: (classical method) 50, 48, 46; (SIDC adjusted values) 30, 28, 26.

SWL NEWS

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

THE NORTHERN Lighthouse Weekend at the end of August certainly captured the imagination of many amateurs, especially on 7MHz where I had suggested that most of the activity might be. All but GB2LB and GB2LL were logged here and an Award claim has been made. It would be good to know how many SWLs managed to hear seven out of the eleven stations and have claimed the Award. For those who still have to do the paperwork, all that is required is a log extract and £2, sent to PO Box 36, Prestwick KA9 1AL.

SWL AWARDS

I AM OFTEN asked if there is an Awards Directory devoted to the SWL. Although there is no dedicated publication, the *Amateur Radio Awards Book* (RSGB) indicates when a transmitting award is available to SWLs. This costs £8.08 plus p&p to members [See *Book Case* pages – *Ed*]. The K1BV *DX Awards Directory* has a special section devoted to SWL Awards. There are over 2,000 awards listed in the Directory, which can be obtained from K1BV, price $24, from HCR10 Box 837A Spofford, New Hampshire 03462, USA.

ABBREVIATIONS

ANOTHER SUBJECT regularly raised by newcomers to the hobby is the number of abbreviations used in articles. I am probably as guilty as my fellow columnists. Most abbreviations are confined to the amateur bands but some have wider applications. For instance. a person's home is his QTH; a card verifying reception is a QSL card; a receiver is an Rx, while a transmitter is a Tx. DX is used to signify distance. In the main this signifies a station outside one's own continent. So when an SWL hears a station calling "CQ DX", it means that he is only interested in working someone a considerable distance away. However, stations in CT3, EA9, 5B4 and 7X2 are DX, even though they are quite near. However, if you want, to hear all countries worldwide, these countries have got to be logged even though the person concerned may be looking for DX from even further afield. Some others in common use are IRC – International Reply Coupon; QSO – two way radio contact; and UTC Universal Co-ordinated Time (= GMT). There are many, many more abbreviations in everyday amateur use. Perhaps I shall deal with a few more next month.

[Whilst unusual and new abbreviations are defined when first used in *RadCom*, and 'real' words are often substituted for the Q code when sub-editing articles, I assume that the vast majority of readers already know the more common ones. For those who would find frequent definition of abbreviations helpful, I recommend the Society's beginners' magazine *D-i-Y Radio – Ed*]

QSL TECHNIQUES

THIS IS a subject that gets revisited all too often! This month Deryck, G3VLX, comments on a card from an Italian SWL as a result of his 4S7VLG operation. It was quite a handsome job, provided by one of Italy's top DX clubs, but the SWL gave no indication of what equipment, particularly the antenna, he was using and his report contrasts sharply with the 58/9 which a fellow Italian amateur exchanged with Deryck. Did the antennas in use make so much difference between a 44 and a 58/9 report? It would also have been interesting to know how much interference and static there was to give rise to a 44 report.

Remember the definition of a 44 report is readable with practically no difficulty and a fair signal. I hear 44 reports given often on 3.5MHz when exotic DX is operating in the DX portion of the band, but elsewhere in the spectrum this report is quite rare. Many listeners give 44 reports, but I think that if the truth be told, the listener has only barely copied the station. In the circumstances, a far more honest report would be a 22. In such cases many more seasoned listeners simply do not include the station in their log. Indeed, to do so they need to hear the station pass several reports.

Returning to the Italian SWL, G3VLX replied with a few helpful comments so that his further reports may be just a little more useful. Deryck hoped to air his 9H3AM call during the last three weeks of October, including CQWW. If anyone hears him, he QSLs SWL reports 100%. You may send your reports to Deryck direct, or to me if you prefer.

HF DX NEWS

THE NUMBER of reporters this month showed a healthy increase, including several first-timers to this piece – BRS94781, BRS95145, BRS94668 and GOAII. With most of the regulars back from holiday, I have a wealth of callsigns from which to compile my 'best of the month'.

Although the month was good to those dedicated to monitoring 18MHz, conditions generally on HF were poor for DX and noisy, too. Solar figures at the time of writing were extremely low – with solar flux numbers as low as 79 and the A Index as high as 23. Taking the best, I have chosen:

7MHZ

This band provided some good DX during the period under review. Some of the more choice loggings included: C91RI, CY9R, D2SA, E31A, HK0OEP, TU5DX, V85PB, XU6WV, XX9AS, 7S8MI, 7S9/DJOWQ/P, ZSOPI, 3DA0SD, 3C1TR, 5X5A, 8RIAK, 9GIMR and 9J2MT.

Mull of Galloway lighthouse: The site of GB2LG operated by Wigtownshire ARC members in August. The lighthouse is the most southerly point in Scotland.

10MHZ

Does any SWL do any serious listening on the 30m band? If so, let me have some details because, once again, there have been reports in the amateur press of good DX on the band, especially during evening hours.

14MHZ

A61AF, A71AN, CY9CWI, FR5ZQ, JTICC, TT8OBO, TU2JL, TZ6FIC, V21AC, V44NK, V73C, XU3RLD, ZD9BV, ZS8MI.

As well as these, Robert Small BRS8841 provided a goodly list of Islands which had been on the air during the month. From a very long list, these have been extracted from his 14MHz log (IOTA numbers in brackets): WT2O/VE8 (NA-007), NU2L/VE8 (NA-185), V02/F5JYD (NA-O44), ED1IDS (EU-077), YU1FW/6 (EU-163) and OD5RAK (AS-108).

18MHZ

Because I had organised one of my Challenges on I8MHz, there is plenty of DX news from that band. It really is a band which is growing in popularity and most of the DXpeditions can be heard. David Whitaker, BRS25429 now has over 2OO countries heard on the band while several other listeners are within 10 or 20 of the magic 200. Interesting stations reported on that band included AH9B, D2EYE (QSL via OZIACB), E31A (the DXAC had recommended that Eritrea be added to the DXCC list), ET3BH, FH5CB, FJ/I4UFH, FK8CP, FT4WD (Crozet Is), FW1DJ, PYOTM (Trindade Is), S92SS, V31BR, V73EX. VQ9QM, XX9AW, YI1ZX, ZK3DM, ZS9/DJ2ZS/P (Walvis Bay), 3D2CK, 3B8CF, 5XIF, 7Q7XX, 9GIXA and 9J2HN. Everyone appeared to miss CY9R (St Paul Is) on 18MHz. With this much DX reported, I hope that I will have even more reports of 18MHz activity next month.

21MHZ

A22PB, BV4JB, CE0ZIS, KB7TRE/DU4, HL9AX, TJICR, VS6GA, ZSOPI, 5H3JD, 6O0A and 9M8TA

AND FINALLY

IF ANYONE needs a card from either RU1R or RU1U, Oleg UR3.122.1393 can help. Simply send me your card and some return postage and I will obtain the QSL for you.

News and views for the **January 1994** issue must be with me no later than **10 November**.

ALINCO, AKD, AOR, ARRL, BARENCO, BENCHER, BNOS, BUTTERNUT, CUSHCRAFT, DATONG, DEECOMM, DEWSBURY, DIAMOND, EMOTATOR, ERA, GLOBAL, HITACHI, HY-GAIN, HIMOUND, ICOM, ICS, JIM, JRC, KANTRONICS, KENT, KENWOOD, LOWE ELECTRONICS (WHO?), MALDOL, MANSON, MFJ, MICROSET, MOMENTUM COMMUNICATIONS, OPTOELECTRONICS, PANASONIC, PERMANOID, REVCO, REVEX, RF CONCEPTS, RF SYSTEMS, RSGB, SIGNAL, SONY, SSC, SSE, TONNA, TOYO, WIN, YAESU, YUPITERU.

ALMOST THE WHOLE A TO Z !!

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New from Kantronics!

One of the problems with packet radio is the speed at which information is disseminated. So I ask myself, is it worth mentioning that there is a new upgrade for the KPC3 available? I am willing to bet everyone knows by now! Still, you can now upgrade to V5.1 and gain all the benefits you've read about on your local BBS! (*P.S. it's only £12.50!!*)

Now's the time to join the digital revolution! The KPC3 now comes with the new V5.1 as standard so new users can start using the latest technology now. If you haven't yet taken the plunge because "packet looks too complicated", the KPC3 can help you. With the Kantronics New User mode, it keeps most of the commands hidden, just letting you deal with the basics. In a few hours, you'll be able to tell it you are an "expert" and gain full control over all facilities.

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QSL

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

● The Society took part in the recent Live '93 Exhibition at Olympia and operated a special event station from there operated by dedicated volunteers. There was also a packet demonstration. Both displays generated a great deal of interest. I show below the QSL card specially produced for Live '93. They will, of course, be going out via the bureau!

● I have mentioned that we get the odd damaged envelope at the bureau minus the cards and although such occurrences are rare the sorting girls thought it might be a good idea if, when you are sending cards to Potters Bar, you put your call on the back of the envelope so that if we get an empty envelope we can get in touch with you and let you know a calamity has taken place.

● Getting cards to the former YU area is still a bit difficult and when I was down at the bureau the other day I saw a small parcel that had been returned by the sanctions people. However, Doreen (one of the sorters) has received a letter from Peter, YT1WW, to say that the method we are adopting is a good one! So someone is happy out there. It's a bit pricey for us though and one hopes the situation out there will soon return to normal.

● Wynne Evans, GW3WWN, has sent me a photograph of an International Reply Coupon he recently received from overseas. On the face of it just another IRC originating in New Zealand. However, the date on it is February 18, 1937 and I was two years old when it started its travels! Now that makes it the oldest IRC I have ever seen but I wonder if it can be bettered by someone out there . . . .

● The QSL manager for the Dominican Republic QSL Bureau has written to say that the address for that bureau is now PO Box 951, Santo Domingo, Dominican Republic.

● Martin Smith, G0OWL, says his success rate with QSL cards is 28%. He doesn't say whether they are for phone or CW. A number of correspondents reckon CW operators are better at QSLing than phone operators but I wouldn't know - never having used phone myself.

● We have recently received the IARU listings of national QSL Bureau addresses. However there seem to be some omissions because they are not official bureaux. I list the additions below for anyone that is interested.

(a) 9H4 cards go to Arthur Cross, 11 Saguna Street, Sannat, Gozo, Malta, although I am not quite sure why!

(b) A9 cards should go to ARAB QSL Bureau, Box 22381, Muharraq

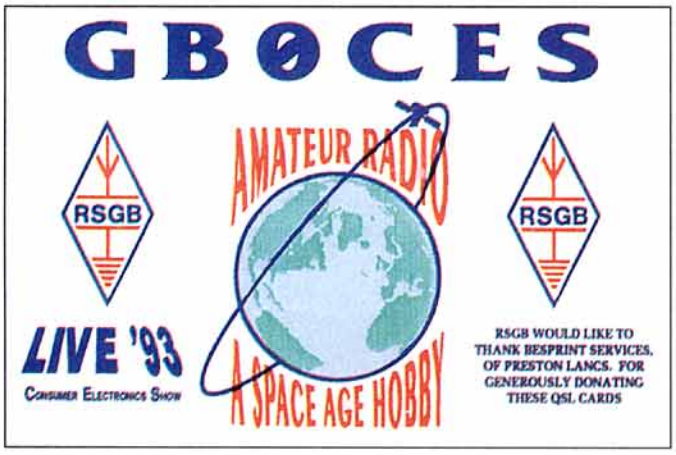
(c) C2 cards should be sent to Nauru ARC, PO Box 29, Nauru

(d) D4 cards go to LDRA de Cabo Verde, Box 145, Mindelo

(e) DARC have asked us to amend their QSL Bureau address to Box 1155, Lindenallee 6, W-3507 Baunatal

(f) EP Cards go to PO Box, 16765/1187, Tehran

(g) ST cards go to Sudan Radio Club, PO Box 80, El Morada Omdurman.



This attractive QSL card was designed at RSGB HQ for the special event station GB0CES at Live '93.

The 1937 International Reply Coupon received recently by GW3WWN.

● As from 6 September the Veron Centraal Bureau, the Veron Service Bureau and the Dutch QSL Bureau have moved address to Ruitenberglaan 29, Section Mailing Service, 6926 CC Arnhem, Netherlands. However, the PO Box numbers remain the same. For reference they are: Veron Centraal & Veron Service Buro: PO Box 1166 6801 BD Arnhem. Dutch QSL Buro: PO Box 330 6800 AH Arnhem.

● Thanks to those of you who have been in touch about the Empire DX Award (*RadCom*, Oct 93). Dick Johnson, G2FFO, Don McLean, G3NOF and John Kay, G3AAE. (The latter, although living in Essex and driving a very snazzy sports car spotted me in Long Stratton!) It appears the award was originally issued on velum and hand coloured but the expense proved to be too much and after a few were issued they changed to a printed certificate. Recipients could also cough up for a special lapel badge, one of which Don McLean still possesses. The Commonwealth Century Club Award replaced it in 1984. Dick Johnson seems to remember that applicants were required to have been members of the Society for a continuous period of time (he thinks three years). The technical requirements were 50 Dominion and Colonial Call Areas on 14MHz and 50 on the remaining bands. John Kay tells me that VE1, 2, 3 etc and ZS1, 2, 3 counted as separate call areas for the award. So there it is and I wish I had one of the velum originals hanging on my wall!

● It is worth repeating that we continue to check all outgoing QSL cards against the membership database. Those sent to us by non-members are not forwarded and will be destroyed unless the person joins or rejoins the Society, or pays the return postage to his or her home address. Don't forget that personal cards sent in by non-members will not be handled even though they might be members of a society affiliated to the RSGB.

● Pat King, G3PVA, writes to me with a strange query I cannot answer. Pat sent a packet containing about 40 QSL cards destined for overseas to the Bureau on 12 August this year. On 16 September one of the cards (for a contact with HC5AI) was pushed through Pat's letterbox. It had a 29 written in ballpoint on the top left hand front of the card and was not delivered by the postman! Readers will remember that on 14 August 1992 a Post Office van was ambushed at Potters Bar and the Society lost a quantity of mail. However, about the only thing recovered after the hijack was the mail for the bureau - my underworld informants tell me there is not much of a market for QSL cards these days! I am at a loss to understand how Pat got his card back.

● Don't forget to send stamped addressed envelopes to your Sub-Manager. If you are not sure who he or she is then the central bureau ladies will always be able to give you an address.

THERE IS NOW A QSL Sub Manager for the G0U series. He is Mr A J Adams, G3DXQ, 'Brooklands' Chestnut Garth, Roos, Hull, East Yorkshire HU12 0LE.

Contest Exchange

ANDY COOK, G4PIQ
Fishers Farm, Colchester Road,
Tendring, Clacton-on-Sea, Essex,
CO16 9AA

PAPERWORK – now there is a word to strike fear into all but the most dedicated bureaucrat. This month I'm going to explain exactly what paperwork you need to submit, and some of the simple checks you can carry out to ensure that you aren't going to lose points through silly, easily-spotted errors.

Any contest entry consists of the actual logs and some supporting summary information. Of these two parts, writing up the logs themselves is by far the most time-consuming part. On a personal note, I always try to ensure that I do as little paperwork as possible, so use a computer logging system. It requires a little investment in time to learn how to use the program, and to become familiar with the concept of talking and typing at the same time, but, except for very short contests I would not be without it. The RSGB HF Contests Committee will accept entries on disk rather than on paper, although they must be in a standard format – see the *RSGB Call Book*. This format is supported by the computer logging packages, Super-Duper by EI5DI, and by later releases of LOG by G3WGV. Please note that the VHF Contests Committee *does not* accept entries on disk!

DOUBLE CHECK!

IF YOU ARE forced to write up the log by hand, please use the standard log sheets – HFC1 for HF contests (40 contacts/page) and LSVHF for VHF contests (25 contacts/page), and use separate sheets for each band. Also, please *do* take the time to write the logs up after the event. Even if you use these forms to scrawl on during the contest, unless you are a really remarkable operator, they will be full of crossings-out, corrections, illegible scribblings, and so on! It doesn't do anything for your image if the adjudicator receives a log like this. If your log is neat and tidy, you are much more likely to be given the benefit of any doubt.

As I said, the other part of the entry is the supporting information. The most obvious piece of this is the summary sheet – for HF contests this is the HFC2 (one covers all bands entered, except for NFD), and for VHF events, form 427 (one needed per band I'm afraid, and any version from 1986 onwards is acceptable). However, for some contests, additional information is required. For HF contests, it is mandatory to submit a 'Dupe Sheet' for each band – this is an alphabetical list of stations worked on that band, along with either the serial number sent, or the time of the QSO. Although not required in VHF events, it is always appreciated when people do supply these lists, and they require minimal effort to generate from a computer log.

MULTIPLIERS?

IF THE contest is a multiplier event, you also need to submit a list of the multipliers worked on each band, along with the callsign and serial numbers of the QSOs for which multipliers were claimed. In case one of the contacts you have claimed as a multiplier is disallowed, where you have them, you should include details of more than one QSO with each multiplier. The VHFCC will shortly be releasing a form which can be used to record this information for county based contests, however, a sample of the type of information to be recorded is shown below.

One final point is that, for multiband VHF contests, you also need to submit a 4422 Summary Sheet which pulls together the details of your score on the individual bands. This sheet can also be used to summarise your entries to a cumulative contest, where you can replace the bands column by the dates of the individual contest sessions.

G4PIQ, 144MHZ LOW POWER CONTEST 1993, MULTIPLIER CHECK LIST

Counties Worked						
Wiltshire	G6RCT	110	G3GKC	201		
North Yorkshire	G6QM	114	G6YYN	119	G7LXK	122
South Yorkshire	G0LBK	044				
West Yorkshire	G8BNE	077	G3ZXZ	160		
Countries Worked						
Ireland	EI/G8PAW/P	185				
France	F5LBU	067				
Northern Ireland	GI4KSO/P	063	GI0LSB/P	068		

On line logging using Super-Duper for NFD 1992: Paul Martin, EI2CA, operating EI5DI/P the winner in the EI restricted section.

CHECK AGAIN!

SO THAT'S the mechanics of generating the entry out of the way, but if once the contest is over, you automatically churn out the paperwork, and just put it in the post without checking it, you are doing your entry a grave disservice. Talking recently to G4BUO, former HFCC Chairman, Dave said that in his experience, about half the points lost by people are given away after the contest has finished, often through careless writing-up of the log. The classic mistakes are made in misreading other people's handwriting. These sorts of mistakes can only really be avoided by careful checking of the logs afterwards. Other errors are just plain silly though – sometimes you see Ws worked at 0200 on 10m, or JAs being worked on 160 at 0900.

This sort of error is one of the down sides of computer logging since it is most likely to occur where there is no human intervention in the final log-build. Even with human intervention things can go wrong – I recently submitted a log where, in using a spreadsheet package to generate RSGB format logs from a K1EA CT file, I managed to make it look like I never received a serial number greater than 009 through the whole event – I wish I had, but . . . !

The classic VHF equivalent of this sort of 'silly' is the contacts whose locator could not possibly be correct for the callsign. Especially popular are F stations in JO16 (the oil & gas fields in the North Sea) instead of JN16 (Central France), or UK stations in IO01 (about 400 miles off the West coast of Ireland) rather than JO01 (eg Essex!). Slightly more subtle, and even more common examples are PA stations in parts of JO31 which are definitely in Germany, or ON stations in parts of JO10 which are in France. Adjudicators develop a sixth sense spotting these sorts of errors, so it is worth taking time to check your log carefully.

Finally however, I must mention the ultimate sin – that of having unmarked duplicates in your log! It is essential that you mark them in the log as duplicates and claim 0 points for them. If you don't, you will lose 10 or 11 (VHF/HF respectively) times your claimed score, and indeed if there are an excessive number (5 or more) in the log you can be disqualified. Also, don't forget that DB8KJ and DB8KJ/P count as duplicate contacts.

Astonishingly, in two of the last three years, the claimed scores in one or other of the sections in VHF NFD have been very close, and the winner has been decided by one station having unmarked duplicates in their logs! The only reason that it did not happen during the third year was that on that occasion the first and second placed stations *both* had unmarked dupes!

So, just remember, you wouldn't accidentally add a couple of zeros to your council tax cheque and not check it before you sent it off – don't do the same to your contest entries!

CORRECTION

WE WOULD like to apologise to the Sutton & Cheam Radio Society for wrongly captioning the photo which appeared in the October Contest Exchange column. The trophy was awarded to the team for winning the low power section on VHF National Field Day 1992 – *Ed.*

NOVICE NEWS

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

IN MAY, a new Radio Club was born – Clacton on Sea Novices ARC – dedicated to working with schools and introducing youngsters into the exciting world of electronics and amateur radio. Alan, G0KYD, and Mark, G0SSS have given their time – and use of their equipment – freely to this end. The club at present hires a room to run a Novice course adding a small charge for this to the usual cost of components.

Enthusiasm abounds – but cash does not. The club is in urgent need of anything that can be used by the members – including old equipment that can be 'recycled'. The wanted list includes tools, components, wire, solder, dead radios – anything. They are also looking for a clubroom.

Jeff, G3LWM, sent me a copy of the leaflet which he took to a number of local firms with pleasing results. Some boxes of goodies were sold at the Colchester rally to raise funds for the cause. (An idea that could be copied?)

GB2NOV was used at the Frobisher County Primary School fete with spectacular results. Apart from contacts with Canada, Greece and Australia, the chief engineer of MGM films, a New York policeman and an operator in an American nuclear submarine caused great excitement.

If you live in the Clacton area and know someone who would like to join a Novice course, contact Mark, G0SSS, on 0255 436565 or Alan, G0KYD, on 473483 for more information. Or give them a ring if you have any surplus equipment they can use. Remember, every little helps.

BUSY NOVICES

OVER THIRTY Novice licences have been awarded, thanks to the commitment of members of the Dover Radio Club (formerly the South-East Kent (YMCA) Amateur Radio Society), so it is hardly surprising that Novice involvement within the club extends to more than just attending meetings.

Kathryn, 2E1BTK, became PRO in June and her first assignment was to submit a report on a demonstration given to pupils at a local boarding school. As this was intended to interest possible newcomers to the hobby, it seemed a good idea for the newly licensed to do the demonstrating.

Experienced club members set up the station and supervised throughout, with many options for pupils to see. Packet radio was demonstrated by Daniel, 2E1ARM, and Matthew, 2E1BSZ. Darren, 2E1BXU, operated 70cm. Brian, G8ZYZ, set up the low power 24cm ATV rig, then called Kathryn and Marion, 2E1BTG, and said "OK, it's all yours". (I would have wanted much more warning than that, Kathryn!)

Daniel and Matthew wear other hats also. Daniel is now editor of the club newsletter *The Net* ably assisted by Matthew who types many of the handwritten reports received. The Awards Manager is another Novice – Roger, 2E1ARN – who is also Daniel's Dad.

The comment made by one of the Instructors perhaps gives an insight into the successful integration of Novices – "If we do not give Novices the chance to become involved, their interest will wane and the future growth of the hobby and this club will be restricted". I feel this sums up the situation quite nicely.

QSL CARDS

QSL BUREAU Sub Manager John, G0DWL, was in hospital. He deals with the G0S— series and needed help. We brought all the cards, envelopes and his filing system home and began. This is good information for Novices, as well as for full licensees. Hence this plea:

1. Make sure the envelopes you send are big enough. Some cards are non-standard and it would be a shame to bend some of those big beautiful cards.
2. Make sure the envelopes are adequately stamped. It might be a good idea to use stamps from books – printed first or second class without a price. If postal charges increase before all your envelopes are used, these cover it.
3. "Send (number)". Why not leave this to your bureau manager's discretion? He/she knows how frequently cards arrive for you – it is a pity to wait for ages for the sake of one more card to complete a batch.
4. Do make sure that the callsign of the contacted station is clearly written – how many times did we argue – is that a 'C', 'E', 'F', 'G' or what? If your card goes to the wrong manager because of this, there will be a long delay before it heads in the right direction.
5. Ensure that a busy person can see at a glance which is your callsign and which the receiving one. On some cards the sender's callsign was so prominent and the receiver's so difficult to find that mistakes could easily be made.

Sub Managers are all volunteers who give a lot of time (and space!) for your benefit. Please help them to help you.

CAN YOU, OR CAN'T YOU?

RECENTLY, a letter came from a Novice who asked me to remind other Novices of one of their licensing conditions.

Emma 2E1BIU, commented that all Novices knew on which frequencies they were allowed to operate as this was part of their exam. However, if they had no access to other amateurs' equipment, they were inclined to forget that they were allowed to operate on other than Novice bands – under certain conditions. She asked me to give a reminder to Novices who have forgotten.

Simply, you can operate on any amateur band, using higher power, *as long as you are directly supervised by an amateur holding the relevant licence.* You can tell your contact that you are a Novice and mention your hard won callsign – although *you must not make the contact using it.* This applies also when helping to run Special Event stations.

Your QSL card could be sent along with the *official* one but should show that you were supervised – otherwise it would appear to show that you were operating illegally – and that would never do, would it?

GB4NWC

NEALE-WADE Community College hosted a special event station with the callsign GB4NWC at the Summer PTA fete on 11 July, as foretold in that month's column to advertise and promote the Novice licence. Robert, 2E1AYZ, has sent the report he promised.

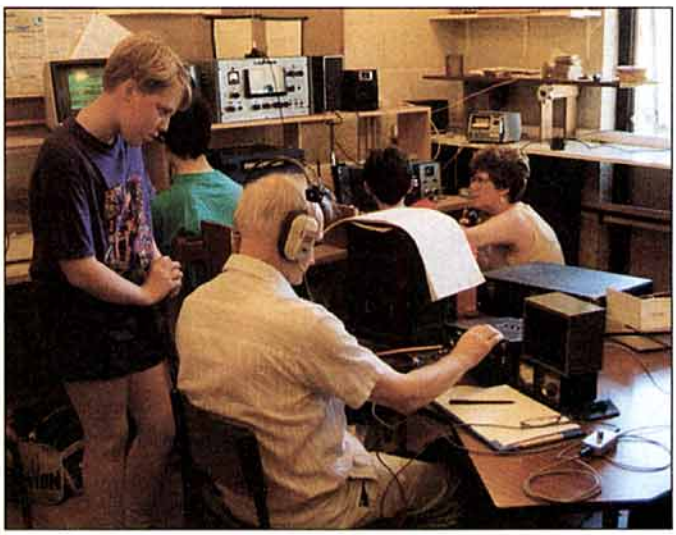
Saturday was spent erecting masts and antennas, setting up and testing equipment and generally preparing for the next day, when operating began about 10.30am. Morse on the HF Novice bands as well as telephony, a two metre packet station, 70cm – simplex and repeaters – were all in action.

John, G0FLP, senior Instructor helped Robert organise the event and Bill, G0BXJ, and Andi, G6OHM, gave invaluable help on the day. Robert expresses his thanks to them.

CERTIFICATES

IN NOVICE NEWS, Sept '93, I mentioned that the Training and Education Committee had presented certificates to Novice Licence Instructors.

The award was inadvertantly referred to as a Certificate of Merit – which is of course an award from RSGB Council. The Training and Education Committee had devised a special certificate for Instructors.



The photograph shows Daniel, Matthew and Marion in the background and, in the foreground, Fred, G4GAN, and Darren, 2E1BXU. All are members of the Dover Radio Club.

RADCOM NEWS FEATURE

IARU Region I Conference September 1993 De Haan

by Tim Hughes, G3GVV, Malcolm Appleby, G3ZNU, John Bazley, G3HCT, David Butler, G4ASR, Mike Dixon, G3PFR, David Evans, G3OUF, Ron Glaisher, G6LX, Graham Shirville, G3VZV.

THE TRIENNIAL Conference of IARU Region I was held at De Haan (near Ostend), 19–24 September 1993.

At the **Opening Plenary**, the Chairman, PA0LOU, welcomed the recent new members from the Czech and Slovak Republics, and the new societies from Albania, Estonia, Lithuania, Slovenia and Croatia; the Deputy Secretary General of the ITU, Jean Jipquep; David Court, Head of the ERO, representing the Chairman of the CEPT European Radiocommunication Committee; I Catrysse, Mayor of De Haan; Dick Baldwin, W1RU, IARU President; Michael Owen, VK3KI, IARU Vice-President; and Larry Price, W4RA, IARU Secretary. He also welcomed from Region II the President HK3DEU, Vice President VE3CDM, Secretary YV5BPG; and VE3KXH from the Radio Amateurs of Canada; and from Region III, the Chairman 9V1RH, Board Member ZL2AMJ, Secretary JM1UXU, and JA1AN President of the Japanese Amateur Radio League. Greetings were extended to ZL1BAD, the IARU Monitoring System Coordinator; K1ZZ from the International Secretariat; and ON6UG, the IARU Satellite Coordinator.

Speeches were made by the Mayor of De Haan, and by the President of UBA (the Belgian host society) G Bertles, ON4WF. The General Manager of the Belgian PTT, spoke of the virtues of amateur radio, particularly as a benefit to the handicapped, and to society in the field of technological development; the Belgian PTT was interested in the work of the IARU, especially in CEPT.

In response, the **IARU President** talked of the future of amateur radio lying in education, initiatives in this area being provided by IARU by five-day leadership seminars, an amateur radio administration course for telecommunication officials, and seminars in Africa stressing the benefits of the Amateur Service.

In a wide-ranging **opening speech**, Mr Jipquep spoke of the importance of promoting amateur radio in developing countries, with special reference to Africa – both as an educational and training programme for "saving life, particularly when natural disasters occur". He congratulated the IARU, and especially its President Dick Baldwin, W1RU, for the work which he had done "not only in Africa but also in other continents, with aid from the ITU".

Mr Jipquep referred to the changes which both the ITU and the IARU must undergo and accept – these involve adapting to new dynamic philosophies, where the role of public administrations is diminished and the whole telecommunications structure is revised. Thus, he continued, the new ITU Radiocommunication Bureau has been created, bringing together the former International Frequency Registration Board and CCIR; a voluntary Group of Experts (VGE) has been established "to study allocation and improved use of the radio frequency spectrum and simplification of the Radio Regulations. I know that the IARU is assiduously and actively participating in that work and, indeed, SP5FM attended the last meeting in February 1993.".

Mr Jipquep next referred to the Radiocommunication Assembly and the biennial World Radiocommunication Conference (WRC) the first of which was to be held this November, enabling a better response to rapid technological changes and changing user needs. Towards the end of his speech he said "I am sure that you will remain vigilant as to the application (of the new measures), particularly with a view to protecting the frequency bands allocated to the radio amateur service and the new bands in which you would like to extend your research and experiments". Amongst his concluding remarks was the sentence "I therefore trust that collaboration between the IARU and the ITU will continue forever, and improve in order to ensure a smooth transition to the new telecommunication world".

A minute's silence was observed in memory of **Alan Taylor, G3DME**, who had been IARU Region I Beacon Coordinator for many years.

As usual the Conference then divided into the following Committees: Steering, Credentials and Finance, General Administrative and Organisational, HF, VHF/UHF/SHF, and Election & Ballot. Working Groups were set up to deal with HF Contests, External Relations, Common Licence, EMC, and Promotion of Amateur Radio in Developing Countries.

HF Matters

Digital modes

The HF band plans were changed to reflect the growing move from RTTY to ARQ modes which are more resilient to HF propagation. These include AMTOR, PACTOR, Clover and Packet. These modes, plus RTTY (Baudot) and ASCII and any new future digital modes, will be designated "Digimode" (Digital Modes) in the following sub-bands: 1.838–1.842, 3.56 – 3.62, 7.035 – 7.045, 10.140 – 10.150, 14.070 – 14.112, 18.101 – 18.109, 21.080–21.120, 24.920–24.929 and 28.050 – 28.150MHz.

Note that (a) in all cases these sub-bands are shared with CW and in some sections with phone and the International Beacon Project, and (b) on 10MHz it was agreed that there would be no unattended digital operation, except in Africa and the Middle East, between 10.14–10.15MHz during daylight hours.

Revised bandplans have already been published in the *1994 RSGB Callbook* and will appear in *RadCom* in March.

Both of the RSGB papers on 'Data forwarding on bands below 30MHz' and 'Experimental transmissions on bands below 30MHz' were agreed by the Conference. In the former, the RSGB will convene an ad hoc working group to study and hopefully improve the efficiency of existing HF data forwarding. A DARC paper 'Co-ordination of HF unattended stations' was passed to this ad hoc group.

With regard to the RSGB's paper on experimental transmissions, it was agreed that HF transmissions requiring special licensing would be notified to other national societies.

Morse code

The necessity for a Morse Code qualification for operation on bands below 30MHz was agreed unanimously. A few countries abstained. These included the RSGB because Council had not yet established its policy following the membership consultation excercise.

Beacons

WHILE THE CONFERENCE expressed the view that HF beacons should be moved to band edges, it was agreed that the following additional sub-bands would be reserved for the International Beacon Project; 18.109–18.111MHz and 24.929 – 24.931MHz.

Other HF matters

The following HF related matters were also agreed:-

(a) that the low power definition of **'QRPP'** will be changed to "power limited to 1 Watt or less output".

(b) that work on **29MHz repeaters** may proceed on agreed channels.

(c) that National Societies should consider the **extension of the 28MHz band** to 30.00MHz.

The Conference appointed Alf Almedal, LA5QK, as the new Chairman of the Region I HF committee and thanked Hans Berg, DJ6TJ, for his past contributions.

Common Licence Group

THE CHAIRMAN, PA0TL, presented his report outlining the progress that had been made, including the acceptance by CEPT of **TR61-01** and **TR61-02**. The main object of TR61-01 was to enable amateurs to operate (in countries that have accepted this facility) for a maximum period of three months. But it had become apparent that those who had made a move to another CEPT country would need a permanent licence. This is available under TR61-02, the foundation of which is **HAREC** (Harmonised Amateur Radio Examination Certificate) in which CEPT has accepted a standardised examination syllabus.

A further major step forward took place in May 1992 at a CEPT Working Group when non-CEPT countries were permitted to participate in the TR61-01 licensing system. The first country to take advantage of this was New Zealand (in Oct 92). The ARRL have been negotiating with the FCC for the implementation of TR61-01.

The Chairman requested all members of the CLG and interested delegates to give consideration to the form that they would wish a **novice licence** to take in their country. The CLG had meetings aimed at agreeing a minimum technical standard for a novice licence acceptable to CEPT without further discussion by that organisation. This emphasised the need for: (a) a harmonised technical specification that administrations may modify to meet their individual requirements; (b) the facility to modify frequencies within this class of licence; (c) emphasis on self training with the ability to upgrade to a higher class of licence; (d) recommended frequencies to be within the bands 3.5, 21, 28, 144 and 432MHz and that these allocations observe the IARU bandplans.

The Conference confirmed the recommendations of the CLG:

(a) to promote TR61-02 to non-CEPT countries
(b) to extend TR61-02 to include any novice licence.

The CLG accepted a paper submitted by Austria (OVSV) requesting that they compile, and regularly update, licence data within Region I.

Representatives from Region II gave a report on progress made within their Region. They are proposing a different concept to the CEPT scheme. The Region 2 proposal is based on a format similar to an International driving licence.

The Chairman, PA0TO, was elected for a further three-year period.

VHF/UHF

THE REGION I VHF Committee consisted of delegates and observers from 24 countries. UK representatives included Malcolm Appleby, G3ZNU; David Butler, G4ASR; Mike Dixon, G3PFR; Graham Shirville, G3VZV (BATC) and Ron Broadbent, G3AAJ (AMSAT-UK).

The meeting was chaired by Kees van Dijk, PA0QC, and the minutes were taken by John Morris, GM4ANB. Because of ill health the Chairman was not available for re-election. Arie Dogterom, PA0EZ was elected after a ballot.

ITU/CEPT/ERO

Recent changes in ITU and CEPT now require the RSGB to pay much more attention to the protection of our allocations than ever before. We are now facing WRCs every two years because of the pace of technological development. Currently the spectrum most under threat is VHF to SHF, and not HF as previously. In addition the ERO is about to carry out the second phase of a detailed spectrum investigation (DSI) for frequencies between 29.7 and 960MHz, resulting in a European table of frequency allocations and utilisations. This covers four amateur bands and spectrum within this area is very much in demand by other services. Another major concern is the policy regarding ISM allocations. On the one hand co-existence with ISM could provide a helpful 'umbrella' for amateur operation as in many cases ISM is considered incompatible with other applications. But, on the other hand it also causes interference to us so it is necessary to be very careful when establishing policy.

50MHz

Repeaters: Eight repeater channels in the 50MHz band were agreed. They will have 20kHz spaced inputs 51.210 – 51.350MHz, with outputs 600kHz higher. It should be noted that the RSGB has made no decision to implement repeaters on this band at the present time. However it was thought helpful to plan for their introduction throughout IARU Region I to prevent chaos in the future.

Facsimile: It was agreed to designate 50.550MHz as the facsimile working frequency.

144MHz

Packet radio linking: Previously it was Region I policy not to allow packet radio networks on the 2m band or access from 2m to networks on other bands. As the result of an RSGB paper, it was agreed that packet network stations shall only operate in the part of the 2m band allocated in the usage section of the bandplan to digital communications and will only be permitted for a limited time. Such network stations should also have access ports on other VHF/UHF or microwave bands and should not use 144MHz to forward traffic to other network stations. In view of the time limitation, the setting up of new network stations is not encouraged. However experiments with narrow band packet radio techniques (5kHz channels for example) are to be encouraged. The objective of this is to provide more access channels within a narrower bandwidth.

12.5kHz channel spacing: The meeting decided (by a majority of one) that Region I will move to a genuine 12.5kHz channel spacing system for 2m FM. However a number of societies, including DARC, REF and RSGB, stated that for the time being they would not be able to follow this recommendation. As these three societies accounted for 55% of European repeater users it was agreed that the timing of the transition and notification to manufacturers would be discussed at the next IARU Region I VHF Managers' meeting.

Meteor Scatter: The use of the 'letter' system for random SSB MS had not gained general acceptance so it was agreed that this system will be abandoned. It had, however, gained acceptance for CW operation and will therefore be retained for this mode. It was further agreed that recognition should be made of the many MS operators that still use the old SSB frequency. It was agreed that two segments for SSB random MS will be introduced; 144.195 – 144.205MHz and 144.395 – 144.405MHz. Full up-to-date details of the IARU Region I meteor scatter procedures will be included in a future *RadCom*.

Moonbounce: At a previous meeting (Vienna 1992) it was agreed that because of computer QRM an additional sub-band, 144.140–144.160MHz would be allocated for EME usage. However this had proved unpopular and an RSGB paper recommending 144.000 – 144.035MHz was adopted.

Usage study: An RSGB paper recognised that some re-balancing of the 2m band between 144.000 – 145.000MHz is necessary. For example why, should a bandwidth of 145kHz be allocated to beacon usage when there is a popular demand for digital transmission modes? The meeting agreed that six societies: Belgium (UBA), Denmark (EDR), Finland (SRAL), France (REF), Germany (DARC) and the RSGB will form a sub-committee chaired by the RSGB VHF Manager, G4ASR, to discuss and formulate a proposed plan for the 1995 VHF Managers' meeting. Details will appear in *RadCom*.

430MHz

7.6MHz-spaced repeaters: The meeting agreed to the RSGB request for a footnote to be added to the bandplan acknowledging the UK's proposed use of low power repeaters on channels R61 to R67. This met a request from the Repeater Management Group (RMG) for future applications.

Mr J Jipquep, Deputy General Secretary of the ITU, opening the IARU Region 1 conference at De Haan.

Microwave Bands

EARLY THIS YEAR the ERO published a report on the findings of a DSI carried out on behalf of the ERC covering 3.4 – 105GHz.

Input to the DSI was provided by civil land military users and by IARU Region I as part of a consultative process. The salient points, as far as the Amateur Services are concerned, are that microwave band sharing is a valid strategy, and that there is also a need to identify 'key sub-bands' where amateur weak signal experiments and investigations can continue, well into the next century.

Although this investigation has not resulted in the 'elevation of status' of any of the amateur allocations, it has resulted in recommended 'harmonised' (that is, 'common') key sub-bands in many of the bands. CEPT Administrations are requested to leave what are best described as 'set-aside windows' for amateur operation.

It was assumed that the next phase of the DSI, which will include the 1.3 and 2.3GHz bands would follow a similar pattern and it was against this background that discussions and recommendations for the future use and development of the amateur microwave bands took place in a working sub-committee, ably chaired (for the last time) by PA0QC.

David Court (OZ3SDL/G3SDL) outlined the 'best and worst scenarios' in the amateur bands above 30MHz, as seen from the CEPT standpoint. This was somewhat gloomy from the amateur point of view, since it served mainly to emphasise the extreme pressure being exerted on all the present amateur VHF/UHF and microwave allocations in Europe. However, it must be emphasised that CEPT represents a relatively small part of ITU Region I.

On the positive side, frequency harmonisation in the key sub-bands was relatively easily achieved, with the usage of the other areas of the existing shared bands left largely to the discretion of member societies. This may have resulted in a degree of simplification of some of the amateur bandplans, and some degree of flexibility within individual administrations.

Starting with **1.3GHz** (outside the scope of the first phase of the DSI) most of the discussions and agreements involved minor adjustments to sub-band frequency limits in order to accommodate national differences necessitated by the presence of radar systems in many European countries. These changes will support different input/output separation schemes for both analogue and digital repeaters. The preferred input/output separation remains at 6MHz, although other separations will be possible by the use of one or more 'all mode' sub-bands.

The **2.3GHz** band is under the greatest pressure from proposals, in Region II in particular, to use frequencies up to 2360MHz for DAB (Digital Audio Broadcasting) and frequencies between 2400 and 2485MHz for wireless Local Area Networks. No significant changes were made to the bandplan and it was agreed that the position would be reviewed at the next Region 1 VHF/Microwave Manager's meeting. It was agreed that a narrowband segment for both terrestrial and satellite use should be identified between 2,370 and 2,410MHz, coupled with a proposal to extend the amateur allocation up to the top limit of the ISM band, mainly to accommodate ATV, should the present allocation be lost.

Above 2.3GHz, agreement was reached to adopt the following:

3400 – 3410MHz, key sub-band

3400–3402MHz, preferred Narrow Band segment (centre of activity, 3400.1MHz)

3456 – 3458MHz, alternative NB Segment (centre of activity, 3456.2MHz)

Region I operators advised to use the preferred sub-band after 1 January 1994.

5650–5670MHz, Amateur Satellite Service (earth to space)

5668 – 5670MHz Amateur Service. Preferred NB sub-band (centre of activity, 5668.2MHz)

5760 -5762MHz Amateur Service, Alternative NB sub-band (centre of activity, 5760.2MHz)

5830–5850MHz Amateur Satellite Service (space to earth)

Region I operators are advised that they should preferably be able to work in both NB segments until such time as the change to the preferred sub-band is made (1994).

10360 – 10370MHz Amateur Service. Preferred NB sub-band (centre of activity, 10368.2MHz)

10450 – 10452MHz Amateur Service. Alternative NB sub-band (centre of activity, 10450.2MHz)

10450 – 10500MHz Amateur Satellite Service.

24192MHz (Secondary) for NB is harmonically related to 1152MHz and is still 'preferred' in Germany. The use of 24048MHz (Primary) was proposed at Vienna in 1992 and was, at that time, supported by DARC and many other Region I societies. After inconclusive debate on the relative merits of the two frequencies, a recommendation was made for no change to the existing 24GHz bandplan which already shows the NB centre of activity to be 24048.2MHz!

The use of an 'extended' **Locator** system (eight character instead of six character) for increased accuracy in the microwave bands was approved and may be optionally used in reporting, although the main intention is to use it to enhance antenna bearing calculations.

External Relations Committee (ERC)

THIS NEW BODY, supportive of the Executive Committee of IARU Region I and of the Administrative Council of the IARU, was set up to deal with intergovernmental organisations, such as the ITU, CEPT and PATU, and specialised technical or standardisation organisations affecting the interests of the amateur radio services. It consists of specialists from Region I; RSGB has nominated Malcolm Appleby, G3ZNU, and Peter Chadwick, G3RZP, to be its representatives, under the chairmanship of SP5FM who is coordinator for spectrum matters. The ERC will work in consultation with other relevant Region I organisations such as the HF Committee, the VHF/UHF/SHF Committee, the EMC Working group, and the Satellite Coordinator.

The Working group which proposed the establishment of the ERC, also considered documents from RSGB and SSA (Sweden), and, as a result, recommended that the work of the European Telecommunications Standards Institute (ETSI) should be monitored in relation to its possible impact on the amateur service. It was emphasised that the fullest liaison should be maintained between societies, national telecommunication bodies, and other standardisation organisations.

STARS

THIS WAS THE Working Group for the Support of The Amateur Radio Service in Region I. Delegates of several European Societies, together with those from Egypt, Lesotho, Nigeria, Kenya, South Africa, and Sierra Leone met on two occasions to discuss practical ways in which amateur radio could be introduced to African countries. There are 55 countries in Africa, but in only 21 of them is the amateur radio service organised in a national society and seven of these were present at the Conference. Further, there are only a thousand licensed amateurs in the whole Continent outside the Republic of South Africa, and many of those are expatriates. However, it is good to note that in Lesotho six new licensees are regularly operating the PADC-sponsored station, in Swaziland the training course generated 13 new licensees, in Zimbabwe a club station has been set up at the University, and in Zambia there are now 40 licensees.

The Working Group recommended that IARU training seminars should be organised to make direct contact with African telecommunications authorities, in order to convince the latter of the value of amateur radio to the community, and that the participants should be indigenous rather than expatriates. Such projects will be considered an integral part of IARU Region I's approach to the promotion of amateur radio. 5N0OBA was nominated as the AFRICOM Coordinator for the next three years.

Copies of the RSGB's *Amateur Radio for Beginners* were presented to 5Z4MR (and to other delegations) by G3GVV. A request for further publications was made to RSGB, and it is hoped that this worthy cause will gain the Society's full support.

HF Contests

WITHIN IARU REGION I, HF contest matters are coordinated by a working group of the HF Committee. This working group is known as the Contest Sub-Group (CSG) and its membership includes the Contest Managers, HF Managers and the representatives of most of the Region I member societies who organise contests. Liaison members come from the other two IARU regions and from several non-IARU contest organisers. There are strong links between the CSG and the RSGB as the RSGB HF Committee Chairman is a member and the Sub-Group is chaired by G6LX, who was elected by the conference to serve for a further three years.

The subjects reviewed by the CSG included computer logging, the adjudication of contests using computers, use of packet cluster information during contests, standardisation of contest preferred frequencies within Region I, revision of the rules for Region I CW Field Day (NFD), 1.8MHz contests, contests for Novice operators and related subjects.

CEPT	European Conference of Postal and Telecommunications Administrations
IARU	International Amateur Radio Union
Region I	Europe, the CIS and Africa
Region II	The Americas
Region 3	Oceania, Australasia
ITU	International Telecommunication Union
ERO	European Radiocommunication Office
ERC	CEPT European Radiocommunication Committee
CCIR	International Radio consultative Committee
CLG	Common Licence Group
DSI	Detailed Spectrum Investigation
ISM	Industrial, Scientific and Medical
PATU	Pan African Telecommunication Union

Eurospeak: Useful abbreviations.

John Allaway, G3FKM, Secretary of Region 1, with the Conference office staff: Audrey Jeffcoate (Reg 1 Office Manager); Hilary Claytonsmith, G4JKS; and Belinda Gannon from RSGB HQ.

Of particular interest to RSGB members was the decision not to make any changes to the present arrangements for CW FD (**NFD**). Although Germany proposed a common scoring method using a country multiplier in the rules, this was resisted by Switzerland and the UK and it was agreed that IARU Region I continue to arrange the dates and times for the event, but each of the supporting countries use their local rules. The CSG was asked to keep the rules under review and to recommend any changes for consideration at the 1996 Regional conference.

There was a lengthy discussion on the proposal by Belgium for all contest organisers to use the same **contest preferred frequency segments** on the 21 and 28MHz bands. It was agreed to keep the status-quo where each contest organiser can set their own preferred frequencies. There was considerable emphasis on the role of the **SWL** in contests and the need for contest organisers to ensure that SWL sections were included in their events.

The joint proposal by Austria and RSGB for a **Region I 160m CW contest** was well received and will be implemented starting in 1994. This will be run under a Region I umbrella (similar to the CW FD) and each society will publish their own rules. RSGB will coordinate the first of these contests.

The information paper from the RSGB describing the **QRS CW Cumulative contests** was extremely well received and a number of societies said that they would be organising similar events.

ATV

MOST OF THE BUSINESS relating to ATV was conducted in the VHF to Microwave Committee although a proposal to set up a working party to investigate the possibilities to improve the available frequencies for SSTV was accepted by the HF Committee.

Much of the business related to band planning and to the pressure on amateur allocations from other services. There were no changes to ATV operating frequencies or recommended areas of operation. Some increases in numbers of frequencies for FM repeaters and packet/data channels on the 430MHz band were approved and these will increase the usage of this band.

The situation in relation to the threats to our allocations in general would mean that some major changes might be needed in the future. In particular if our 430MHz allocation were reduced, ATV operators would need to adopt a reduced bandwidth system to remain on the band. Such a system was described in an IARU Region I paper as long ago as 1975 and is already used by many ATV operators on 430MHz for DX and contest operation.

The possible reduction in size of the 2.3GHz band was also discussed in detail and it was agreed that IARU would fight for a new allocation of 2450.0 – 2483.5MHz. It was accepted that although this part of the spectrum is likely to be heavily occupied by other services it would be useful allocation for FM ATV operations in the future.

Additionally some changes were made to the rules of the IARU Region I ATV contest.

Final Comments

THE RSGB DELEGATION, led by Tim Hughes, G3GVV, included Malcolm Appleby, G3ZNU; John Bazley, G3HCT; David Butler, G4ASR; Mike Dixon, G3PFR; David Evans, G3OUF and Ron Glaisher, G6LX. The President, Peter Chadwick, G3RZP, was an observer, as was Graham Shirville, G3VZV, who represented the British Amateur Television Club at no cost to the Society. Ron Broadbent, G3AAJ attended as Region I Satellite Coordinator, at IARU's expense. [The satellite report will form part of next month's *Satellites* column – *Ed*].

Dr John Allaway, G3FKM was re-elected unopposed as Secretary of Region I. Professor Martin Harrison was appointed Region I HF Beacon Coordinator, G4ASR as VHF/UHF/SHF Beacon Coordinator, John Morris, GM4ANB VHF/UHF/SHF Records Coordinator, Jim Bacon, G3YLA Sporadic E Coordinator, Ray Flavell, G3LTP Tropospheric Studies Coordinator, and G6LX Chairman of the HF Contest sub-group. G3GVV was Chairman of the Election and Ballot Committee, for the duration of the Conference.

Tribute must be paid to the office staff, directed by Audrey Jeffcoate (Office Manager), for their tireless and excellent work producing thousands of pages of documents. Special mention must be made of Belinda Gannon from RSGB HQ who did so much essential word-processing, and of Hilary Claytonsmith, G4JKS; Angelika Voss, G0CCI; and John Morris, GM4ANB, who wrote the Minutes for three of the main committees.

At the final Plenary, the G2BVN Memorial Trophy was awarded to Mr Kees van Dijk, PA0QC who had been Chairman of the VHF/UHF/SHF Committee for some twenty five years.

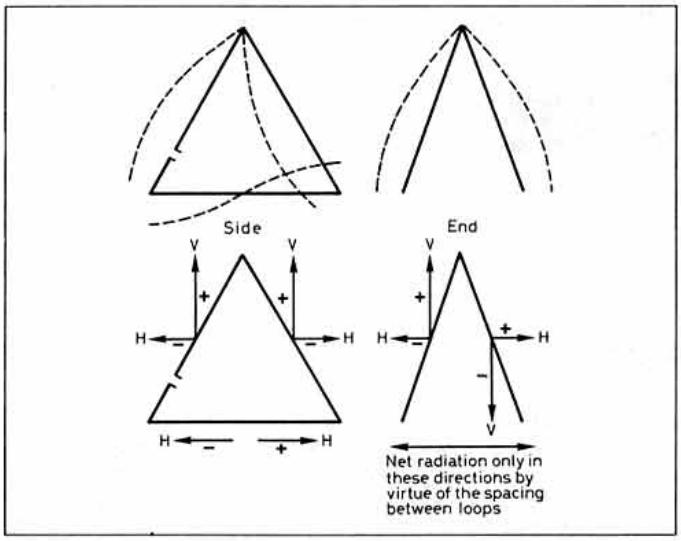


Fig 3; Spacing between the loops and the sides of loops affects polarization as shown.

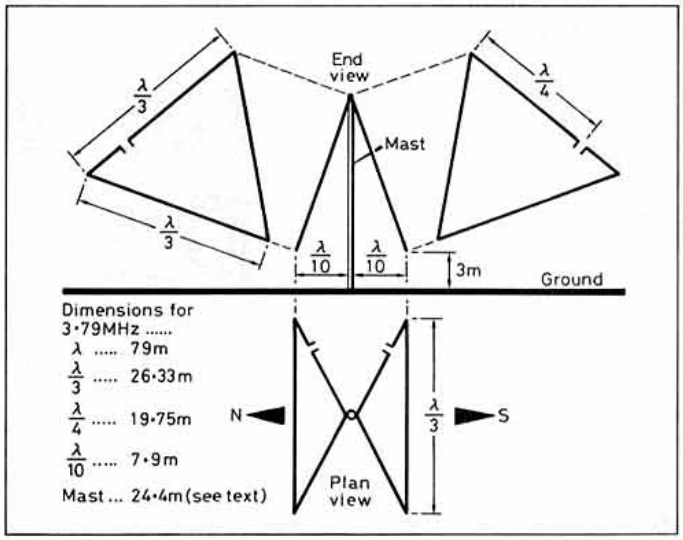


Fig 5: For a loop with a centre frequency of 3.6MHz dimensions should be multiplied by 1.055.

real snag is the space required over the ground. However this is probably no greater than that required for stays supporting an 80m Yagi and certainly less than that required for a phased array of comparable performance. By placing the mast on top of my flat-roofed bungalow and arranging for the loops to terminate on opposite sides it becomes quite manageable.

The minimum space required is a third of a wavelength by a fifth of a wavelength with a short pole at each corner of the rectangle. Alternatively, the four corners can be pulled out to ground spikes or, as in my situation, to large stones if more space is available. The height of the base of each loop is not very important, but 3m is a safe height to avoid contact with people or vehicles.

By mounting the mast on the house and using thin wire you possibly reduce local authority planning problems, but there will probably be a certain incompatibility with the TV. I can transmit, even with a linear, without TVI but I can't hear much with the TV working because of radiation from the TV sitting inside the array.

PERFORMANCE COMPARISONS

A VERTICAL TRIANGULAR loop fed one quarter wavelength from the apex is electrically similar to a pair of quarter wave monopoles spaced a quarter-wave apart and driven in phase. This combination has a gain of about 2dB over a single monopole. A second identical loop suitably spaced from the first and tuned as a reflector forms the equivalent of a four mast array. I measured 4dB gain for two loops compared with a single one. Total gain over a monopole is therefore about 6dB.

This will not equal the performance of a three element Yagi at optimum height unless you are over sea water, but it will be a better antenna than most of the competition will be using. In practice, the various modes provide flexibility in fighting QRM. I obtain a front to back ratio of 30dB or more for local stations, and when listening to DX signals arriving via the ionosphere the front to back ratio is seldom less than 10dB.

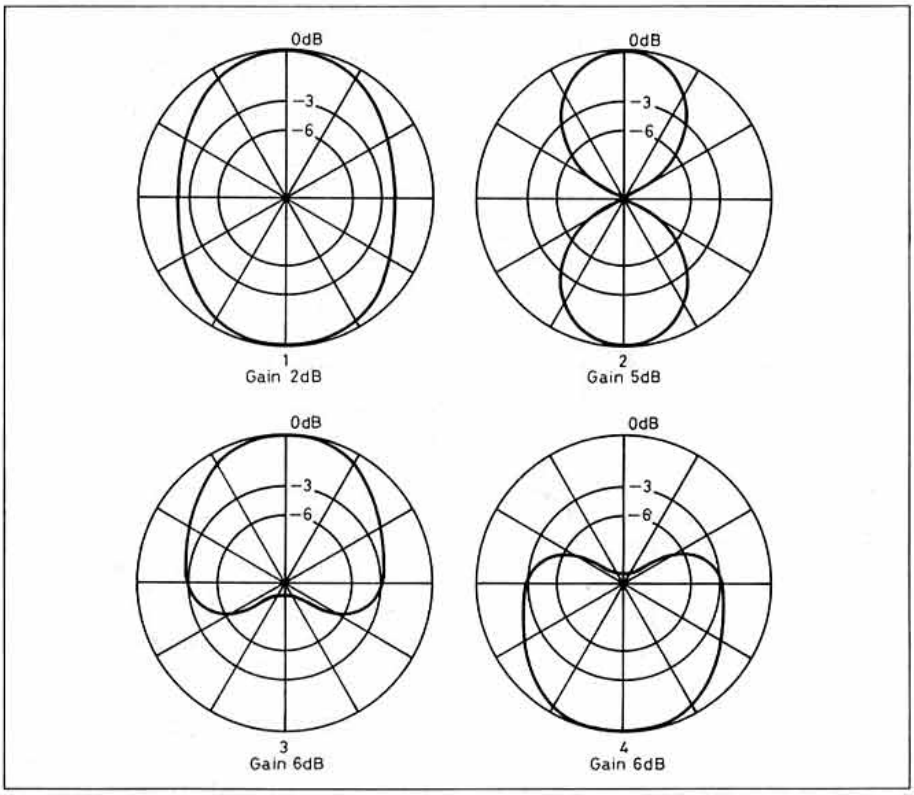


Fig 4: Theoretical radiation patterns for each of the four antenna configurations.

ADJUSTMENTS AND TUNING

TO TUNE THE REFLECTOR, I used a very low power 3.79MHz oscillator, powered by a battery. This was connected to a few metres of wire and hung from a tree about two wavelengths behind the array. The reflector reactance was then adjusted for minimum signal strength on the receiver. After obtaining the optimum tune point, I replaced my series tuned circuit with a single component which in my case was just a piece of wire! This just happened because my feeders were 80ft pieces of low-loss semi-airspaced 75Ω TV cable and the loops were just the right length.

I seldom work CW so my antenna is adjusted to perform best around 3.79MHz. If I go below about 3.60MHz the reflector turns into a director and the pattern reverses. This is a bonus I had not really anticipated, but occurs because directivity is only achieveable over a narrow band.

TUNING AND EARTHING

IT SHOULD NOT BE necessary to reset the tuner when switching between the unidirectional modes, but this may be required when changing from these modes to the omnidirectional pattern. When selecting the bidirectional pattern for maximum side rejection, it will almost certainly be necessary to retune. This is because this mode has quite a narrow bandwidth. In fact it is best to fine-tune the antenna in this mode. Make equal changes to the length of both loops and then optimise the reflector tuning.

ICOM IC-Δ1E: MANUFACTURER'S SPECIFICATION

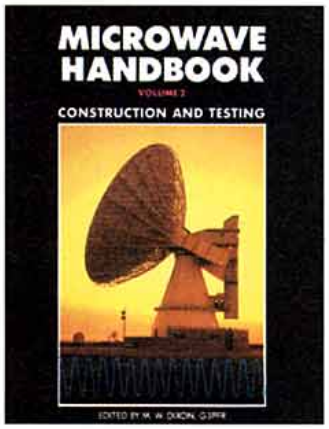
General	
Frequency Coverage	144-146MHz, 430-440MHz, 1240-1300MHz
Tuning Steps	(2m/70cm) 5, 10, 12.5, 15, 20, 25, 30 or 50kHz (1.2GHz) 10, 20, 25, 50kHz
Memory Channels	78 (including scan edge and call channels).
External DC power supply	6 to 15VDC (negative ground).
Typical current drain:	
Receive	20mA (144MHz), 24mA (430MHz & 1.2GHz)
High Power Transmit	1.9A (144MHz & 430MHz), 1.1A (1.2GHz).
Low Power Transmit	700mA on all bands
Transmitter	
Output Power at 13.5V:	
144MHz/430MHz	5.0W, 3.5W, 1.5W or 500mW selectable
1.2GHz	1.0W or 200mW selectable
Max. frequency deviation	± 5kHz
Spurious emissions:	
144MHz/430MHz	Better than −60dB
1.2GHz	Better than −40dB
Receiver	
Receive System	Double conversion superhet
IF frequencies	2m: 30.85MHz, 455kHz 70cm: 35.8MHz, 455kHz 23cm: 72.2MHz, 455kHz
Sensitivity for 12dB SINAD	
144MHz/430MHz	Better than 0.16μV
1.2GHz	Better than 0.2μV
Selectivity:	More than 15kHz at −6dB Less than 30kHz at −60dB
Audio output power	More than 200mW at 10% distortion, into 8Ω load (12.5V supply)

ICOM IC-Δ1E: A versatile three-band hand-held transceiver.

RSGB Books for Christmas

Microwave Handbook

Mike Dixon, G3PFR



A major publication in three volumes giving theory and practical designs for the microwave enthusiast

VOLUME 1 deals with operating techniques, system analysis and propagation, antennas, transmission lines and components, semiconductors and valves. 224 pages.

Members Price: **£8.08** Non Members Price: **£9.50**

VOLUME 2 continues with construction techniques, common equipment, beacons and repeaters, test equipment, safety, filters and data.

Members Price: **£12.33** Non Members Price: **£14.50**

VOLUME 3, contains practical designs for each band from 1.3GHz to 24GHz and beyond. A must for anyone active on the microwave bands or contemplating 'life beyond 70cm'.

Members Price: **£12.32** Non Members Price: **£14.47**

Special Offer

For RSGB members only. All three volumes for just

£25.50

The Dove of Peace

The Society's new Christmas Cards will be in stock soon, the design of which will be apreciated by amateurs and non amateurs alike. We anticipate a high demand for these cards so please place your orders early to avoid disappointment.

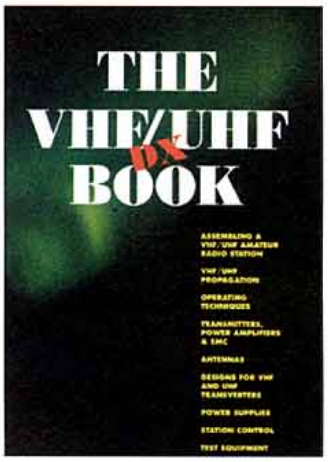
ONLY £3.85 *POST FREE*

for ten large, high quality cards (8" x 6" approx)

VHF/UHF DX Handbook

Edited by Ian White, G3SEK

(DIR Publishing)



The essential guide to working DX on the VHF/UHF bands, with sections on equipment, propaga-tion and operating techniques. Read this excellent book and improve the performance of your station.

Special Introductory Price

Members **£15.30** Non Members **£18.00**

Technical Topics Scrapbook 1985-89

Pat Hawker, G3VA

'*TT*' is one of the most popular features in *RadCom*, and this new book is a reprint of all the *TT* pages from 1985-89 inclusive, together with an index. This handy volume will be invaluable for keen experimenters and constructors everywhere. 340 pages.

Members Price: **£7.65** Non Members Price: **£9.00**

Please add postage and packing on all except D-i-Y Radio;

RSGB Books

RSGB Call Book 1994

Edited by Brett Rider, G4FLQ

Just published - the 1994 Amateur Radio Call Book and Information Directory. Contains over 60,000 UK and Republic of Ireland callsigns and a wealth of detailed information invaluable to the licensed amateur or short wave listener **including the very latest band plans**

SAME PRICE AS LAST YEAR!

Don't struggle on with an out-of-date edition any longer - treat yourself this Christmas. 416 pages.

Members Price: **£7.00**

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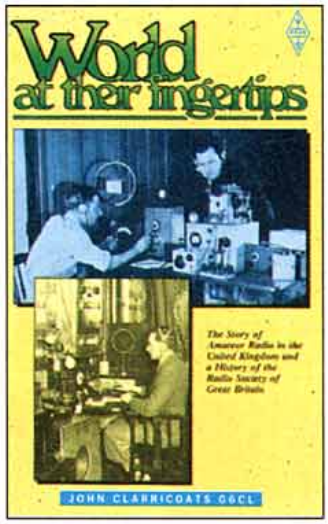
World At Their Fingertips

John Clarricoats, G6CL



(First published in 1967 and reprinted in 1984 – first time available in ten years!)

The fascinating story of amateur radio in the UK and a history of the RSGB, now back in print at last. Read this book and be proud to be a radio amateur! 307 pages.

Members Price: **£5.10**

Non Members Price: **£6.00**

Beginners and Novices

Amateur Radio For Beginners

FIND OUT ALL ABOUT Amateur Radio - this book by **Victor Brand, G3JNB**, explains: how to build a crystal set, how to listen to radio amateurs, how to understand Morse code and how to choose equipment, and how to get a transmitting licence.

Members Christmas Offer Price: **£2.00** (normally £3.50)

Non Members Price: **£3.50**

Practical Antennas for Novices

THIS GUIDE, written especially for UK Novice Licensees by **John Heys, G3BDQ**, describes in detail how to build simple but efficient antennas for each of the Novice bands from 1.8 to 434MHz, plus ancillary equipment to ensure that they are working correctly. A chapter is devoted to the safety and common sense aspects of installing and using a transmitting antenna. This book will be invaluable not only to Novices, but also to any beginning amateur looking for easy-to-build antenna systems that really work. 60 pages.

Members Price: **£3.83**

Non Members Price: **£4.49**

D-i-Y Radio

EACH ISSUE OF THE RSGB's 24-page magazine, for beginners of all ages, (published six times a year) features three simple construction projects, a review, ham facts, news features, a pull-out poster, a prize competition and a special offer. Subscribe now and get *D-i-Y Radio* for the next year, plus a pack of goodies

Members Christmas Offer Price: **£6.00** (normally £7.65) post free

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Don't miss the Christmas present bargain of the year:

SAVE A FURTHER £1.83 on the offer price of *Amateur Radio for Beginners*, *Practical Antennas for Novices* and a year's subscription to *D-i-Y Radio*.

All three for the Members Only Price of: **£10.00** **Offer expires 31 December**

see page 95 for details. Special offers are available to members only and are valid until 31 December 1993.

Novice Note Book

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

DO YOU HAVE ACCESS to a decent size workshop that several people can work in? Well, if you have why not do as we do and have a workshop evening!

A small group of keen constructors in the Dover area meet in my workshop on a Thursday evening and we build some very interesting and useful gear. We have a 'kitty' which covers the cost of heating and lighting, tools etc. Oh yes, it also pays for the coffee and tea! So with careful budgeting we now have a complete workshop, and all the tools we need. We don't buy new but have acquired everything from hacksaw blades to major tools such as pillar drills, by visiting boot fairs! The last eight years have been a complete success for us with major projects such as SSB transceivers being completed.

MAKING A START

LEE VAUGHAN, OUR LATEST arrival in the fold, is a keen short wave listener who has now decided to go for his licence. His first project was to build an AMU (aerial matching unit) for use with wire antennas such as the one he uses with his Lowe HF150 receiver. As it was Lee's first construction project he decided that he didn't need to make it too small. A suitable case was found under the benches (see photo) and cleaned up. We then had a group discussion to decide how the metalwork should be built inside the case.

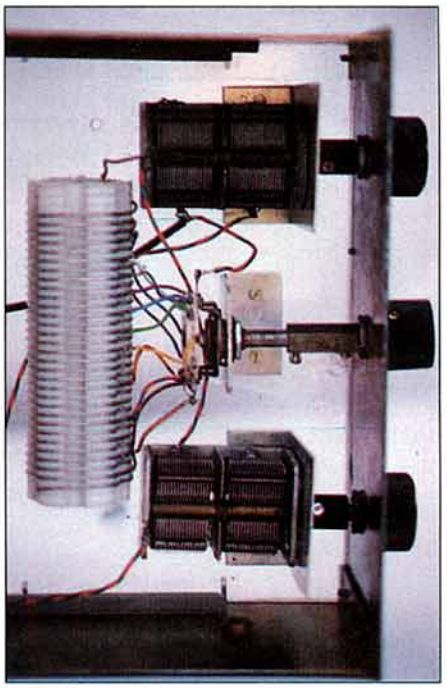
As the case had two side cheeks, Lee cut a front panel to be flush with the front and a rear panel that would slide through the back. Then a panel of 6.3mm perspex was cut for the baseplate. Thick perspex is ideal as it's a good insulator and being thick, screws can be countersunk into the material to guard against short circuits. Another advantage is that it can be tapped so avoiding the use of nuts during construction, a big saver of time and temper!

AIR SPACED TUNING

TWO TUNING CAPACITORS from an old broadcast radio set and a coil which looked suitable were found at the Brighton amateur rally and construction started in earnest. We looked through the G-QRP Club *Antenna Handbook*, a first class antenna ideas handbook [taken from their excellent *Sprat* magazine - *Ed*], and decided that a variation of John White's, G4BCY, AMU would fit the bill. the circuit is shown in **Fig 1**. As mentioned earlier, we already had a suitable coil, and so didn't quite follow the design on this point. As the AMU needed to cover all HF bands we used 500pF capacitors to increase the range.

WORKSHOP ANTENNA

ON TESTING, WE FOUND that the workshop 'wire' antenna, could be tuned over the range 1.6 to 30MHz. Incidentally, this is sheep fencing which covers the inside of the roof and holds up the insulation! We soon realised that it would sometimes be an advantage to be able to switch the AMU out of circuit and we did this with a small slide switch on the backdrop of the unit. The photographs show how the unit is constructed - it looks like an ideal club project, and can dramatically improve the performance of a wire antenna.



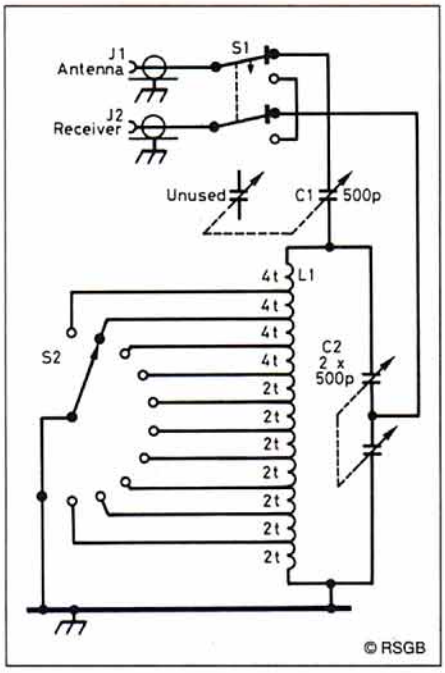


Fig 1: Coil taps select the frequency range.

HANDY HINTS

NEXT THIS MONTH, a small but important note on safety. Any tool, whether a screwdriver or hot soldering iron can be unsafe if used incorrectly. To our less experienced readers especially, please make sure that you know how to use any tool properly. And if you don't know then ask someone who does!

Finally in this month's column, an appeal for feedback. We want, welcome, and crave feedback, good and bad, but please ensure that it is constructive. Send in your ideas and suggestions for Novice Notebook - they are all welcome!

COMPONENTS LIST

S1	Double-Pole 2 Way Slide Switch
S2	Single Pole 11 or 12 Way Rotary Switch
C1,C2	2 x 500pF Ganged Variable Capacitor
L1	30 turns 22SWG tinned copper wire spaced over 100mm (long) on 35mm diameter former.

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

EFFICIENCY VERSUS LINEARITY

THE ITEM IN JUNE about tuning and loading pi-networks raised some correspondence about tuning for highest efficiency. Is that the right objective for today's band conditions?

AT FIRST SIGHT it would be a good thing if our transmitters gave the maximum possible RF out for the minimum possible mains or battery power consumed. Also, some older-timers have a preoccupation with power amplifier efficiency which dates back to when power limits were based on DC input rather than RF output. In those days, high efficiency was needed to give the maximum possible RF output within the confines of the power limits. It became fashionable to adjust a valve power amplifier by 'dipping' the anode current to a minimum value, and then increasing the loading and re-dipping to produce exactly 150W DC input, or 10W on Top Band. But we don't have DC power limits any more, and in the meantime another limited resource is becoming ever more pressing: band-space.

If we are going to use our limited amateur bands efficiently, our transmissions need to occupy the minimum possible bandwidth consistent with the mode in use. This applies particularly to SSB, where routine adjustment of the transmitter and/or the antenna matching unit can make a large difference to the bandwidth of the transmitted signal. Nowadays it's much more important to transmit a clean, narrow-bandwidth signal than it is to save a few coppers on the electricity bill. You will *not* achieve the best linearity and narrowest bandwidth by 'dipping' the anode current for minimum DC input power. As I said in June's column, if you know the correct operating conditions for maximum linearity from your PA, then use them; if not, simply tune for maximum RF and you won't be too far wrong. Then, most important of all *follow the 10% Rule* for a cleaner signal – see the panel.

MORE ABOUT DEVIATION ADJUSTMENT

STILL ON THE SUBJECT of bandwidth, James Miller, G3RUH, has contributed some further ideas to July's item about adjusting FM deviation.

"I USE A SECOND RECEIVER to measure deviation. Attach a 'scope to its FM discriminator output, and key up the unmodulated transmitter into a dummy load. Tune in the second receiver. Vary the transmitter frequency by exactly plus and minus 3kHz, and note the DC voltage changes on the 'scope. Then apply FSK tones or voice modulation to the transmitter and adjust its deviation to make the recovered modulation peaks on the 'scope the same as the previously measured DC levels corresponding to ± 3kHz deviation. This method is invaluable for setting up 9600 baud deviation too."

The only slight problem may be to locate the appropriate test point on the FM discriminator of the second receiver. **Fig 1** shows some of the possibilities for various kinds of FM detector. The basic rule is to trace the audio signal path back from the AF gain (volume) control to find the place where the demodulated audio first emerges from the FM detector. Normally this signal will have both AC and DC components, the DC component being what you see in the first part of the test before applying the tone modulation. To see the DC component you must attach the test probe to a location before it is blocked by an AF coupling capacitor. Very often there will be a low-pass pi-filter (C1/R1/C2) coming out of the FM detector, to eliminate any residual RF and pass only the audio signal, as shown between points B and C on Fig 1a and Fig 2b. Usually this will have a DC path back into the FM detector, and you could attach the 'scope probe to any of points A, B or C.

Finally, G3RUH half-jokingly adds: "Amateurs who do not have a 'scope, yet do have equipment like radios/TNCs/computers worth many hundreds of pounds oughtn't to be allowed on the air!" I'd certainly agree that many of us give far too low priority to acquiring some fairly basic test equipment, and then finding out how to use it. If you have test equipment lying around that you aren't quite sure how to use, why not ask *In Practice*?

POWER SUPPLIES

WITH SO MANY '12V' power supplies on the market, how can I tell a good PSU from a poor one?

FIRST OF ALL, you need a supply which will provide an unvarying, ripple-free DC voltage at whatever current your equipment needs to draw. The voltage probably needs to be adjustable above 12.0V, because many items of equipment – particularly transmitters and power amplifiers – function much better on voltages up to 13.5 – 13.8V. All of these voltages are related to the performance of an ordinary car battery, which delivers about 12.0V when fully charged but may have a terminal voltage of up to 13.8V when being charged at full rate by the alternator. Unless your equipment manual says otherwise, 13.5V is a reasonable setting for a supply with an adjustable output voltage.

WHAT'S THE DIFFERENCE between 'continuous' and 'peak' or 'surge' current ratings?

'CONTINUOUS' RATING IS exactly what is says: the current that the supply should be able to source continuously for as long as you wish, without losing voltage regulation, introducing additional mains-derived ripple or hum, overheating or any other form of misbehaviour. Whether the power supply can live up to that promise is quite another matter: truly continuous power demand at high currents is quite rare in amateur radio operation, so some manufacturers for the amateur market may be hoping that you don't take their so-called 'continuous' ratings too literally.

'Peak' or 'surge' current ratings are even more uncertain. They indicate the maximum current that you can draw from the supply – but don't expect full performance all the way up to the peak current unless the manufacturer explicitly says so. As you increase the current demand from a regulated power supply, you can expect degraded performance due to the following sequence of events.

1. As the output current increases, the DC voltage across the reservoir capacitor C1 (**Fig 2**) will fall, and the 100Hz AC ripple component will increase. The smaller the value of the reservoir capacitor, the worse this will be. A certain minimum voltage drop must exist across the 'pass' transistors TR1, TR2 etc (Fig 2) in order to regulate the output voltage correctly, and typically this 'drop-out voltage' is at least 3V. So in order to obtain a 13.5V DC regulated output, the voltage across the reservoir capacitor must at every instant be at least 16.5V. If the negative tips of the 100Hz AC ripple waveform fall below this minimum value, they will get through to the output of the supply.

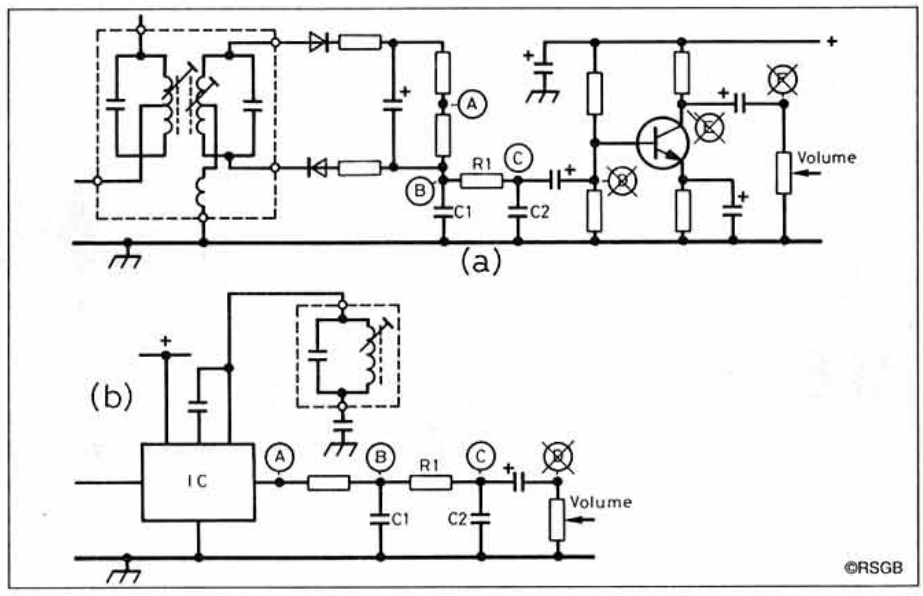


Fig 1: Two typical FM detector circuits. A, B or C are suitable points to attach an oscilloscope probe for FM deviation calibrations. Points D – F are not suitable, having no DC path back to the FM detector.

2. At higher output currents, the negative-going 100Hz spikes become so predominant that the average output voltage falls significantly below the required value. In other words, voltage regulation has been lost and the AC ripple increases dramatically.
3. Meanwhile, rather slower-acting thermal effects threaten to damage various components unless they are properly rated to handle high currents. Firstly, large 100Hz AC ripple currents are flowing through the reservoir capacitor C1. Unless this has a sufficiently high ripple current rating (closely related to physical size) it may become extremely hot and may even burst. Secondly the transformer may overheat unless it has a sufficiently high current rating (also related to physical size). Thirdly the combination of voltage drop through the 'pass' transistor(s) TR1, TR2 etc multiplied by the current passing through them will result in a large number of watts to be dissipated as heat. Unless the transistors have sufficient power ratings and the heatsink is sufficiently large, these too will bake and eventually fail.

Summing up, it isn't good policy to consistently push a regulated power supply towards its so-called 'peak' current output. In particular, if the supply is used with an RF power amplifier, the voltage sag and increased ripple will appear at the peaks of modulation. Just when your signal is at its strongest, its quality will be at its poorest. The moral is to buy or build a power supply whose continuous rating, before any onset of degraded performance, is at least equal to the peak current you will ever wish to draw.

WHAT WILL HAPPEN if I short-circuit the supply?

A GOOD QUESTION, and one you should certainly ask whoever is trying to sell you a power supply. Put it to the test: if the supply can't deal comfortably with a simple short-circuit – which sooner or later *will* happen – don't buy it. Fuse protection as the first and only line of defence is indicative of a cheap and nasty design; electronic overcurrent protection is easy and inexpensive with modern regulator circuits (Fig 2). Many voltage-regulator ICs include all the functions discussed above and much more besides, so look for a power supply which uses these techniques to the full.

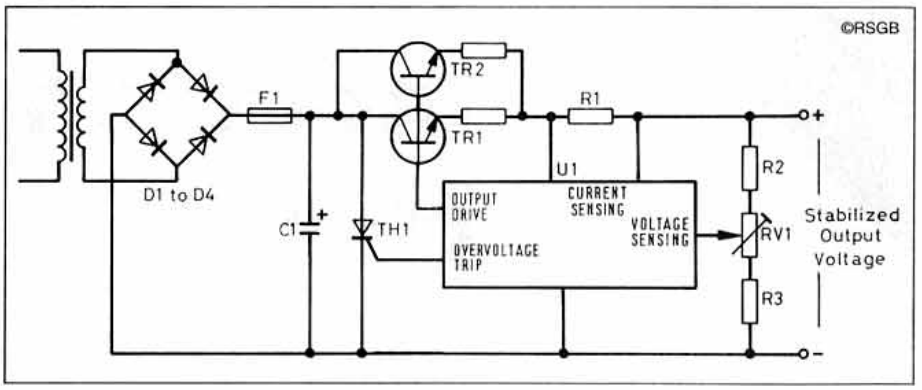


Fig 2: Elements of a high-current stabilised power supply: C1 – Reservoir capacitor, high capacitance and high ripple-current rating required; D1-4 – Bridge rectifier; F1 – 'Crowbar' fuse, rated considerably above the maximum output current; TR1, TR2 etc – 'Pass' transistors which regulate the current to maintain a constant voltage at the output terminals, typically two or more transistors in parallel, with individual emitter resistors to share the current more equally; R1 – Current sensing resistor, excessive voltage drop across this resistor activates the overcurrent protection; R2, RV1, R3 – Voltage divider provides a sample of output voltage to the electronic regulator; RV2 – adjusts the output voltage; TH1 – 'Crowbar' thyristor, triggered only if excessive output voltage is detected (usually due to a malfunction), TH1 short-circuits C1 and blows fuse F1; IC1 – Control electronics (details omitted)

CAN A POWER SUPPLY damage my equipment?

YES, IT CERTAINLY CAN if it fails. Transistors generally fail short-circuit, so if one or more of the 'pass' transistors dies it will connect your equipment to the full unregulated voltage across the reservoir capacitor. Most transceivers and PAs designed to operate on 12 – 13.5V do not take kindly to 18 – 20V! Good-quality power supplies incorporate so-called 'crowbar' protection which continuously monitors the output voltage. If that voltage rises above a preset value, the circuit fires a thyristor (TH1 in Fig 3) to short-circuit the output and protect anything connected downstream. The short-circuited power supply then has to protect itself, either by blowing the high-current fuse F1 (Fig 2) or perhaps by tripping a circuit breaker to disconnect the mains supply. If you're buying a power supply to connect to a transceiver costing £1000 or more, crowbar protection makes good economic sense.

Taking all these requirements together, a beefy '12V' power supply has to be quite a large and heavy item, and quite a substantial financial investment too. Which begs the next question . . . .

HOW DO THEY MAKE 'CB' power supplies so compact and inexpensive?

YOU'VE PROBABLY GUESSED the answer by now – these cheap-and-cheerful power supplies are vastly over-specified. The transformers are generally far too small for the rated output, the reservoir capacitors are invariably pathetic and the electronic design is often highly dubious. Such supplies are unlikely even to deliver their rated 'continuous' output current without loss of regulation, and would not survive long at their peak current rating. In the event of a short circuit, it's usually a race to see which blows first, the fuse or the main power transistor.

For example, I recently acquired a small, lightweight supply which boasted in shaky English: "Regulated power supply, 100% solid state. Convert house AC current 220V to 13.8V DC. Output 13.8V DC 5 amp constant, 7.5 amp surge. Fused for protection." Being sceptical from the outset, I wasn't particularly surprised that it could deliver no more than 3A without serious loss of regulation; and as for "7.5 amps surge" – forget it! By moving the transformer to make space for the largest reservoir capacitor that would fit in the box, and adding a modern IC regulator with built-in overcurrent and thermal shutdown protection, I was able to rebuild the unit into a nice little 13.5V 4A supply.

INSTANT CONCRETE

WHEN WE WERE PUTTING up a fence a few weeks ago, my wife returned from B&Q with a bag of their 'Post Mix', which is concrete's answer to instant Superglue. You half-fill the hole with the dry mix, tamp it firmly down around the fence post, and then add water until it no longer soaks in. Then repeat to fill the rest of the hole. The resulting concrete is firm in 10 minutes and is ready to support fence panels after an hour. B&Q Post Mix looks like just the thing for light concreting jobs in amateur radio, such as fixing ground-mounted HF verticals, or firming-up the earth around the tops of permanent guy stakes.

BEST BOOKS

ANOTHER GOOD BOOK this month, continuing the recommendations from Gerald Stancey, G3MCK. "*Low Band DXing* by John Devoldere, ON4UN, (ARRL) contains the best analysis of simple aerials (dipoles, loops, slopers) that I have ever read. It also contains a lot of design details such as impedances of monopoles that are not given in other amateur radio aerial handbooks. The chapter on receiver sensitivities and noise figures also contains information that will be novel to many amateurs" Unfortunately it is out of print!

UNTIL NEXT MONTH . . .

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.

THE 10% RULE FOR CLEANER SSB

THIS SIMPLE three-step process will help ensure a cleaner signal from almost any SSB transmitter.

1. Whistle loudly into the microphone and advance the drive level until the RF output is hardly rising any more.
2. Back off the drive until the RF output falls by *at least 10%*.
3. Use speech clipping to make sure your drive level on speech *never* rises above the value you've set. If speech clipping makes your signal broader, you've been habitually overdriving your transmitter!

RADCOM CONSTRUCTION FEATURE

The G4HUV Inductance Meter

by Laura Scott, G4HUV

THE INDUCTANCE JIG was developed to allow measurement of the inductance of coils having closed magnetic circuits, such as those wound on toroids and others which are enclosed in pot cores and/or in screening cans. Such inductors are difficult or impossible to measure with a dip oscillator.

This instrument is a 'self starter' in that it does not require the availability of a reference inductance measuring set for calibration. The only 'standard' needed is a signal source such as a signal generator or a calibrated dip oscillator. This source also provides the energy needed to power the jig.

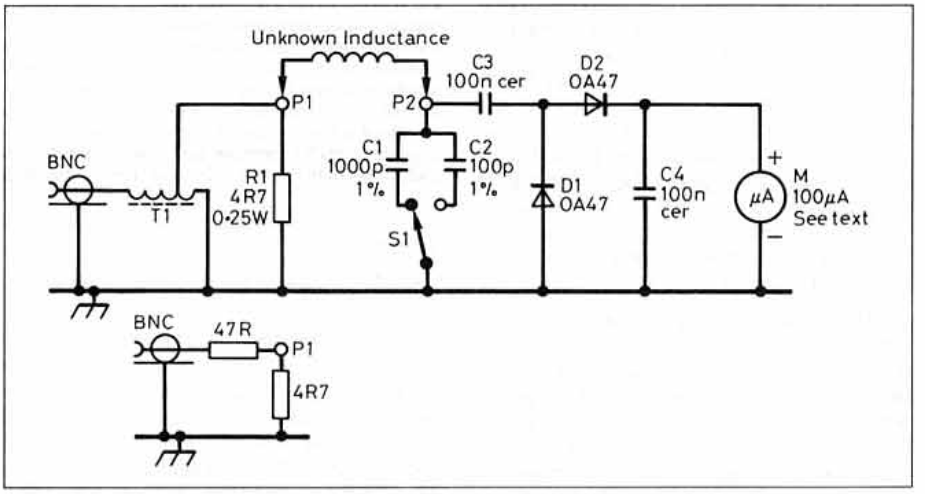


Fig 1: When used in conjuction with a calibrated signal generator, the inductance jig is a simple but most useful instrument.

TUNE TO RESONANCE

THE OPERATING PRINCIPLE is that of the 'Q' meter in which the inductance to be measured is connected in a loop, with a calibrated variable capacitor and a low value resistor, typically of 1Ω or less. An RF current of known frequency is passed through the resistor and the capacitor is adjusted to resonance as indicated by an RF voltmeter connected across it's terminals.

Referring to the circuit diagram (**Fig 1**) a 50Ω coaxial lead is connected from the signal generator to the BNC socket where it is matched to the 4R7 resistor by T1. The inductance to be measured is connected to 4mm terminal posts P1 and P2. S1 selects either the 100pF or the 1000pF capacitor against which the inductance will be resonated by adjustment of the signal generator frequency. Resonance is indicated via the voltage doubling circuit D1, D2, C3, C4 and the 100 μA meter.

It is important to use a sensitive meter with a high resistance and a long scale as there is limited power available for deflection. In the prototype, the meter used was of 120mV FSD (100uA and 1k2 resistance) and had a scale length of 2.5 inches.

The inductance is calculated as follows:

$$L\ (\mu H) = \frac{253.3}{f^2\ (MHz)}$$ for the 100pF range

and

$$L\ (\mu H) = \frac{25.33}{f^2\ (MHz)}$$ for the 1000pF range

These formulae are readily solved with a four function calculator.

OSCILLATOR OPTIONS

SIGNAL GENERATORS with an output of at least 200mV into 50Ω are adequate for testing most medium to high 'Q' inductors. The one that I use is an elderly valve type oscillator with unbuffered output. However, after realignment it was found to be within ±0.3% of scale indication over the entire frequency span of 100kHz to 250MHz.

Alternatively, a dip oscillator can be used in conjunction with the jig. It is loosely coupled via a few turns around the oscillator coil into a 6in length of 50Ω cable. I found that a G3WPO Fet Dip Oscillator, powered from a 9V PP3 battery produced as much output as the signal generator.

For best results the dip oscillator should be checked and recalibrated if necessary as any error in frequency translates as the square of the inductance value. For example a +2% error in frequency will produce a -4% change in the indicated inductance.

APPLICATIONS AND OBSERVATIONS

MOST INDUCTORS WILL resonate with either capacitor and the frequency ratio of these resonances is ideally 3.16:1, (the square root of the capacitance ratio). For inductors which have appreciable self capacitance such as 1.5mH air cored RF chokes this ratio was 2.9. This represents an inductance difference of about 10% as measured at the two frequencies and is about the worst case likely to be encountered.

However, such an inductor would rarely be used to form a tuned circuit where high accuracy is required. If however, one were to persist in this direction the resultant frequency error would be only 5% as the resonance is dependent on the square root of LC and not on L alone.

To test the effectiveness of the jig a number of inductors were wound which were typical of those likely to be used in MF and HF resonant circuits. Resonant frequencies with known capacitors were measured with a well calibrated dip oscillator. The inductances were also measured on the jig. The average inductance spread between the two methods was 3.5%, with in one case a 6% difference. When translated into resonant frequencies these examples gave 1.8% and 3% differences - more than adequate for most practical purposes.

The prototype works from 100kHz to 40MHz with decreasing sensitivity, possibly due to

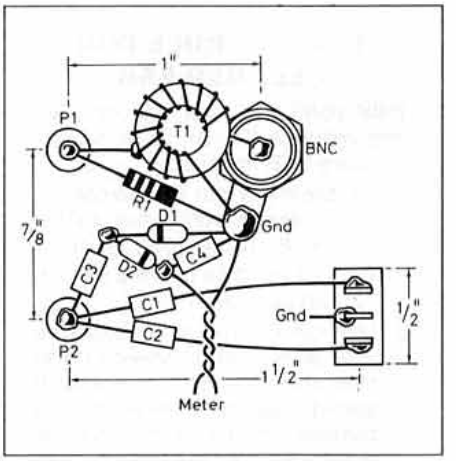
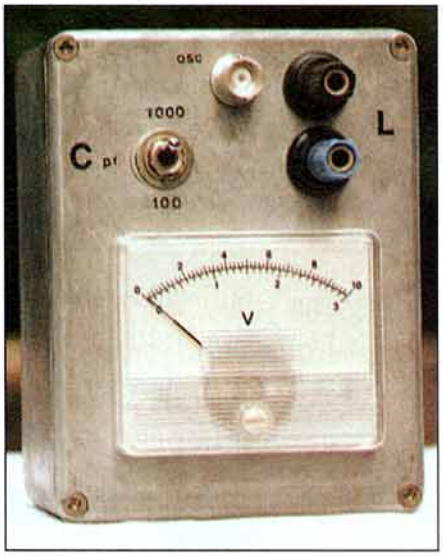


Fig 2: Components can be wired as shown above. A PCB is not required for this one.



An aluminium box provides a suitable enclosure for the unit. All components are readily available at low cost. A high sensitivity meter of 50 or 100μA works well with this design. OA91 diodes are also suitable, but have slightly reduced sensitivity.

the ferrite core, above 25MHz. This wide frequency range allows the measurement of inductors from about 0.2mH to 3mH.

CONSTRUCTION IDEAS

A MATCHING TRANSFORMER T1 is used between the signal generator and the jig. The winding has an inductance of 250μH. It can be adjusted using the jig if a 47R resistor is connected between the BNC centre connection and P1. This temporarily replaces T1 but with reduced sensitivity (see **Fig 1a**).

The core used for T1 was a surplus item made of relatively low frequency ferrite. It is not critical and suitable alternatives would be the Amidon FT-50-B-77 (12t and 4t). The reactance of the winding should be about four times the load resistance, or about 200Ω at the lowest frequency (eg 100kHz) likely to be used.

Fig 2 shows the layout, and symbols are mixed with component outlines as appropriate to make the layout clear. The prototype was built on the inside of the lid of a 4.5 x 3.5 x 2in diecast box. It was easier to construct and solder this way than in the base of the box. P1 and P2 were mounted on an insulating plate to reduce their capacitance to the lid. It was found that about 0.125in clearance all round was sufficient.

C1 and C2 are mounted edgewise to the lid and the moving contact of S1 is connected to it's metal frame in directly contact. Other components are connected as indicated. Note that S1 is a miniature mains type toggle switch rated at 2A 250VAC/5A 125VAC. Its internal construction is such that it has negligible inductance and capacitance, so is suitable for low power RF use. Also, it is commonly available from component suppliers.

OA47 diodes were used in the prototype instrument as these were found to give about 20% more deflection on the meter than OA91's. Other types may also be suitable.

COMPONENTS LIST

Resistors 0.25W 5%

R1	4R7
R2	47R (see text)

Capacitors

C1	1000pF 1% silver mica
C2	100pF 1% silver mica
C3, C4	100nF ceramic

Additional components

D1, D2	OA47
Meter	High sensitivity eg 100μA
Transformer	Amidon FT-50-B-77 (16 turns tapped at 4 turns) or similar
BNC socket	
Two 4mm sockets	
S1	Single Pole Changeover Switch (mains type)
Case	Diecast box approx 4.5 x 3.5 x 2in

● Service manuals, circuit diagrams, handbooks etc for any or all of the following pieces of equipment: **Marconi** Instruments Type TF1099 20MHz Sweep Generator; **Heathkit** OS1 Service Oscilloscope; **Eagle** AC Millivoltmeter Model MV72; **Avo** Transistor Analyser Type TA; **Radivet** Type 211 Wobbulator made by Airmec. Prepared to meet any expenses and return any information after copying. Any information to GW8WNB who is QTHR.

● Any information on an **RCA** Handheld Tx/Rx, type HCB32AA72 is required by A Langton, GM4HTU, QTHR. Or contact by tel: 0224 592104.

● Information and/or Circuit diagram for **Motorola** Two channel SSB Portable/Mains Set, model SA211 serial No M/10111. In green case, with detachable Mains P/S. Has the appearance of an Ex Military set, solid state through-out. No replies received from Motorola in UK or USA. Any information to G3NSI who is QTHR.

● A copy or possible location of the article written by Huw, G3XSE, several years ago, possibly in SWM, on Servicing a Trio TS700, to "clean" the DC contact on the VFO Drive, wich causes the Receiver to intermittently fail. Any info/etc to G3OJI, QTHR or tel: 0926 812621.

● David, G4IQM, needs a service manual and operating manual for an **Advance Oscilloscope**, Model OS2200, with Plug in Modules OS2007Y and OS2006X. He will pay postage costs and return after photocopying. Contact David, G4IQM by tel: 0293 882641.

RADCOM Helplines FOR MEMBERS

● Martin, G4NCE, needs any technical, operational or historical information on a WW2 RAF Mobile HF DF Rx Type R1273, TGRI 5070/5333 and an American Eureka Set type RT-44/PPN-1A. Contact Martin by tel: 021 357 6139 or write QTHR.

● Rob, G0HJR needs an Operating Manual for a Type 78M **Wobbulator**, made by Samwell & Hutton Ltd, of Ilford, Essex. Any information to: 11 West Street, Timberland, Lincs LN4 3RX.

● Circuit diagram and Service data for **Dymar/Burndept** 2000 Type H2080 AM, Synthesised mobile Transceiver tx 106Mhz, rx 139Mhz. Any help would be much appreciated. Costs reimbursed. Information to Chris, G8FHN tel: 0634 849112.

● Robert, 2E1AXZ, needs a User Manual (or copy) for a **PRISM** I/TX5000 Modem. Also any information on how to connect this Modem to an Amiga A500 Computer, if it is possible. Contact Robert Aley at: 39 Westwood Avenue, March, Cambs, PE15 8AX.

● Circuit diagrams for an **Icom** IC280E 2 metre Transceiver. Will reimburse costs, contact first. Details to Charles, G3JDA Tel: 0892 852144.

● Instruction Book (or copy) for **Eagle** TT145 Transistor Tester. All costs paid. Information to GM0KMG, Tel: 041 649 4345.

● A circuit diagram and/or any Servicing instructions for a **Hacker** Sovereign Radio Model RP18, model introduced at the National TV and Radio Show in 1964, and mentioned in Wireless World October 1964. Any information on the RP18 to Geoffrey Turner, 578 Warwick Road, Solihull, West Midlands B91 1AD.

● Any articles, manual and/or circuit diagram on the Ex Air Ministry Receiver **R1147A** as used in Sunderland Aircraft. These are required by Mr J C Norman, ZS5JX. Contact him at Audiocraft Electronics, Shop 3, Crown Buildings, 95 Umbilo Road, Durban 4000, South Africa.

● Gianluigi Portinaro, I1POR, needs a manual/circuit diagram for a **Boonton** L-C Meter, model **71A**. He can be contacted at: Via Deandreis 52, 13040 Palazzolo Vercellese (VC), ITALY.

● Brian Devlin, GM0EGI, needs advice/information for 'deaf' and high SWR readings on a **KLM KT34** Tribander Antenna. Feedline, connections and Balun check out OK. Suspect Bi-metallic corrosion. Any advice on this problem would be appreciated. Please write to Brian at: 5 Birksburn Avenue, West Mains Estate, Stonehouse, Lanarkshire ML9 3QW.

● GM3NUF requires details on the HF SSB Receiver/Exciter and Antenna Coupler Unit made by **Texas Instruments** and bearing the type or part number "FCC ID A929 JWT 13000" required by GM3NUF. Contact by Tel: 08522 237.

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Pat Hawker's Technical Topics

A 'DUZ EVERYTHING' PSU/ CHARGER

TREVOR KING, ZL2AKW, in *Break-In*, July 1993 presents a voltage-variable and current-variable regulated power supply and charger based on the L200C IC regulator. This device, which has been around for quite a few years, provides user programming of the output voltage over a range of 2.85V to 36V and current limiting from a few milliamperes up to about 2.5A. It has on-board power limiting, thermal shutdown and input voltage protection (up to 60V). **Fig 1** shows the basic arrangement although the ZL2AKW prototype includes metering, fast blow fuses and an auxiliary output socket fed via a protective diode using an octal valve socket and plug made from a discarded valve base. This outlet provides isolated power which can be floated across a 12V vehicle starter battery to provide a ripple-free power sufficient to run a modern HF 100W transceiver. Smaller rigs, including dual-band handhelds, can be run directly from the output terminals, with the voltage set to suit manufacturer's recommended voltage. Nicad battery charging is via the auxiliary output socket taking care to check polarity.

ZL2AKW recommends a maximum of 24V DC input to the regulator since the amount of heat that has to be dissipated is governed by "unwanted" voltage multiplied by the current. On heat sinking he writes: "While it is practicable to bolt the L200C to the cabinet wall via a mica washer and insulated bushings, it is still going to get hot. There are two things to do: first, use a small finned heat sink on the PCB side of the cabinet wall (the PCB has the regulator right at one end to make this easy to do); second, it is advisable to use a mains transformer with a tapped secondary to limit 'unwanted' voltage differential."

In his prototype he uses a junk sale transformer with a 21V secondary winding tapped at 5V, thus providing 5VAC, 16VAC or 21VAC depending on how it is connected; ZL2AKW incorporates switching so that he can use the 5V tapping for lower voltage applications such as nicad charging at 25mA for the AAA size, 50mA for Penlite cells and 120mA for C or D cells with fully discharged cells given 150% of their labelled capacity over 15 hours; the 16V tapping is used for all 13.8V equipment and for car-battery charging; the full 21V winding for powering HEXFETs such as the IRF511. A variable voltage and current limited supply is particularly useful when trying out newly completed apparatus; this helps avoid disasters and enables measurements to be taken and circuits tweaked before final installation.

The 1000pF capacitor across the secondary prevents rectified RF entering the mains, helping to ensure direct-conversion receivers are hum-free (both DC supply leads can be wrapped about five turns through a 72-type toroidal core to increase the decoupling). The 1µF stabilizing capacitor should be connected very close to the L200C input pin 1. Keep the smoothing capacitor(s) isolated from chassis or cabinet to avoid earth loops. The 3k3 voltage sensing resistor can be 0.25W but the current limiting control (20 or 30Ω) should be wire-wound and it is essential to ensure the minimum setting is only a small fraction of an ohm or the output current will be less than the maximum 2.5A. If the supply goes into blocking oscillator mode when feeding a sharply varying load, increase the setting of the current limiting control.

Polyester capacitors are used for the decoupling capacitors to pins 5 and 2 of the regulator; the 10µF, pin 2 to 'earth' capacitor copes with transient current demands. There is also a 1000pF disc-ceramic capacitor with very short leads for RF decoupling. Component values were chosen after experimentation and may differ from those given elsewhere for the L200. A diode provides output clamping. Not shown in Fig 1 are off-the-board stabilization resistors to ensure a minimum load current, one across the output terminals and another to bleed the charge from the filter capacitor(s), these can be 4k7 resistors. Calibrated current and voltage meters make this a flexible unit; the output meter is in series with the positive output lead, with an Amidon jumbo ferrite bead over the output wire as it leaves the PCB.

ZL2AKW warns that floating a DC power supply across a battery is very different from floating a conventional charger. Battery chargers are not filtered and may modulate a phase-locked-loop in transceivers using them, particularly at the higher frequencies towards 28MHz: "On the other hand it is occasionally necessary to discharge a battery used with this PSU down to 10V or so. The amount of antimony used in car starter batteries seems to give them a 'memory'-effect when charged with pure DC, akin to the so-called Nicad 'memory' effect. It is also a good idea to make a very accurate measurement of the open circuit voltage from the octal socket at 13.8V, this will avoid boiling all the electrolyte out of the battery when it is permanently connected to the power unit and used as a no-break transceiver power source." His original starter battery can still provide 25Ah of emergency shack lighting as well as run his current rig.

NZART Branch 50 Projects is supplying New Zealand amateurs with L200C regulators, pre-drilled boards (board layout is not shown in the *Break-In* article), 60V filter capacitors and the board-mounted components, but the information given above should at least draw attention to the way in which a flexible PSU/charger can be fashioned around a readily-available L200C.

RSI, KEYBOARD CRAMP & GLASS ARM

DAVID GOSLING, G0NEZ, noted the *TT* item 'RSI, Keyboard Cramp and Brass Arm' (May 1990, pp28-29) which in commenting on recent interest in the problem of 'Repetitive Strain Injury' suffered by keyboard operators, suggested that it was akin to the form of telegraphist's cramp (popularly called glass or brass arm), as discussed in a long unpublished monograph written in the late 1930s by Colonel Prynne, a retired Chief Medical Officer of the GPO, which I had unearthed in the Post Office Archives.

As noted then "Telegraphist's cramp was no joke – in severe cases experienced operators lost completely the ability to manipulate a morse key and, in its final stage, telegraph operation becomes a matter for dread and the emotional repercussion may be such that the touch, sight or even memory of a telegraph instrument and its working may induce intense apprehension, tachycardia, tremors, hyperidrosis or loss of emotional control . . . . [Hence the Class B license? – *Ed*]. Telegra-

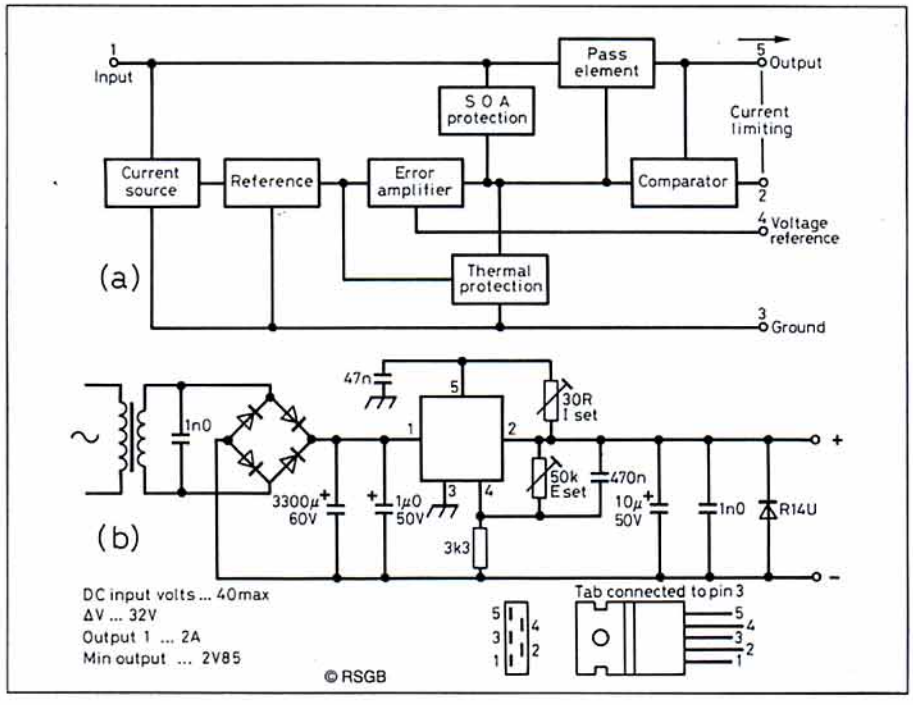

Fig 1: (a) Functional diagram of the L200C IC voltage regulator. (b)Basic arrangement of the "Duz-Everything" variable voltage, current-limited PSU/Charger described by ZL2AKW.

phist's Cramp is a disease of the central nervous system, and is the result of a weakening or breakdown of the cerebral controlling mechanism in consequence of strain upon a given set of muscles." *TT* also noted that the 1930s GPO management was anxious that, if Colonel Prynne found a publisher for his monograph, all reference be deleted to the fact that a few cases had also occurred among teleprinter keyboard operators.

RSI is currently being claimed in the Courts to be a real and not an imaginary problem affecting keyboard word-processor/VDU operators. It is usually associated with working long hours in an awkward posture. Recommendations have been given advising VDU operators to face forward with feet on the floor, with head and neck balanced and the bottom of the elbow in line with the keyboard: see **Fig 2** adapted from the *Hemel Hempstead Herald & Post*. But G0NEZ (and I fully agree with him) feels that mental stress is an equally important factor; undue concentration on getting it right, working long hours under pressure to a very tight schedule, handling urgent and important material, etc, etc.

G0NEZ writes: "I think, myself, that the amount of concentration on 'Getting it Right' ie no errors via key/paddle/keyboard etc is the real cause of muscular 'tension' in all areas, ie eyes, fingers, arms, upper limbs and torso in general . . . . perhaps we should seek to become aware of our own correct 'time on the key/keyboard'." My own advice would be to sit comfortably and keep calm and relaxed even when that choice DX station never seems to answer your calls!

A three-page article 'RSI on trial' (*New Scientist*, 11 September 1934) links RSI with writer's cramp first described by Bernadino Ramazzini in 1713. It lists such symptoms as aching necks, shoulders and arms, tingling fingers, and loss of feeling. Research suggests that symptoms can be aggravated by psychological factors such as stress and anxiety associated with repetitive tasks carried out over long periods without breaks.

Fig 2: "The right way to work" to minimise RSI problems as suggested in G0NEZ's local newspaper. A, balanced head position. B, upper arm vertical. C, lower back support and adjustable back rest. D, adjustable chair height. E, feet flat on the floor. F, balanced wrists. G, swivel stand and adjustable screen height. H, tilting screen.

NORWEGIAN AND AUSTRALIAN MULTI-BAND HF BEACONS

BACK IN JANUARY 1991, *TT* described (p33) how in order to assist the work of the CCIR (ITU) Study Group 6, it was planned to set up a worldwide system of automatic radio beacons. These were to be time-shared in the same way as the useful amateur 14.1MHz beacon network and operated on five widely spaced frequencies: 5470, 7870, 10,407, 14,405 and 20,945kHz. Although it had originally been hoped that up to 15 beacon stations would be established, it was clear by 1990 that in practice far fewer were likely to come into operation.

Time of transmission (minutes past hour)			Freq (kHz) (VK4IPS)	Freq (kHz) (LN2A)
00	20	40	5470	14,405
04	24	44	7870	20,945
08	28	48	10,407	5470
12	32	52	14,405	7870
16	36	56	20,945	10,407

(Four minutes per band, 20-minute cycle through five bands)

Table 1: Transmission schedule for the two ITU HF beacons

However, a first station, then located near Melbourne, Australia began operating in Autumn 1990, initially using the callsign AUS1MLB. By May 1991, I was reporting that Neville Paul, G3AUB had been receiving this beacon quite regularly in the mornings and afternoons on all five frequencies.

An ITU statement of 22 April 1993 (passed to me by the Radiocommunications Agency) reveals that the Australian beacon transmitter has been relocated near Brisbane and now uses the call VK4IPS. It has been joined by a Norwegian beacon, LN2A. This is located at Sveio (59.5° N, 05.3° E) on the west coast of Norway, north of Stavanger and roughly west of Oslo. Both beacons operate continuously on a 24-hr basis (**Table 1**)with nominal power of 1kW to omnidirectional antennas (VK4IPS a wideband spiral antenna – LN2A a five-band trapped vertical monopole). Power of both is a nominal 1kW.

As described in January 1991, the transmission format is designed to permit a number of propagation measurements (including multipath) to be made automatically but includes Morse identification and three-seconds or so of steady tone, making the signals of use to anyone equipped with a general-coverage HF receiver. The 12-second signal format (repeated over four minutes) comprises one second of 100bit/s FSK (850Hz shift); CW identification (about three seconds); 1.2kbit/s sequences for about 0.75 second; four seconds of FSK reversals; and steady tone for at least three seconds. The final sequence may be cut short to permit change of frequency.

FEEDBACK ON THE G2DAF LINEAR

G8DPS SPOTTED AN unfortunate error in the published circuit diagram of the classic G2DAF linear as used by G3USC. In *TT*, September 1993, Fig 1, the screen metering of the 813s is short-circuited as in **Fig 3(a)** although this would not otherwise affect the amplifier. The correct circuit is shown in **Fig 3(b)**.

Leslie Toke, G3ETU, is another G2DAF enthusiast. He built one in the early 1960s which is still going strong. Bill Wheeler, G3BFC built his linear using two 813s in a Pye PMR cabinet in 1967 while 5A5TE in Libya (one of his many overseas postings with IAL) with a design taken from the *ARRL Handbook*. He similarly endorses the age-old 813 as compared with more modern (and more expensive) valves such as the 3-500, 4CX250B, 572B etc for those wishing to enjoy the pleasures of home construction of high-power linears.

Steve Cook, G4ANA, kindly sends along photocopies of American valve data (pp2410-2435) from a near 50-year-old copy of the 28th edition (1944) of the 2 inch thick *Handbook of Chemistry and Physics* which he feels comes near to being a 'book of all known knowledge'. From the types listed I suspect the valve data may have been compiled a few years earlier as it does not include the 813 but does list some of the higher-number 800 types such as the water-cooled 862 which had a tungsten filament rated at 33V, 207A! With 20kV on the anode, it could pass 3A, representing a DC input of some 60kW! It lists the 807 and the small Acorn 944, 955 types introduced about 1937.

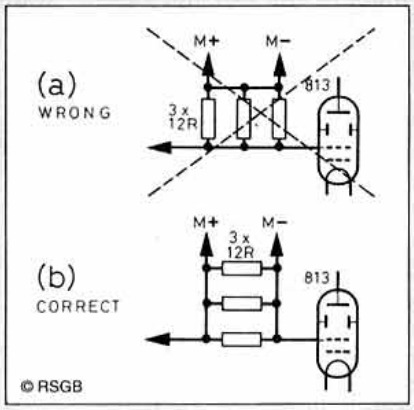

Fig 3: Correction to the screen-grid metering of the G2DAF linear amplifier. (a) As shown in *TT*, Sept 1993, Fig 1. (b) Correct connections.

THE PROS OF SURFACE MOUNTED DEVICES

THE COMMENTS BY G4EIK and myself in the February *TT* on the difficulty of repairing equipment using surface mounted technology and excessive miniaturisation brought correspondence not only from those who agreed that SMD does call for 20/20 vision, but also those who felt that *TT* may have given the impression that surface mounted technology was not really suitable for home construction and failed to bring out the value of this remarkable technology.

In fact, in 1985-86, *TT* included several items on the then developing role of SMD and hybrid microminiature assemblies and forecast that it would not be long before such technologies were used in amateur radio equipment. **Figs 5-7** from *Electronics Australia* outline the basic SMD approach.

Dr Gil Cleeton, G3LBS, at the Department of Communication and Neuroscience at Keele University, is involved with signal processing for cochlea ear implants. These enable totally deaf people to hear again. Their device passes RF at about 7MHz across the skin so that no wires pass through the body.

"We used the kits from Blue Rose Electronics (who are apparently not currently trading) and found them easy to build. They worked first time - a jig was supplied to hold each component down, but with practice we now find we no longer need it. I use a fluorescent lamp magnifier but younger colleagues manage without one.

"The advantages of SMT are that the entire circuit is on top of the board - there is no drilling for wire ends. My colleague, Dave Thomson, discovered that we could make the breadboard circuit twice final size and the components in 1206 size would still bridge the footprints so that normal size ICs could be used. Then for the final circuit we would go to half size and use the small outline integrated circuits. Admittedly, for my eyes, 1206 is as far as I can go, but some people can solder the smaller 0805 size by hand! These days, we find SMT so good we hate using wire-ended components!"

Similarly, Albert Heyes, G3ZHE, writes: "Your comments on surface mount construction raised a smile - I'm 58 years old and find that as I get older the electronic bits get smaller! But I have built a number of SMD items over the past year for QRP operation. They work first class and now I find pushing component wires through holes seems all wrong.

"To make SMD construction easier, I have made a jig (**Fig 8**) for holding the components to the PCB. It resembles a small gibbet made of double-sided PCB and mounted on a small wooden base. I aligned two 2BA nuts and soldered them to the arm, then used an old knitting needle suitably weighted at the top. The circuit board is then placed under the needle point, one end of the component can now be soldered using a small iron. The surface tension of melting solder will move small components if they are not pinned down.

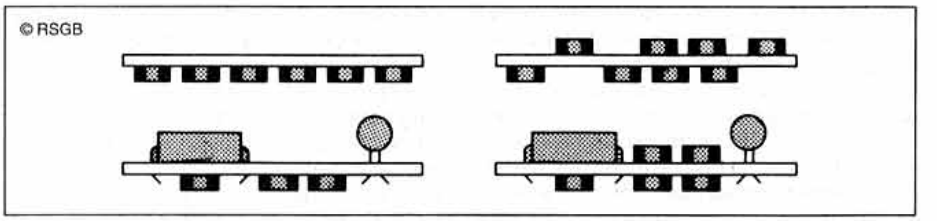

Fig 5: Surface-mounted components can be mounted on or below the printed circuit boards.

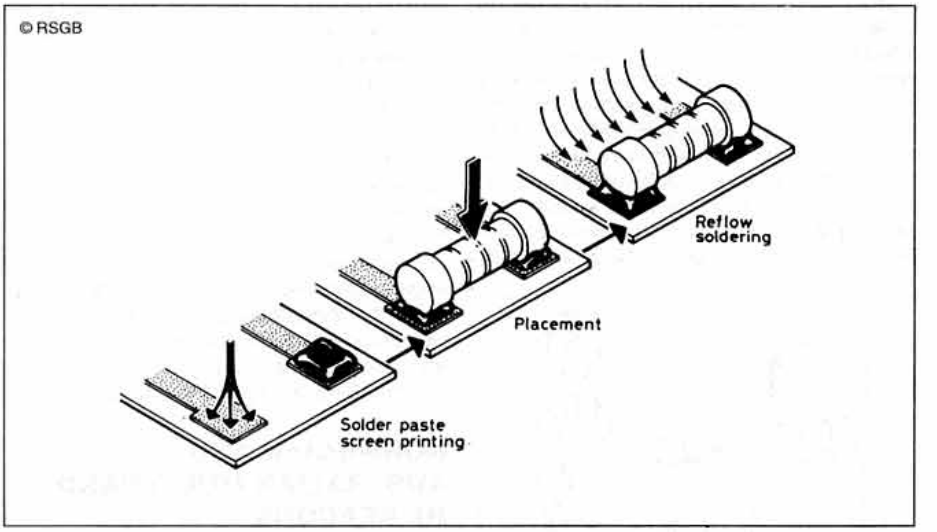

Fig 6: An alternative mounting procedure in which glue is used to hold the component to the board during flow soldering. This makes subsequent removal of faulty components rather tricky as it is easy to damage the board.

'BATTERY-LOW' INDICATOR

WITH THE INCREASING amount of equipment powered from rechargeable and disposable batteries, there is a place for a simple monitor that provides an audible warning when the battery voltage falls below some chosen value. Such a device was described by J Ruffell in *Elekto Electronics*, March 1990, and reprinted in John Walker's, ZL3IB, 'Technical Forum' column in *Break-In*, January/February 1991.

The indicator (**Fig 4**) is small enough to fit inside most battery-operated equipment, drawing current of not more than 1mA at 9V with a TLC272 dual op-amp chip (or about 250µA with a type TLX27L2). It is suitable for use with battery voltages between 4.5V and 15V, and the 'low-voltage' point is accurately adjustable with RV1.

Op-amp IC1a, connected as a comparator, compares the battery voltage, applied to the inverting input via the input network, with a reference voltage of about 4.7V derived from the zener diode D1 (note that with the low zener current, the reference voltage may not be exactly 4.7V). As the battery voltage drops, the potential at the inverting input decreases much more rapidly than at the non-inverting one, so that the comparator always toggles at the same battery voltage as set by RV1. When the zener voltage exceeds that across R3 + RV1, the level at point A rises to that of the battery voltage. C2 is then charged slowly via R5 causing IC1b to toggle, and the output of IC1b goes low. The Darlington device T1 and consequently the buzzer, BZ1, is switched on. BZ1 is a DC type with built-in oscillator and its operation causes the voltage across C2 to fall, switching off T1 and the buzzer. This process continues to repeat until the equipment is switched off and the battery replaced or recharged.

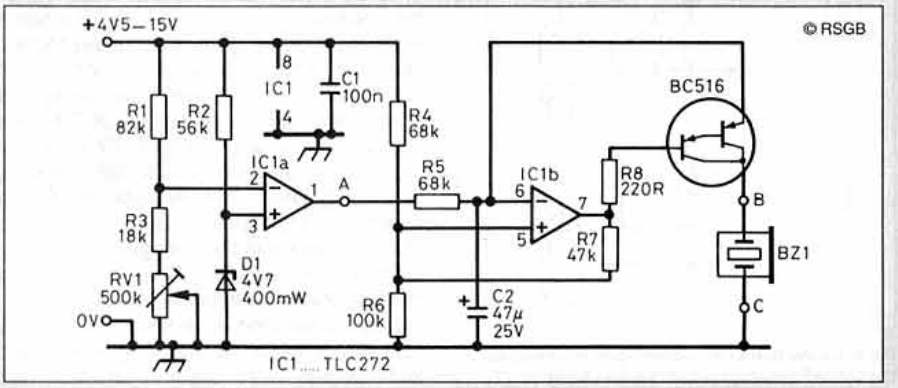

Fig 4: 'Battery Low' monitor that buzzes when the voltage falls to a pre-set value set by RV1.

J Ruffell writes: "Since the whole circuit consists of only 15 components, it is easily constructed on a small piece of prototype or Veroboard. It is preset as follows: Assuming that the battery is 9V and the buzzer required to start operating at about 7V. Connect a regulated variable power supply to the circuit and set its output precisely to 7V. Turn RV1 to maximum resistance. With a multimeter, measure the voltage at test point A; this should be virtually zero. Slowly turn RV1 until the voltage at A suddenly rises to 7V. Within a few seconds the buzzer should sound. The indicator can then be fitted into the relevant equipment and its battery connections soldered to suitable take-off points behind the on-off switch."

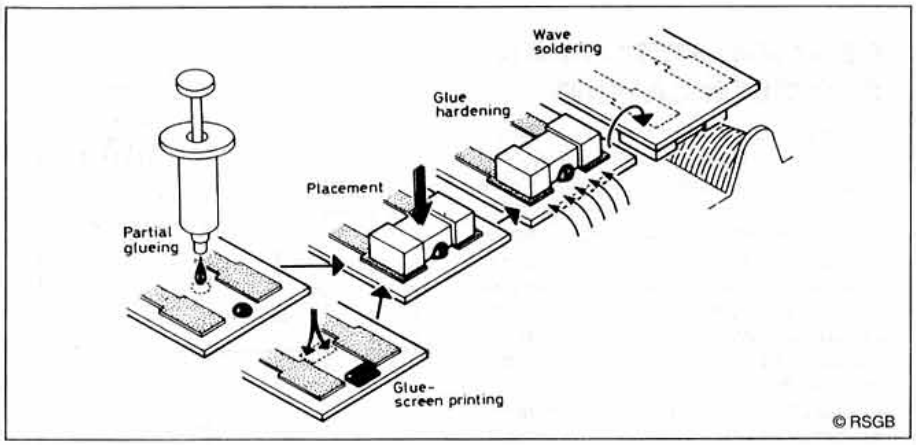

Fig 7: A standard procedure for fixing surface-mounted components on the upper side of a PCB, using solder paste screen printing as used professionally.

"I have used the Blue Rose Electronics small AF amplifier kit mentioned in the February *TT* including its construction as part of an electronics-badge course I run for the local Scouts. It makes a fine output for a crystal set! One of the Scouts built one as his second project despite little previous soldering practice. Sadly the supply of these kits has dried up."

COOKING UP HIGH POWER TRANSFORMERS

SALVAGING AND RECYCLING high-cost components from cast-off consumer-electronic appliances has long had a traditional role in amateur radio, but modern technology does not always make it a simple matter to remove parts from printed-circuit boards, etc. Perhaps it is time we began to look at the potential of some of the less obvious sources. For example, microwave ovens.

I recollect reading an article in an American magazine on how to build a simple TV transmitter in a scrap microwave oven but otherwise the subject seems to have cropped up only in connection with the interference that can be generated by these ovens. However, Dave Penny, G3PEN, shows that a discarded oven can be the source of some very useful components. He writes:

"Being ever reluctant to throw away any possible source of electrical or mechanical parts for amateur radio use, I recently stripped a (donated) microwave oven, a faulty Toshiba Model ER-672, which had been diagnosed (probably correctly) as having a dying power microwave valve. The oven worked at defrost levels but cut out on higher loadings, so it appeared there was a good chance that most of the other parts were in working order. Apart from a useful range of electro-mechanical parts including the 1-hour timer clock and several micro-switches, the obvious prize was the power transformer.

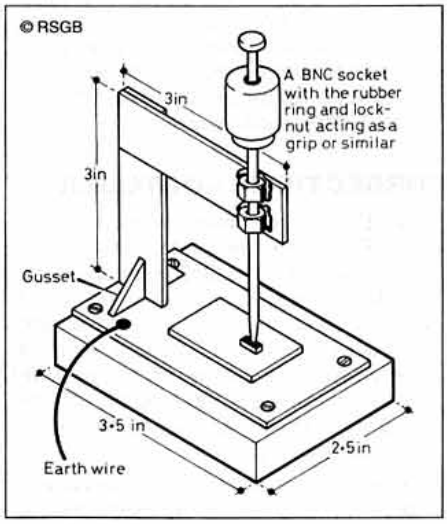

Fig 8: G3ZHE's home-made jig making it easy to hold the components to the PCB for soldering.

"The primary winding in this model was found to use 18SWG wire, allowing about 3.5-4.0A, depending on which data tables are consulted. This represents about 840-960VA which is reasonable for an oven rated at 650W output. The secondary delivers 1860VAC unloaded and 1800V loaded to about 200mA. My calculations suggest that the allowable RMS secondary current should be about 400mA. The core appears to be standard E/I laminations, of good size and proportions.

"The primary winding is untapped (presumably intended for 240V mains supplies) and the secondaries comprise a well-insulated heater winding, and a single untapped HT winding, which is connected to earth (transformer core) at the inner end. I would not advise 'lifting' this connection to permit bridge rectification, as the insulation between inner end of the winding and core may then be insufficient. The original oven power supply used the half-wave mode, with a single (unmarked) diode and a 1µF high-voltage capacitor as the only smoothing – not recommended for amateur radio applications!

"However with half-wave rectification, and using normal component values, a continuous rating approaching 300mA DC at up to 2000V DC should be achievable – nearly 600W. Enough for almost any power amplifier or linear amplifier within the UK legal limit – at very little cost! No doubt ovens of other makes and models would provide similarly rated transformers.

"Incidentally, the transformer, although fitted with bolt-holes for lamination clamping in the usual way, did not use them, but was arc-welded across the laminations in several 'stripes' around the core, possibly increasing iron losses but resulting in a transformer totally free of audible hum.

Finally, an oven can also provide useful mechanical and screening materials, including magnetic strips from around the door, and fine metal mesh from the door itself. I still haven't found a use or market for tired microwave valves – possibly one exists. I haven't tried to look into them in case they echo solid-state power devices in containing beryllium."

FERRITE BEADS NOT STEEL WOOL FOR W2DU BALUNS!

WALTER MAXWELL, W2DU, the highly-respected antenna expert and originator of the ferrite-loaded 1:1 current balun (see for example *TT*, September 1992, Fig 7 and January, 1993, p43), has sent me, along with other topics I hope to report on in a future *TT*, a copy of an article of which a shortened version appears in the September 1993 issue of *QST*, p77. It shows conclusively that steel-wool, as used by W0KKQ (*TT*, March 1993, pp36-37 based on an item in *QST*, November 1992) is not, repeat *not*, suitable as a substitute for ferrite beads in this application. Extensive measurements by W2DU "prove that the high isolation impedance required to perform the balun function is simply not obtained using steel wool as the loading material."

He adds: "The steel-wool-on-unjacketed-coax device in the *ARRL Handbook* is useful in reducing RF radiation from coaxial lines due to conducted chassis radiation. But in this case, no isolation impedance is required between a load terminating the line and the line itself, as there is with a balun. Here the steel wool presents a highly absorptive, low-resistance path for the RF, dissipating it in the form of heat." My apologies to anybody who was misled by *TT*!

FESSENDEN – PIONEER OF RADIO TELEPHONY

RONALD MARTIN, VE3ORN, has drawn attention to a letter by John S Belrose, VE2CV, in *The Canadian Amateur Radio Magazine*, June 1993, under the heading "Fessenden – the inventor of radio as we know it today". VE3ORN, writes: "It seems to me that I have heard other versions of who invented radio and would appreciate another opinion".

VE2CV's letter is a paraphrase of the introductory remarks of the 15th Annual Alexander Graham Bell Lecture which he presented last November at McMaster University, and included the rhetorical question: "Do you know: (1) Who first used the word and the method of continuous waves? (2) Who was first to transmit voice over radio? (3) Who devised a detector for continuous waves? (4) Who first used the method, and the word heterodyne? (5) Who was the first to send two-way wireless telegraphy messages across the Atlantic Ocean? (6) Who was first to send wireless telephony (voice) across the Atlantic Ocean? and (7) Who made the world's first wireless broadcast (voice and music)?

VE2CV then gives the answer to all seven questions as "Reginald Aubrey Fessenden, a Canadian-born radio pioneer working in the United States. Fessendon must clearly be the pioneer of radio communications as we know it today. I wonder how many of you have heard of him?"

My feeling is that most of us who are interested in the history of radio recognise

that it was Fessenden who made the first 'broadcast' of music and speech in 1906. In fact, none of the seven claims made by VE2CV, can be seriously disputed, although A F Collins had demonstrated a form of 'electrostatic' radio-telephony by 1900. Fessenden's major contributions stemmed from his work with radio-frequency alternators rather than with spark. His alternator was later vastly improved in power output by E F W Alexanderson and became a key factor in the formation of RCA. Canadians have every reason to be proud of his work. The 1934 Science Museum handbook *Radio Communication – History and Development*, in the chapter 'Early wireless telegraphy experiments', briefly reviews the contributions of Sir Oliver Lodge, Prof A Popoff, Sir Henry Jackson, Dr Ferdinand Braun, Prof Slaby and Count Arco, Nikola Tesla, R A Fessenden and then devotes several pages to Senator G Marconi. The contributions of Clerk-Maxwell, Hertz and Hughes are discussed earlier, and Americans point to the work of Loomis.

The note on Fessenden is as follows: "Fessenden was one of the earlier workers in the field of wireless communication and radio frequency measurements, and some of his researches are notable for the influence they bore after a lengthy period. Thus he proposed the beat reception of continuous wave signals as early as 1902, before adequate means had been devised to propagate them. He afterwards patented the separate heterodyne method of reception after the introduction of the valve, in 1913. He did valuable work on high frequency measurements and compressed gas condensers and was one of the pioneers of the high frequency alternator. He broadcast speech and music, by modulation of the output of a small alternator, in 1906, and also obtained musical spark transmission by means of a rotary discharger independently of Marconi, who also developed such a method."

A detailed, illustrated article 'The First Radio Broadcast – Christmas 1906' by W S Marcell (Reprinted in *Radio Bygones* No 20, Christmas 1992 from a 1969/70 issue of the training and information bulletin of the Canadian Forces Communication System), quotes Ormond Raby of Toronto: "Reginald Fessenden has been the victim of both the vast progress in science since his death, and the almost total neglect of his Canadian compatriots. As a result, his work instead of being recognised as perhaps the greatest contribution ever made to science by a Canadian, has been relegated to near oblivion."

CERAMIC FILTERS AS BFO OSCILLATORS

JOHN BEECH, G8SEQ, recalls some information on the use of ceramic resonators and ceramic filters to provide stable beat frequency oscillators that he published some time ago in *Sprat*. *TT* has in the past included information on the use of ceramic resonators rather than higher cost crystals in oscillators and also for variable-frequency 'VXO-type' oscillators (eg *TT*, February 1991, pp30-31 and December 1985, p937).

It has been shown for example that it is easier to *pull* the frequency of ceramic resonators rather than crystals without significantly degrading stability. Ceramics are lower Q than crystals and have a higher temperature coefficient but will function satisfactorily for a number of applications including their use in BFOs.

G8SEQ gives (**Fig 9**) a typical oscillator using a 455kHz ceramic resonator. He measured a change of frequency of only about 125Hz for supply voltage changes of from 5-10V while delivering between 4 and l5Vp-p output.

Finding himself without a ceramic resonator, he experimented with ceramic CMF filters types CMF 24550 (455kHz) and also a 10.7MHz ceramic filter type CFS as in **Fig 10(a)**. He found that provided he connected pin 2 (normally grounded when the device is used as a filter) as a 'centre tap' in a Hartley/Colpitts configuration. With the 455kHz filter, the output frequency tends towards the bottom edge of the filter bandpass (ie about 450kHz). With the 10.7MHz filter (type CFS), oscillation was at the top end of the bandwidth - ie about 10.87MHz.

G8SEQ adds: "Using the 4550 as an oscillator in conjunction with a 4550 IF filter, upper sideband can be effectively demodulated: **Fig 10(b)**."

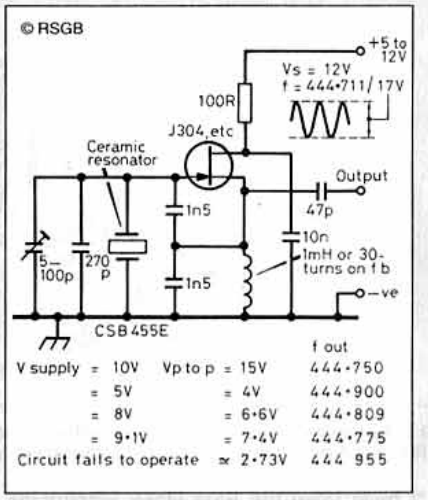

Fig 9: BFO oscillator using ceramic resonator.

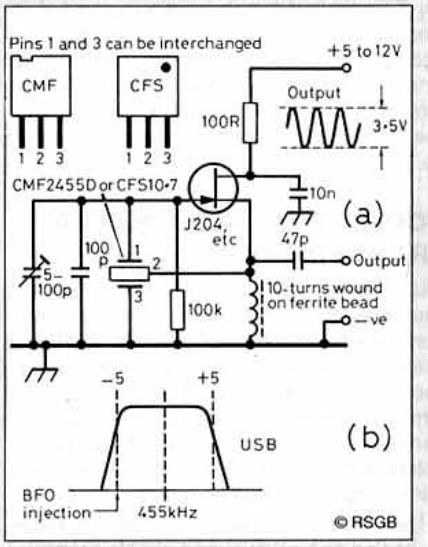

Fig 10: (a) BFO oscillator using a mechanical/ ceramic filter (b) 455kHz filters can be used for the IF strip and carrier injection oscillator to demodulate VHF SSB.

HERE AND THERE

A RECENT EDITION of the BBC World Service programme *Waveguide* drew attention to the difficulty that seriously visually handicapped people have when using modern hi-tech radios and audio equipment where digital push-buttons have largely replaced a small number of analogue controls. It was reported that large international companies when approached about the possibility of producing special models for the blind and nearly blind were unwilling because of the relatively small numbers concerned. A member of the Wireless for the Blind organisation suggested that broadcast radios made by the UK firm of Roberts Radio were reasonably user-friendly and that there are also substances that can put 'feelable' identification marks on the controls. While listening I could not help wondering how 'white stick' amateurs cope with modern transceivers some of which now have over 50 front-panel push-buttons and rotary controls, and with operation dependent on liquid crystal displays and multipurpose meters. By no means, I would guess, simple to get used to even with 20/20 vision, particularly if one cannot read the manual.

Wilf Boothman, G3SWP, sent a cutting from the *Electrical Review* "Dry cell recycling claims get battery makers charged up" which shows how the long-term controversy surrounding the recharging of dry-batteries using 'dirty-DC' still rambles on despite all the evidence that this can be economically worthwhile, provided that care is taken to avoid overheating of the cells leading to the possibility of explosion. A mail-order company, Innovations, has recently introduced two models claimed to recharge, a useful number of times, 90% of all primary batteries, including zinc chloride, alkaline manganese and mercury-free types, as well as Nicad and alkaline rechargeables, but not lithium, mercury and other button cells. As might be expected, the British Battery Manufacturers Association (BBMA) casts doubt on the safety of these chargers. Since their widespread use would eat deeply into a £1-million per day market, in the classic phrase of Mandy Rice-Davies, "They would, wouldn't they".

CORRECTIONS - OCTOBER *TT*

(1) G3SBI's H-mode mixer. Three errors crept into Fig 3 showing the test assembly of this new mixer. The Q, Q outputs from the 74AC74 should pass through 0.1µF DC-blocking capacitors. The 6k8 resistor to the left-hand bias-adjustment pot should be joined to the junction of the two 150R resistors to pins 3 and 6 of the SD5000 and not as shown. (Compare with Fig 4 of September *TT*).

(2) Reflectometer diodes (p56), third column, second paragraph should read: "Unfortunately, this does not work with the FT290 and HX-240 . . . ." ***G3VA***

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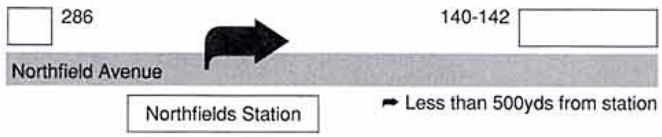

By Tube, still the same Piccadilly line and get off at Northfields, but turn RIGHT, (instead of left for the old shop), walk less than five hundred yards and the showroom is on your left hand side. For those of you who know RUPERT'S Vintage Wireless shop, we're opposite!

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RADCOM TECHNICAL FEATURE

The New HF Data Mode: Clover II

The first of a three-part feature by Jack Hollingworth, ZF1HJ

YOU MAY WELL BE ASKING "What on earth is Clover, where did it come from and how did it get its name?" Clover was conceived by Ray Petit, W7GHM, and developed over a period of some five years. The story really begins around 1975 when articles began to be published about a new mode known as 'coherent CW' or CCW. This is a method of transmitting Morse code in an extremely narrow bandwidth, around 12 to 15Hz, at approximately 12WPM. The code is generated with extremely accurate timing and transmitted at a very precise and stable frequency.

By 1981 hardware working in conjunction with an early personal computer had been built and practical tests produced some remarkable results, showing an effective gain of around 20dB over conventional Morse code. [1] concludes with an acknowledgement of W7GHM's contribution to the design. The mode never became popular, although a small group inspired by Peter Lumb, G3IRM, is still working with it. It did however illustrate what improvements could be made to a venerable mode of communication using current hardware and software.

Ray Petit had observed the ludicrous inefficiency of HF Packet and admired the ability of AMTOR to maintain a link in adverse conditions. He felt that what was needed was a mode that would transmit something close to the theoretical maximum amount of data in a given bandwidth, with a minimum of errors and repeats. Ray began to work on Clover full-time in 1987, initially drawing on his experience in the research laboratory of the US Navy Communications Sciences Division in the early seventies.

His first move was to carry out a series of observations of the factors affecting HF transmission of data signals and then to develop a method of modulation that would occupy a minimum bandwidth whilst carrying a maximum of data. In the course of this work one of the displays used for signal analysis produced a clover-leaf shape – hence the name Clover. His approach was to develop a system that was unfettered by the need to be compatible with any existing mode and indeed to question and re-examine many of the established doctrines of HF data transmission.

INITIAL EXPERIMENTS

THE FIRST SYSTEM, which is now known as Clover I, sent data at modest rates in a very narrow bandwidth. It yielded a great deal of practical information and worked very well. A major problems was that the data rate, whilst adequate for one-on-one communications, was relatively slow and therefore unsuitable for BBS operation. Also the demands on receiver and transmitter performance were extreme, to the point where early versions included a specialised high-performance transceiver, at least half of the circuitry being a sophisticated synthesiser.

Using many of the basic design features together with the practical experience gained, Clover II was then developed. This version is capable of much higher data rates and can be utilised with virtually any modern transceiver. After joining forces with HAL Communications in 1990, Ray continued the development of Clover II and both hardware and early versions of operating software became available at the end of November 1992. Clover II is the end result of a complete re-examination of all the factors involved in HF data transmission and its underlying strength lies in a radical departure from conventional FSK modulation methods.

Whilst Clover is a complex and sophisticated system internally, as far as the operator is concerned it is functionally no more difficult to use than any other data mode. Indeed, it has far fewer options and commands than AX25 Packet. There are a number of parameters unique to Clover that can be pre-set (or simply left at their default settings) and in Forward Error Correction (FEC) mode a selection may be made from a range of encoding methods, or the default setting can be used.

It is not necessary to have a profound understanding of the design of Clover to use it; hardware and software are easily installed and can be used without detailed knowledge of the internal workings, which will be described in this article.

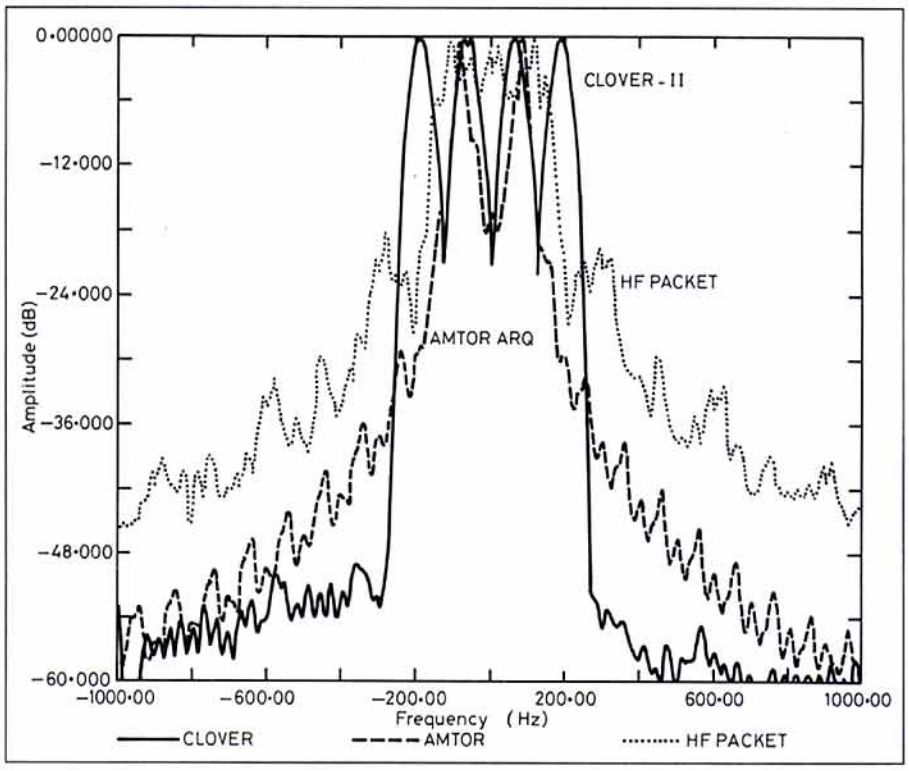

Fig 1: A comparison of Clover and other data modes demonstrates its bandwidth advantages over AMTOR and HF packet. The four sets of Clover pulses are spaced at 125Hz intervals.

A REVIEW OF EXISTING DATA TRANSMISSION MODES

BEFORE EXAMINING the finer points of the new Clover mode, we should first review how existing 'conventional' data modes work and appreciate their deficiencies. The modes in common use are RTTY (with Baudot or ASCII codes), AMTOR (in ARQ and FEC modes), Pactor and Packet. All are designed to ac-

cept, transmit and reproduce serial digital data at the receiving end. The precise form of that data need not be considered for the moment; suffice it to say that we are presented with a series of digital 'ones' and 'noughts' which must be transmitted and reproduced accurately at the receiver.

All existing amateur data modes have one thing in common; they use frequency shift keying as the modulation method. That is, when a 'nought' is being sent, a constant amplitude carrier or tone is transmitted at a particular frequency and when a 'one' is sent, the frequency of that carrier is shifted. Amateurs normally use a shift of 170Hz at HF (in the case of HF Packet and some commercial RTTY/AMTOR units, 200Hz).

At first sight one might think that this would produce a nice narrow-band signal, which perhaps would allow us to operate in a bandwidth of around 200Hz. This, unfortunately, is far from the case. To explain why this is so, consider our transmitted signal not as a single carrier that is shifted, almost instantaneously, between two frequencies, but as two carriers, each of which is keyed on and off in antiphase. This amounts to much the same thing; we are merely looking at it in a different way.

If we consider one of these signals, we will see that we have a carrier that is 100% modulated by something approaching a square wave. Our basic theory tells us that the spectrum of this signal will consist of a steady carrier and a series of sidebands at multiples of the modulating frequency. Therefore the composite signal consists effectively of two steady carriers 170 (or 200) Hz apart, each having sidebands that may extend several hundred Hertz above and below the carrier frequency. This can be seen quite clearly in **Fig 1**, which shows the measured spectra of HF Packet and AMTOR signals, superimposed on the spectrum of a Clover signal.

FSK BANDWIDTH

WE CAN NOW see that an FSK signal is inherently wide band. How wide depends both upon the sharpness of the transitions between 'one' and 'nought' – or to use the correct terminology 'mark' to 'space' – and the modulating frequency, that is the rate at which data is sent. In practice, such signals have sidebands typically around –50 to –40dB at ±1kHz from the centre frequency. Obviously if we are copying a weak FSK transmission and another station with a strong FSK signal is transmitting as much as 1kHz away, the weak signal may be obliterated. In our narrow and crowded HF bands, this is something to be avoided if at all possible.

All existing data modes using FSK exhibit this wide-band characteristic. It is of course possible to limit the bandwidth, either by filtering at the output of the AFSK generator (a technique used in some implementations of Pactor) or by using a narrow filter in the transceiver, typically having a bandwidth of around 500Hz. The effect is to slow the transitions between mark and space in the demodulated signal, since the higher harmonic components of the modulating waveform are attenuated.

At low data rates this does not matter but at higher rates the elimination of the higher frequency components can create excessive distortion of the waveform, resulting in decoding errors. What is happening in practical terms is that the rise time at the start of a bit becomes so long that it is comparable to the length of the bit itself. Packet signals, which use a 300 baud data rate compared to AMTOR's 100 baud and RTTY's 50 baud, are severely distorted if passed through a narrow filter. Consequently Packet signals typically occupy a bandwidth of some 2kHz, as any attempt to restrict the bandwidth results in excessive distortion and a high error rate.

PROBLEMS SPECIFIC TO HF – RTTY AND PACKET

ANOTHER FACTOR that all existing digital modes have in common is that they are either adapted directly from systems originally designed for use over landlines (RTTY and Packet) or they are developments of such systems designed to overcome some of the problems encountered when transmitting over a radio rather than a landline circuit (AMTOR and Pactor). RTTY and Packet were originally designed solely for transmission over landlines, where the circuit quality in terms of noise and distortion can be controlled and kept within specified limits. Such systems assume, in effect, that if transmission errors occur due to deteriorating circuit quality, then the circuit problem will be corrected – they make no provision for dealing with transmission distortions that are outside specification.

Other than in relatively rare circumstances, HF radio circuits are subject to distortion and noise well beyond that which could be accepted on a landline. Impulsive and other forms of noise from various sources are usually present and the ionosphere itself introduces distortions. On any particular path the receiver sees not one simple clean reflection of the transmitted signal from the ionosphere; rather it sees the sum of many signals that have arrived after travelling by different paths. Not only do these signals arrive at different levels due to differing attenuations, but they travel over paths of differing length and moreover the paths are changing continuously. This results in selective fading (some components of the signal adding to produce a strong signal whilst others cancel to produce no signal at all) and also in smearing in time due to the arrival of signals having differing propagation delays.

Fading and impulse noise can result in the loss of bits in the data stream or the insertion of spurious bits. To an extent these problems can be reduced by increasing the signal level at the receiver, but they can rarely be entirely eliminated – even on a relatively good HF circuit some errors can be expected. Ionospheric distortions resulting in smearing are another thing altogether; typically they can cause a variation of up to 4mS in the apparent

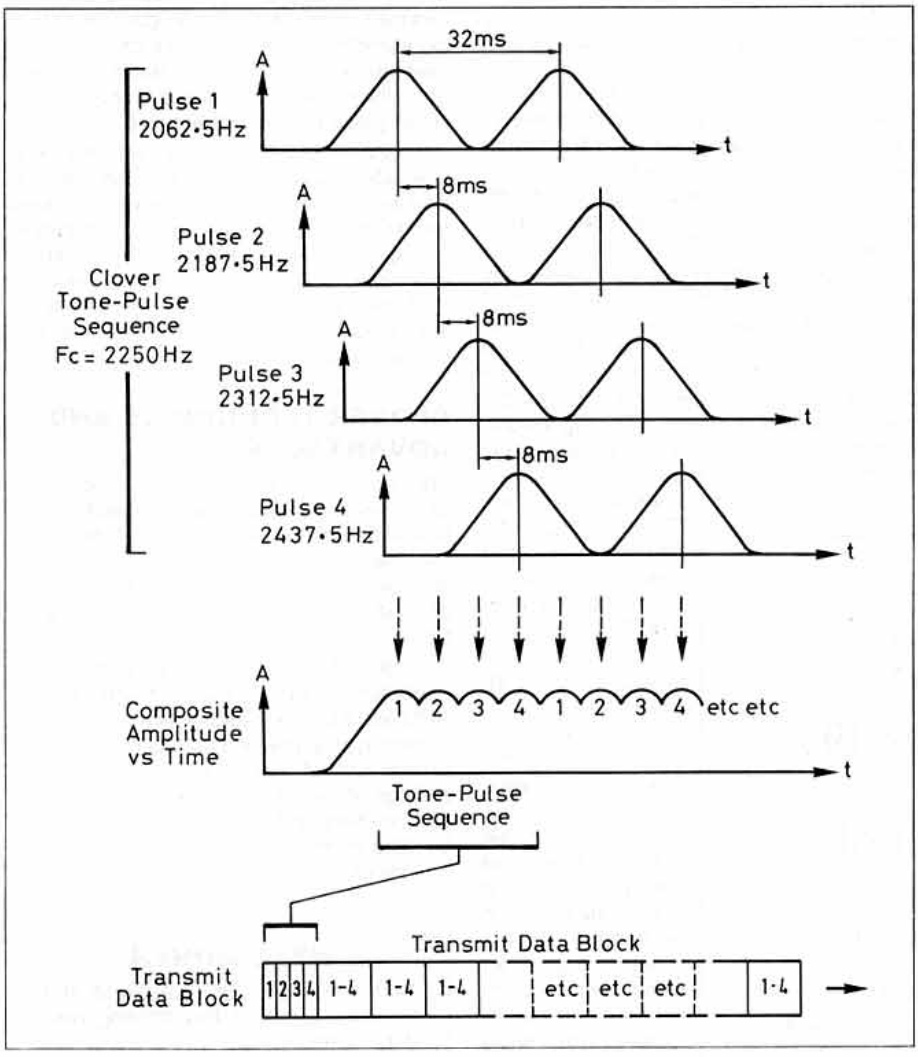

Fig 2: Clover tone-pulse sequences as a function of amplitude and time.

timing of an individual bit. Increasing the signal level at the receiver does not help in these circumstances and high error rates are often experienced even on very strong signals, due solely to such ionospheric distortion.

If data is transmitted at a relatively low rate, so that the length of each bit is substantially greater than the 4mS or so smearing that may be caused by multipath propagation, then it can be recovered at the receiver without difficulty. As we increase the data rate however, the bit length eventually approaches the 4mS level of distortion that can occur due to smearing and errors occur. Individual bits are effectively moved in time by anything up to the width of a bit, thus appearing at the wrong place in the data stream and causing errors. This phenomenon imposes an upper limit on the rate at which data in this form can be reliably transmitted over an HF circuit.

AMTOR AND PACTOR

RTTY AND PACKET have been developed into AMTOR and Pactor to overcome some of the problems encountered when applying systems designed for landline use to HF conditions. They address the problem of correcting errors, in the case of AMTOR ARQ by sending short blocks of three characters, encoded in such a way that single bit errors can be detected and a repeat of the damaged block requested by the receiving station. AMTOR FEC employs effectively 100% redundancy, sending each character twice and in such a way that errors may be detected and, if not too severe, corrected by the receiving station. Pactor employs rather more sophisticated techniques to detect and correct errors and it also offers a simple strategy to take advantage of better than average propagation conditions; the baud rate may be increased from 100 to 200 if conditions permit.

Both AMTOR and Pactor are very considerable improvements on their predecessors but both suffer from the same limitation; they are developments of existing, basically unsuitable systems, designed to overcome some of the problems encountered. Neither has been designed from scratch as a data system specifically for HF use and therefore they fail to reach maximum effectiveness, in terms of transmission of the maximum amount of data in the minimum bandwidth, under whatever propagation conditions prevail at a given time. The designers of these systems have done a good job but, as the saying goes, one cannot make a silk purse out of a sow's ear. Indeed, one could say that in trying to utilise Packet on HF, we have succeeded in making a sow's ear out of a silk purse!

MODULATION METHODS AND THE CLOVER PULSE

CLOVER USES A completely different modulation method, which is inherently narrow-band. Rather than use frequency shift keying, a series of pulses is transmitted. The pulses are carefully shaped in amplitude (the pulse shape is known as a Dolph-Chebychev function) in such a way that the resulting transmitted spectrum is very narrow and compact.

Each pulse is 8mS long and is repeated at intervals of 32mS. The bandwidth of the resulting signal is 125Hz (at –50dB) and four such pulse trains are generated, spaced 125Hz apart and resulting in a total bandwidth of 500Hz, with the sidebands of the composite signal being –50dB or more at ±250Hz from the centre frequency. In addition, the pulses in the four channels are staggered in time, so that the pulse in the second channel occurs 8mS after a pulse in the first channel and so on, resulting in a crest factor of 2 for the composite waveform. **Fig 2** shows the pulse timing and frequencies and **Fig 3** represents the pulse ensemble in amplitude, time and frequency. Readers may find this diagram useful as a graphical illustration of the Clover format. The resulting measured spectrum is shown in Fig 1, with those for AMTOR and HF Packet superimposed for comparison.

Data is transmitted by modulating the pulses in increments of phase, in increments of amplitude or both or these, but the basic pulses and pulse rates remain unchanged. As the phase changes take place during the intervals between pulses, the wide spectrum normally associated with phase shift keying (PSK) is not generated. The pulse rate in each channel is always 31.25 per second and the spectrum is unchanged for all modulation formats and data rates. The pulse length is such that ionospheric distortions do not cause significant errors, and data throughput is increased by utilising four pulse trains rather than a single pulse train at a faster rate.

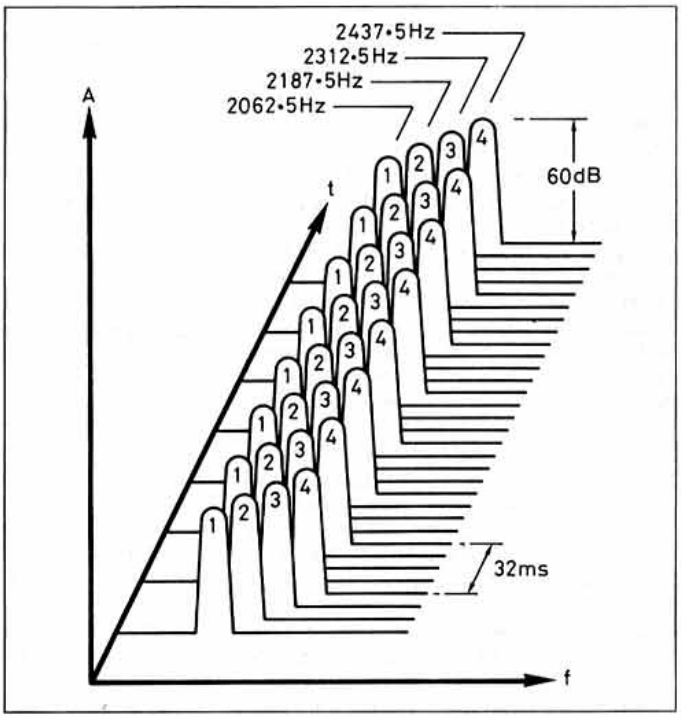

Fig 3: Clover data pulses plotted against frequency and time.

This technique provides two very desirable characteristics for transmission on the high frequency bands, firstly inherently narrow bandwidth and secondly relative immunity to ionospheric distortion caused by multipath propagation. The immunity arises because the Clover pulse length of 8mS is double the ionospheric distortion of up to 4mS that can be expected.

CLOVER TECHNIQUES AND ADVANTAGES

WE HAVE LOOKED somewhat superficially at how existing data modes approach modulation and error correction and have described the basic parameters of the Clover signal. We will now look in rather more detail at the forms of modulation and error correction used by Clover.

Unlike AMTOR, which has a fixed error correction technique for each of its two modes, ARQ and FEC, or Pactor which can adapt to changing propagation conditions by sending at data rates of 100 or 200 baud, Clover has a range of modulation modes and error correction methods from which to select a combination most appropriate to the prevailing conditions.

NEXT MONTH

Jack Hollingworth goes into the technical detail of this exciting new data mode.

RADCOM TECHNICAL FEATURE

Circuit Concepts Explained

by Clive Smith, G4FZH

THIS ARTICLE follows my previous one 'Complex Numbers' [1], and expands on previous principles to develop circuit theory. I will now introduce the concepts of admittance, conductance and susceptance, and the equivalence between parallel and series circuits. The j notation is used to assist in circuit analysis. A short computer program is also given to help in any analysis required, they have been tried on a BBC computer and a PC (GWBASIC).

Impedance comprises a resistive term and a reactive term due to capacitance and inductance – do you remember? Using complex number notation this can be written as:

impedance = resistance + j reactance (units Ohms)

Another way of expressing this is admittance, the reciprocal of impedance:

$$\text{admittance} = \frac{1}{\text{impedance}} \quad \text{(units Siemens)}$$

NOTE: The SI unit, the Siemen (S), is the reciprocal of the Ohm and was once referred to as a mho.

Admittance can also be split into complex number notation and is written as:

admittance = conductance + j susceptance

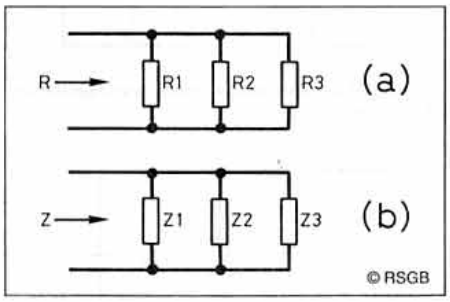

Fig 1: Parallel impedance elements.

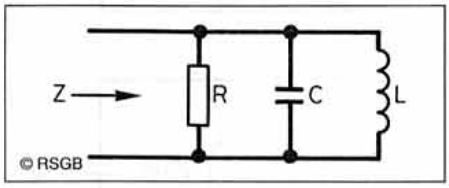

Fig 2: Z = R at resonance.

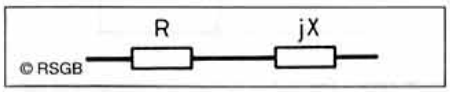

Fig 3: Impedance of a series circuit.

Trying now to put this in a mathematical form, assuming the impedance is given by:

$$z = r + jx$$

then the admittance is given by:

$$y = \frac{1}{z} = \frac{1}{r + jx} = \frac{r}{Z^2} - j\frac{x}{Z^2} = g + jb$$

where $Z^2 = r^2 + x^2$

Where g is the conductance and b the susceptance.

The admittance can also be expressed in a magnitude and angle form, this is related to the impedance by:-

$$Y\angle -\theta = \frac{1}{Z\angle\theta}$$

ie, the magnitude $Y = {}^1/_Z$ and the angle becomes minus that of Z; thus if $Z = 100\angle 30°$ then $Y = 0.01\angle -30°$.

A PRACTICAL USE

THE FOLLOWING example shows how either impedance or admittance can be used to describe circuit values. Take the parallel circuit as shown on **Fig 1(a)**. It has been taught or learnt (possibly somewhere in the dim and distant past) that the equivalent resistance of the circuit is given by:-

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

This is basically the summation of conductances as no reactive elements are included. If each resistance is replaced by an impedance (a more general form), then for **Fig 1(b)**

$$\frac{1}{z} = \frac{1}{z_1} + \frac{1}{z_2} + \frac{1}{z_3}$$

When performing this summation it is imperative that phase angles are taken into account. If the simple case of **Fig 2** is now considered, then:

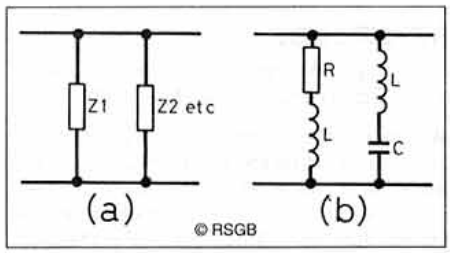

Fig 4: Parallel branches are first dealt with separately.

$$\frac{1}{z} = \frac{1}{R} + \frac{1}{jX_L} - \frac{1}{jX_C}$$

If $X_L = X_C$ the term involving j becomes zero and then ${}^1/_z = {}^1/_R$ or z = R. This is the condition of resonance, the resonant frequency being obtained from:

$2\pi fL = 1/(2\pi fC)$ which gives $f = 1/(2\pi\sqrt{LC})$

— a familiar formula!

If the circuit is not at resonance, after juggling with the mathematics:

$$z = \frac{X^2R}{R^2 + X^2} + j\frac{XR^2}{R^2 + X^2} \quad \text{where} \quad \frac{1}{X} = \frac{1}{X_L} - \frac{1}{X_C}$$

SERIES AND PARALLEL CIRCUITS

IN CIRCUIT ANALYSIS it is a general principle that wherever possible, reactances and resistances are individually combined in order to reduce the circuit to its simplest possible form. This makes it easier to solve the problem.

This philosophy applies in amateur radio circles, especially when trying to match circuits to each other, eg transmitter to antenna. The foregoing section of this article gives some of the possible mathematics involved whilst this section deals with converting between series and parallel circuits. Please note that when an equivalent circuit has been found it is only valid at one frequency as it involves reactances which themselves are frequency dependent.

SERIES CIRCUITS

THESE ARE GENERALLY the easiest to deal with (**Fig 3**). Collect together all the resistances and reactances – taking into account the sign which represents capacitance (-) and inductance (+). The result can then be expressed in the form a + jb. Note; the reactance is frequency dependent and so the value of a + jb changes with frequency.

PARALLEL CIRCUITS

THESE CAN CONSIST of many branches (**Fig 4a**), each branch consisting of resistance and/or reactance – see **Fig 4b** for an example.

As with many problems there is not necessarily a single approach, however the methods chosen here are the most straightforward for people to understand. All solutions must produce the same result – the main problem being one's ability to use a computer, calcu-

lator or brain correctly! Like soldering, it is often a matter of experience that will determine the approach that requires the minimum amount of manipulation.

The case of two parallel branches is relatively simple to analyse. Each of the branches can be put in the form r + jx and the formula below used to obtain the equivalent value in the form R + jX for the combined network.

$$z = \frac{z_1 z_2}{z_1 + z_2}$$

This can be evaluated with a knowledge of complex mathematics [1]. **Listing 1** contains a BASIC program for performing this calculation.

A more general approach to this problem is to use the summation of admittances. Referring to **Fig 5**, the total admittance can be expressed as:

$$y = y_1 + y_2 + y_3 \text{ etc}$$

If each branch is input in the form g + jb, the equivalent admittance can be calculated. The reciprocal of this can then be found to give the equivalent impedance.

EQUIVALENT SERIES AND PARALLEL CIRCUITS

THE FOREGOING hopefully will have given some insight into the fact that generally one circuit can be represented by an equivalent circuit, although maybe only valid at a given frequency. This means that the input impedance of an unknown circuit (**Fig 6**) can be represented by, for example, a series or parallel circuit although the exact arrangement of components within the box is unknown. It is the relationship of voltage/current/phase at the terminals that defines the input impedance.

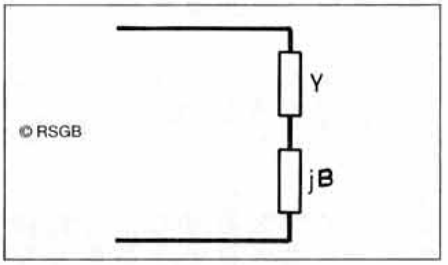

Fig 5: Summation of admittances.

The most common relationship is that between series and parallel circuits – **Fig 7**. Although some of the values obtained during these analyses are not necessarily practicably realisable (eg huge values of inductance), when reverting back to the opposite form practical values are usually obtained.

The relationship between parallel and series circuits is:

$$R_p = \frac{R_s^2 + X_s^2}{R_s} \qquad X_p = \frac{R_s^2 + X_s^2}{X_s}$$

$$R_s = \frac{X_p^2 R_p}{R_p^2 + X_p^2} \qquad X_s = \frac{R_p^2 X_p}{R_p^2 + X_p^2}$$

PRACTICAL EXAMPLE

THE FOLLOWING example makes use of this theory.

The input to a circuit appears like 1kΩ in parallel with 100pF at 2MHz. What is the series element needed to make the input resistive only? See **Fig 8** for the circuit and solution. (Hint: convert the parallel branch to a series circuit and then use X to cancel out the reactance).

PROGRAM LISTING

NO ERROR CHECKING is provided on the user input. Care must be taken to ensure that the ATN function is within the range –89° to +89°.

Listing 1 calculates the combined impedance of two parallel impedances and provides an equivalent circuit as shown on Fig 5. Each branch is input in the form of a resistive part and a reactive part. These are transformed into a magnitude and angle. The top line is combined using the mathematics in reference [1] – lines 80, 90 and 100. The bottom line is evaluated by adding the resistive terms and reactive terms together separately. This is then converted to a magnitude and angle – line 110. The top and bottom lines of the equation are then combined and the overall impedance and phase angle calculated and printed – lines 120 and 140. The form R + jX is calculated (line 170) and printed out.

REFERENCE

[1] 'Complex Numbers', Clive Smith, G4FZH, *Radio Communication*, May 1993.

● Three further computer listings are available: To calculate the impedance and admittance for multi-parallel branches, to convert series to parallel and to convert parallel to series. Just send an SASE to the *RadCom* office at RSGB for your copy.

LISTING 1

```
10  REM calculates impedance of
    two parallel branches
20  CLS
30  INPUT "Branch 1, resistance
    value ", R1
40  INPUT "Branch 1, reactance
    value ", X1
50  PRINT
60  INPUT "Branch 2, resistance
    value ", R2
70  INPUT "Branch 2, reactance
    value ", X2
80  Z1=SQR((R1^2)+(X1^2)):
    THETA1=ATN(X1/R1)
90  Z2=SQR((R2^2)+(X2^2)):
    THETA2=ATN(X2/R2)
100 ZT=Z1*Z2:
    THETAT=THETA1+THETA2
110 ZB=SQR((R1+R2)^2+(X1+X2)^2):
    THETAB=ATN((X1+X2)/(R1+R2))
120 Z=ZT/ZB:THETAT=THETAT-THETAB
130 PRINT
140 PRINT "Impedance is ";Z;" At
    an angle of ";THETA*180/
    3.14159
150 IF THETA<0 THEN S$=" -j "
    ELSE S$=" +J "
160 PRINT "          OR"
170 PRINT "Impedance is ";Z *
    COS(THETA);S$;ABS(Z*SIN(THETA))
```

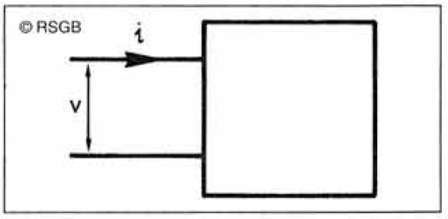

Fig 6: Input impedance of unknown circuit.

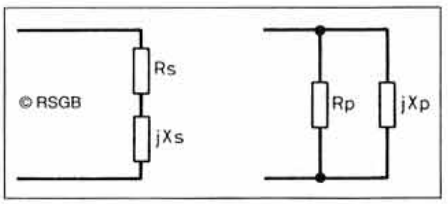

Fig 7: Combinations of resistance and impedance, for analysis.

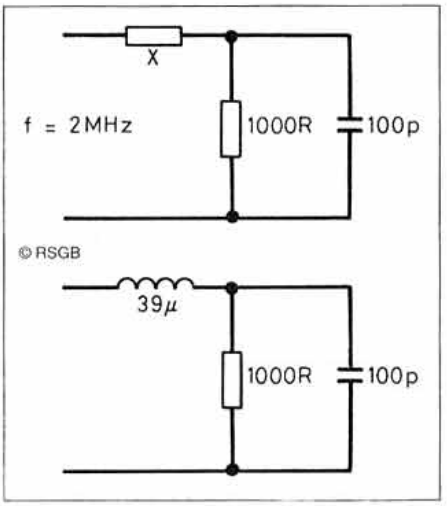

Fig 8: Check that the inductance value agrees with impedance X.

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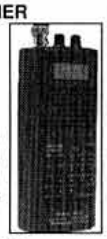

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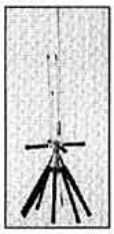

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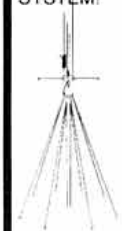

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PRODUCT NEWS

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.

THE NEW **MAPLIN catalogue** for 1993/94 is now available from major newsagents, Maplin stores, or direct from the company. This impressive 800 page publication is illustrated in full colour, and features hundreds of new products. There are also special offer vouchers, giving useful savings.

Many *RadCom* and *D-i-Y Radio* projects use components available from Maplin, so if you are an avid home constructor, it should be a very useful addition to your bookshelves. Amateur radio equipment is included, together with low cost test gear and a wide range of kits and modules for shortwave and electronics enthusiasts. The catalogue is priced at £2.95 plus £1.40 p&p.

Further details from: Maplin Electronics, PO Box 3, Rayleigh, Essex SS6 2BR. Tel: 0702 554161.

ACCURATE MEASUREMENT of RF field strength is provided by the **Digi-Field** Field Strength meter, marketed in the UK by Rollo Electronics. This useful unit has a frequency range from DC to 1GHz with full sensitivity, and up to 12GHz with reduced sensitivity. This looks like a handy little instrument to take along to a field day or special event station. Price is £115 plus £1.25 p&p.

Contact: Rollo Electronics, 25 Beaufort Drive, Kirkintilloch, Glasgow G66 1AX. Tel: 041 776 2065.

TECHNICAL SOFTWARE of Caernarfon are 10 years old this year, and to celebrate they are offering discount amateur radio software for BBC and Spectrum computers.

Programs are available for FAX, SSTV, RTTY, CW, AMTOR. Weather satellite software is also available, together with a number of other special offers.

Full information from: Technical Software, Fron, Upper Llandwrog, Caernarfon, Gwynedd LL54 7RF. Tel: 0286 881886.

KENWOOD HAVE just announced the **TH-22E (2m) and TH-42E (70cm)** compact handheld transceivers which are being launched at the Leicester Amateur Radio Show. They are small and slim enough to slip into a shirt pocket, but despite their space-saving design, a new MOSFET power module gives enhanced reliability and low voltage operation. A large speaker ensures high quality sound, and the makers say that operation is superbly simple with the sophisticated menu system - a welcome feature indeed!

Advances in power management result in long hours of operating between charges, and an optional rapid charger is available if required. The rigs each have 40 memory channels plus a separate call channel, VFO and versatile memory scan modes (with lock out). Other features include configurable squelch, key lock, time-out timer, auto power-off and two backlighting modes. There is also an optional CTCSS decoder - useful with the increasing number of repeaters in some areas.

Find out more about these advanced hand-held transceivers from any Kenwood appointed dealer, or in case of difficulty from:

Trio-Kenwood UK Ltd., Kenwood House, Dwight Road, Watford, Herts WD1 8EB. Tel: 0923 816444.

THE NEW **IC-707** Budget HF SSB/CW transceiver from ICOM is set to become a very popular rig. Its compact design and forward facing speaker make it ideal for mobile use, but it would also make the basis an excellent home station. The easy-to-use push button functions are complemented by a bright, clear LCD display. As well as the six figure frequency readout, this has a bar-graph S-meter, memory channel and mode information.

The IC-707 is rated at 100 watts RF output, and has a general coverage receiver with optional 250Hz or 500Hz CW filters. Other optional accessories include DC power supplies and a choice of external speakers and desktop microphones. An FM module is also available. We will be reviewing this interesting new transceiver in a future *RadCom*.

More information from: ICOM (UK) Ltd., Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 741741.

IDEAS FROM ABROAD

TRANSLATED AND EDITED BY ERWIN DAVID, G4LQI

A 7 – 30MHz tuner to drive equal and properly phased currents into two driven beam elements, while presenting a 50Ω load to the transmitter, was designed by **Dick Rollema, PA0SE,** for his DJ4VM cubical quad antenna and described in *Electron* (NL) 3 and 5/92.

THE CONDITIONS for best F/B ratio in beams with two identical close-spaced driven elements, be they loops, dipoles or monopoles, are currents of equal magnitude and a phase relationship of (180-α)°. α° is the physical distance between the elements at the frequency in use (1 wavelength = 360°).

The task was to design an ATU permitting this current magnitude and phase to be set over a wide range of frequencies, making for extreme variations of input impedances to the feeders and alpha ranging from 19 – 80° (2.25m boom). Then, the resulting resistance was to be transformed to 50Ω without interacting with the phase adjustments. All this was simplified by placing wide-frequency (and wide impedance range) baluns [1] at the feed point of each element and doing all tuning and matching single-ended. The 180° phase shift only requires that connections of one element to its balun be reversed; when phasing unipoles, one such balun in the shack could be used to achieve the same.

Fig 1 shows the basic circuit and **Fig 2a** the basic phase diagram of the tuner. If Z is the impedance measured at the shack end of either feeder and X_{L1-C1} and X_{L2-C2} are set as shown, the vectors A and B have equal resistance and opposite reactance; if a common voltage is applied to the junction, the currents into each feeder are equal in magnitude and their phase difference is alpha. R_r, the impedance looking into the junction, is purely resistive as the reactive components of the currents cancel. An L network, L3, C3, is used to transform this resistance to 50Ω.

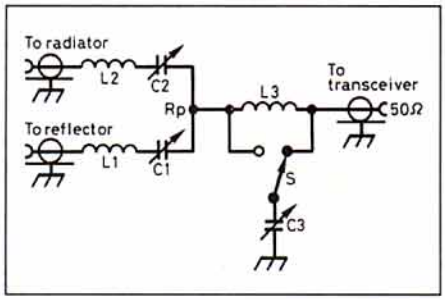


Fig 1: The basic diagram. L1, C1 and L2, C2 tune for equal element currents with the required phasing. L3, C3 transforms R_p to 50Ω.

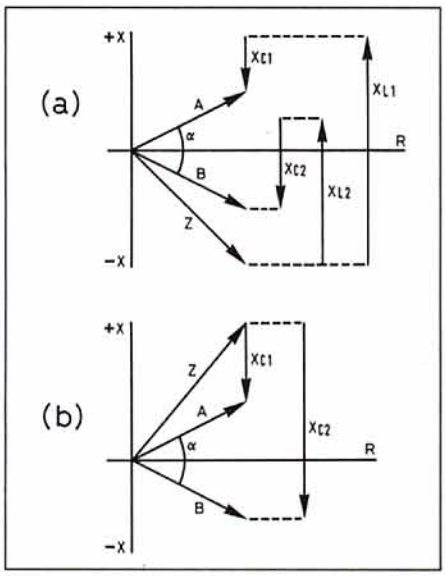


Fig 2: Phase diagrams for the left half of Fig 1. The reactance (vertical) vectors are spread to the right for clarity. Z, representing the input impedance to either feeder, is shown capacitive in (a). To obtain the desired vectors A and B (equal resistance and opposite reactance), the nett of both L1, C1 and L2, C2 must be inductive ($X_L > X_C$). If Z is very inductive, as in (b), the nett of both L1, C1 and L2, C2 must be capacitive ($X_L < X_C$) and L1 and L2 are not required. In an in-between case, not shown, Z is mildly inductive and only L1 is needed.

Impedances Measured on One DJ4VM Loop

5.65m per side, with coreless balun [1]

Freq MHz	Z (Ω) at unbal. side of balun	SWR in 50ohm cable
7.05	0.92 + j11	>20
10.13	56 + j184	14
14.0	9.0 - j1.3	5.5
18.07	234 + j110	5.7
21.0	7.7 - j7.5	7
24.9	6.5 + j40	13
28.0	31 + j135	14
29.0	246 + j287	12

Table 1: PA0SE measured these impedances at the shack end of one element.

Cognoscenti, including PA0SE, would question the assumption of equal impedances Z for the two feeders, ie neglecting the effects of the mutual coupling between two closely spaced quad loops; doing so, however, gives an indication that the components required to tune for the desired current magnitude and phase relationship are practical. Proof that this condition was eventually achieved was found in the depth of the nulls obtainable with the completed system: –60dB on stable line-of-sight signals, provided the wind does not shake the antennas.

On various bands, PA0SE, measured the impedance at the unbalanced side of the balun of one element, **Table 1**. The impedances seen at the shack end of one feeder are those of Table 1, transformed by the length and Z_0 of the cable, 17m and 50Ω at PA0SE. At those frequencies at which the shack-end impedance is inductive, L2 is not required and if the impedence is very inductive, L1, too, is superfluous. **Fig 2b**. PA0SE, was lucky: L2 was not required on any band and L1 only on some.

The calculation of the components for the ATU was a tedious process. Firstly, the shack-end impedances of the cables were measured at 34 frequencies with an admittance bridge. Using only a simple calculator, the measured admittances then were converted to impedances of the form $Z = R \pm jX$, from which the X_C and X_L of the required components and ultimately their values in pF and μH were obtained. [Readers may be interested in the formulae in Clive Smith's, G4FZH, article 'Circuit Concepts' on p55 – *Ed*]

A suitable computer program would have saved much time and frustration.

CIRCUIT DIAGRAM

THE RESULT OF THE calculations and experiments is shown in **Fig 3**.

The three positions of S1 are: (1) normal, (2) reverse (radiator and reflector interchanged), and (3) single-loop, used for transmitting on 7MHz where no gain can be achieved because of inadequate radiation resistance; (in position 1, the full directivity is available for receiving on 7MHz).

The band switch S2 selects one or two tuning capacitor sections or one section with a coil in series for each phasing branch and configures the L network as required, and switches the capacitor to the side of the higher of 50Ω or R_r. S2 also selects the proper taps on L1 and L3.

THE MECHANICS

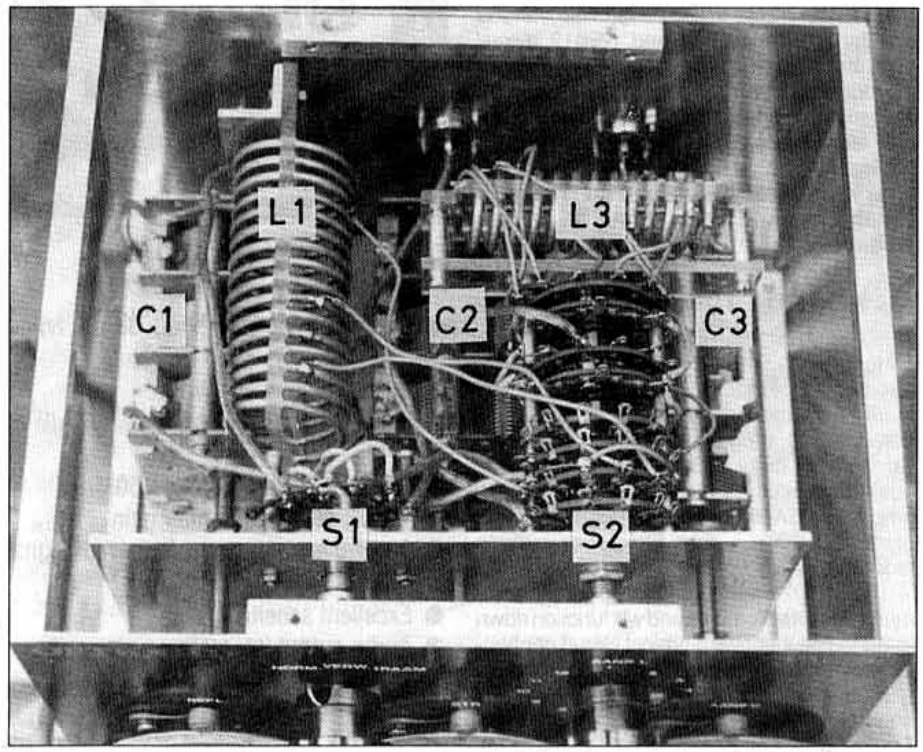
THE PHOTOGRAPHS SHOW the details. The capacitors are 3 x 580pF valve-receiver types; their spacing proved adequate for 120W PEP. C1 and C2 have insulated shaft couplings and are mounted on a common aluminium plate which is insulated from the enclosure. Slow-motion drives with good logging dials are used.

The coils were air-wound of 3mm silvered copper wire but solid electricians' wire with its insulation removed would do as well.

Both switches are rotary with paxolin wafers. S1 has two sections with three positions. S2 has six sections and 12 positions. On some frequencies the current through C3 is high, so for S2e two sections are parallelled.

MAKING IT WORK

THE ADJUSTMENT OF the ATU requires a stable line-of-sight signal of the same polarization as the antenna, preferably one which is not reflected by large near-by objects capable of creating multiple-path reception. Adjustment of the phasing elements, for the deepest null, is done with the reflector turned towards the signal source, L3 shorted out, C3 at minimum capacity and the receiver AGC switched off. A receiver input attenuator is used if the maximum signal overloads the receiver. The signal was read on an RF volt meter with dB scales, which was connected to the receiver's last IF stage.



On 14, 21 and 28MHz adjustments are performed and logged every 100kHz and in the centre of each narrower band. Before starting on any one band, the resistance and reactance of the feeders is roughly measured, eg with an RX noise bridge; this gives an idea of whether one or two capacitor sections or an LC section will be required at C2 and C1. The best null is then found by carefully tuning C1 and C2; proper nulls are as deep as from S9 to below noise level. If no null can be found, it may be necessary to add or remove a capacitor section and/or select another coil tap. If there is a choice, the lowest inductance of L1 (and L2 if any) which will allow a good null is best. After a null has been found, C1 and C2 should not be touched.

By transmitting into the ATU at the same frequency through an SWR indicator, the proper S2d and S2e connections can be selected so that C3 can be tuned for minimum SWR. Start with C3 connected to the 50Ω side, as was required at PA0SE on 27 of 34 test frequencies; on the 7 other frequencies, C3 needed to be connected to R_p or was not required at all. If the minimum SWR found is not low enough it may be necessary to make another tap on L3. At some frequencies only a fraction of a turn or none of L3 was used.

Having the lowest SWR, 14MHz is a good band for familiarization with the procedure, which then should be repeated on all frequencies from low to high. Having found the correct S2 connections at the low-frequency end of a band they are soldered in; then, somewhat higher in the band, an effort is made to get a null and proper match by retuning C1, C2 and C3. If successful, the frequency is raised some more etc until, at some frequency in the band, no satisfactory null and/or match is possible; from that frequency up, the procedure is repeated for the next position of S2. At PA0SE, ten S2 positions covered all HF bands from 7MHz up.

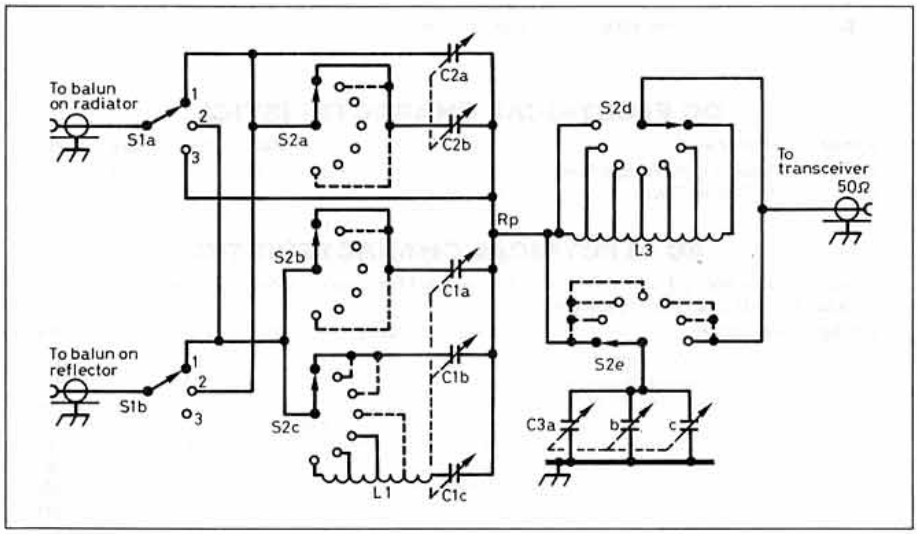


Fig 3: The full diagram of PA0SE's ATU. His feeder impedances happened to be inductive on all bands, so that L2 of Fig 1 could be omitted.

CONCLUSIONS

THERE WERE SIGNIFICANT differences between calculated and as-tuned values of L1, C1 and C2. This was ascribed to two causes.

First, leads within the ATU have inductive reactances which, on the higher frequencies, are not negligible when compared with the capacitive reactances of the capacitors used; this means that actual capacity values turned out smaller than had been calculated.

Second, and more important, is the difference in element impedances due to mutual coupling. Measurements of power going into the two feeders with the ATU tuned for best F/B ratio showed a radiator/reflector power split of 64/36 on 14MHz, 68/32 on 21MHz and 84/16 on 29MHz.

REFERENCE

[1] Eurotek, *RadCom* August 92.

MANY READERS WILL be familiar with the popular Philips NE602 and NE612 mixer/oscillator ICs, which have been used in numerous amateur radio construction projects. This month we feature the SA607 which not only incorporates the NE602's mixer/oscillator, but also has a number of additional features which make it is suitable for low-power portable receivers, test equipment, or even an S-meter with a 90dB dynamic range!

MANUFACTURERS DATA

THE PHILIPS SA607 is a low voltage, high performance monolithic FM IF system incorporating a mixer/oscillator, two limiting intermediate frequency amplifiers, quadrature detector and a logarithmic Received Signal Strength Indicator (RSSI). It also has a voltage regulator plus audio and RSSI output op-amps. The SA607 is available in 20 lead DIL plastic (N suffix – see **Fig 1**), or surface mount.

The SA607 was designed for portable communication applications and will function down to 2.7V. **Fig 2** shows a typical circuit configuration. The RF section is similar to the earlier NE605, and the audio output has an internal amplifier with the feedback pin accessible. Temperature compensation is applied to the RSSI output and this is buffered (see **Fig 3**). The IC also has a buffered limiter output, which can be used to perform a frequency check by comparison with a reference.

Sensitivity is excellent at 0.31μV (typ) from a 50Ω matching network for 12dB SINAD.

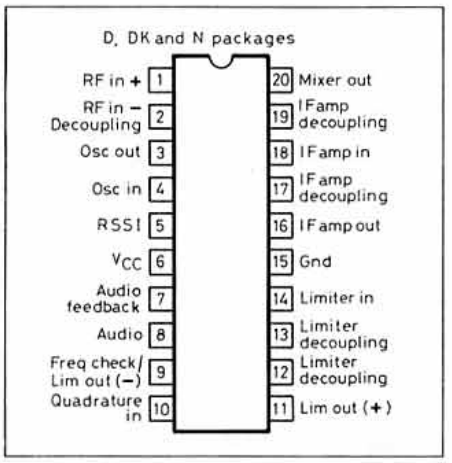
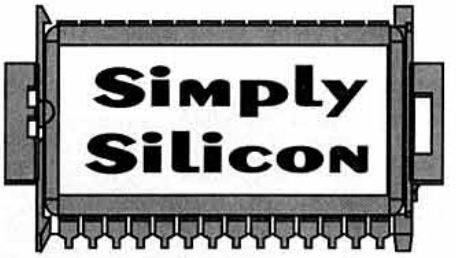


Fig 1: SA607 pin connections.

AVAILABILITY

THE SA607N is available from Philips distributors. It is also stocked by Electromail (RS Components). Stock No is 284-551 and the price (one off) is £12.43 inc VAT, plus £2.95 p&p per order. Electromail, PO Box 33, Corby, Northants NN17 9EL tel: 0536 204555.

NOTE: Device characteristics and application notes in *Simply Silicon* are compiled from manufacturers' published data. Circuit diagrams are included for experimental purposes only, and have not been proven by *Radio Communication*. Transmitting equipment must be operated in accordance with national regulations. All data is copyright of the device manufacturer.



PHILIPS SA607N MIXER / FM IF SYSTEM

- Low power consumption: 3.5mA typ at 3V
- Mixer input to > 150MHz
- Mixer conversion power gain 17dB at 45MHz
- Internal osc. effective to 150MHz
- 102dB of IF Amp/limiter gain
- 90dB dynamic range Received Signal Strength Indicator (RSSI)
- Excellent sensitivity
- Audio output internal op-amp

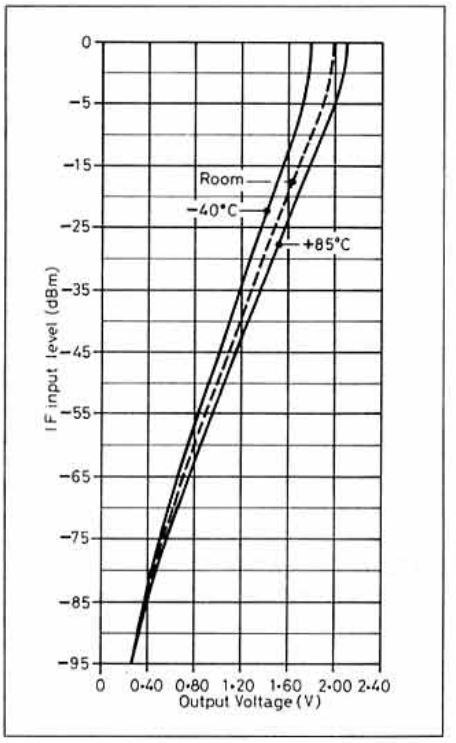


Fig 3: Variation of RSSI output with IF input in dBm.

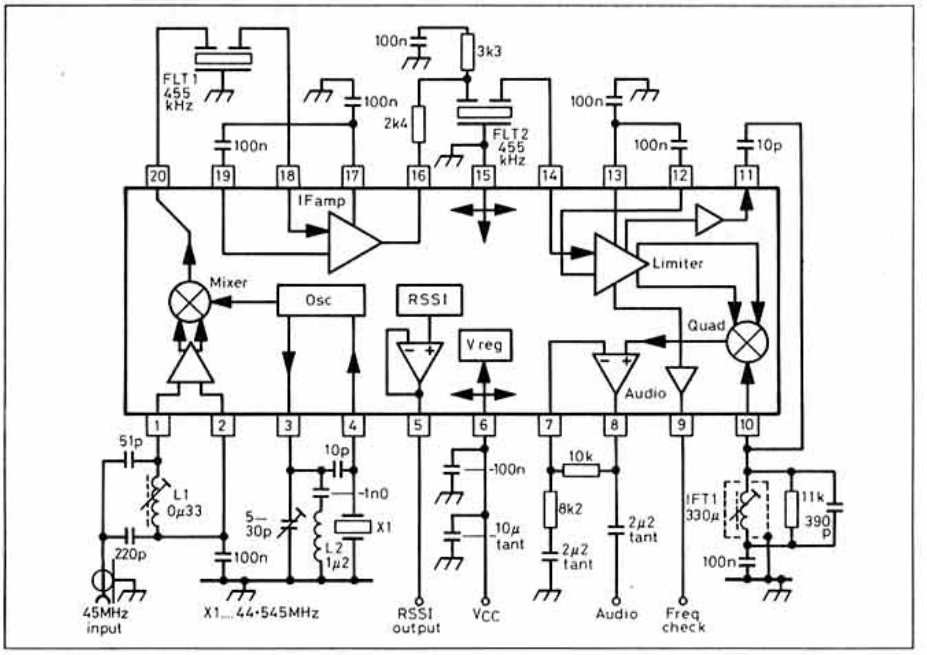


Fig 2: Typical application with 45MHz input and 455 kHz IF.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Min	Typ	Max	Units
V_{CC}	Power Supply Voltage Range	2.7		7.0	V
I_{CC}	DC Current Drain		3.5	4.2	mA

AC ELECTRICAL CHARACTERISTICS

Unless otherwise stated, T_A=25°C, V_{CC}=+3V, RF freq = 45MHz, IF freq = 455kHz, RF level = –45dBm, FM modulation = 1kHz with ±8kHz peak deviation.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
f_{IN}	Input signal frequency			150		MHz
f_{OSC}	Crystal oscillator frequency			150		MHz
	3rd order intercept point (50Ω source)	f_1=45.0, f_2=45.06MHz Input RF level= –52dBm		–9		dBm
	RF input resistance	Single ended input		8		kΩ
	IF amp gain	50ohm source		44		dB
	Limiter gain	50ohm source		58		dB
	RSSI range			90		dB
	RSSI accuracy			±1.5		dB
	Audio level	V_{CC}=3V, RF level=–27dBm		120		mV_{RMS}

NOW HERE'S A CHIP which should find numerous applications in test and measurement equipment. As well as the input and output diodes (used to couple digital signals), the Siemens IL300 has a second detector diode. This is used in a feedback loop to linearize the transfer characteristic of the device, whilst still maintaining a high degree of isolation. In fact, the typical input to output capacitance of the IL300 is just 1pF.

Fig 4 shows a typical application, with the graph of **Fig 5** demonstrating the excellent input/output linearity.

MANUFACTURERS DATA

THE IL300 Linear Optocoupler can be used in applications such as monitoring the output voltage from a line-powered switch mode power supply, measuring bioelectric signals, interfacing to industrial transducers, or making floating current measurements. For these applications an isolated, DC coupled interface is often essential. The IL300 can be used to construct an amplifier that will meet these needs.

AC characteristics are quite impressive with –3dB bandwidth of 10kHz, and –45° phase shift at 80kHz.

AVAILABILITY

MAPLIN COMPONENTS stock the IL300 at £2.95 inc VAT plus £1.40 p&p. Maplin are at PO Box 3, Rayleigh, Essex SS6 2BR. Tel:0702 554161.

SIEMENS IL300 LINEAR OPTOCOUPLER

- Couples AC and DC signals
- 0.01% Servo Linearity
- Wide Bandwidth > 200kHz
- High Gain Stability ±0.005% per °C
- Low power consumption, <15mW
- Isolation voltage 4420VAC$_{RMS}$, for up to 1 minute
- Low Cost
- 8 pin DIL Package

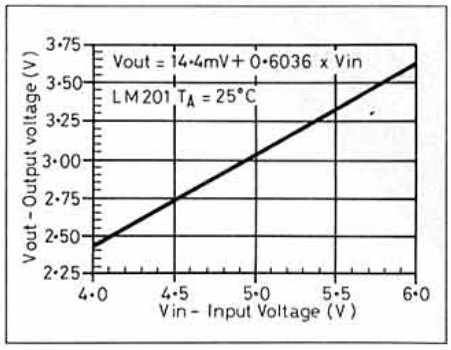


Fig 5: the above graph shows the excellent linearity achievable with the IL300 optocoupler. The LM201 may be replaced by an LM301 in most applications between 0°C and 70°C. Maximum forward current is 60mA, but best linearity is achieved with LED emitter currents between 5mA and 20mA.

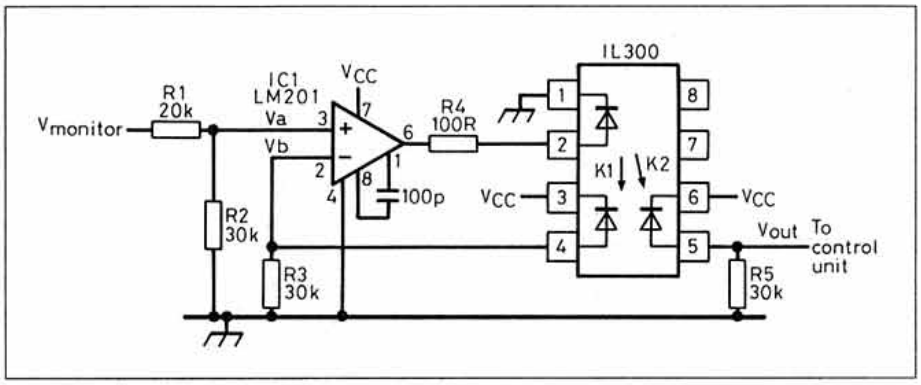


Fig 4: IL300 used in a DC coupled power supply feedback amplifier.

PCB AND KIT SERVICES FOR *RADCOM* PROJECTS

PCBs

THESE PCBS ARE NOT AVAILABLE FROM RSGB HQ, BUT DIRECT FROM BADGER BOARDS,

Description	RadCom	Part no	Price
RSGB Morseman		MMPCB	£10.00
Morseman EPROM		MMEPROM	£5.00
GW4HWR 12V 1A PSU	(May/June 91)	99137	£3.25
ICOM IC725/735 Controller	(Oct 92)	ICREMPCB	£10.00
IC725/735 Ctrlr EPROM		EPROMICOM	£5.00
Wobbulator	(Nov 92)	WOBB	£4.95
Wobbulator ready built		RBWOBB	POA
Simple Spectrum Analyser	(Nov 89)	1189SSA	£16.00
Oscilloscope Probe Tester	(Nov 91)	OSCPRO	£4.50
G3TSO 5-band Transceiver	(Sep 88)	TSO07	£28.00
G3TXQ 3-band Transceiver	(Feb/Mar 89)	TXQ7	£23.50
G3TSO Miniature 80m Tcvr	(Jun/Jul/Aug 91)	G3TSOMIN	£8.00
G4WIM 50/70MHz Transceiver	(May - Aug 1990)	WIM10	£52.00
2m noise eliminator	(Apr 92)	2MTRRF	£9.00
Ultimate keyer	(early 80s)	ULTKEY	£6.00
White Rose Receiver	(Feb 90)	WRMAIN	£4.25
White Rose Plug-in converters	(each)	WRCONV	£2.00
White Rose Case		WRCASE	£15.75
G3PCJ 160m Transceiver	(Jan/Feb 93)	TOP160	£7.50
Direction Finder	(TT Apr 91)	VHFDF	£3.75
AF Oscillator	(Sep 90)	AFOSC	£4.95
Synthesiser	(Jul/Aug 92)	SYNCPCB	£POA

Add £1.50 to all prices for postage and packing

Available from:
Badger Boards
87 Blackberry Lane,Four Oaks,
Sutton Coldfield, B74 4JF. Tel: 021 353-9326

KITS

JAB's aim is to have kits available off the shelf. Sometimes, especially following publication, demand is unknown so you are advised to check availability or allow 28 days for delivery. Kit contents vary, the contents are given, eg 1+2 means that PCB parts and PCBs are supplied. Price shown is the price you pay except that if the order value is under £15.00, please add £1.00 towards P&P.

Contents Codes:
1 = PCB Mounted Parts Only
2 = PCB Only
3 = Case Mounted Parts
4 = Ready Punched Case
5 = Case Un-Punched

Exclusions Codes:
A = Air Spaced Variable
B = Crystals
C = Display

Notes:
SF = State Frequency or Band
POA = Price on Application

Author	Date	Kit	Contents	Price	Notes
G3TSO	1088	Multiband Tx/Rx		POA	
G4PMK	1189	Spectrum Analyser	1+3	£55.65	
G3TDZ	0290	White Rose Radio		POA	
G4WIM	0590	Dual Bander 50+70MHz		POA	
G3BIK	0990	AF Oscillator	1+2+3+5	£25.00	
G3TSO	0491	Digital Freq Display	1-C		
G3TSO	0691	80m SSB Tx/Rx	1-A	£77.00	
G3BIK	0192	HF Absorb W/meter		POA	
G4SGF	0492	A Novice ATU	1+2+3+5	POA	
G4ENA	0592	QRP+QSK Tx/Rx	1+2+3+4	£45.05	SF
G3ZYY	0992	4m/6m IRS		POA	
G7IXK	1192	Wobbulator	1+2+3+4	£21.50	
G3VML	0493	2m SSB/CW Transceiver		POA	
G3ROO	0493	6m Converter	1+2	£11.85	SF
G4ENA	0593	Direction Finding Kits 160m:-			
		DF Receiver	1+2+3	£32.50	
		DF Transmitter	1+2+3	£25.30	
G3TDZ	0793	Phasing Transceiver:-			
		Receiver	1	£27.00	
		Exciter	1	£24.10	
		Converter	1-B	£11.40	SF
		Power Amp	1	£18.60	SF
G4BWE	0993	Two Band Superhet	1-B	£44.80	

Available from:
J.A.B. Electronic Components, The Industrial Estate, 1180 Aldridge Road, Great Barr, Birmingham B44 8PE. Tel: 021-366-6928

RADCOM CONSTRUCTION FEATURE

Updating the G3VML Synthesizer

by Peter Barwick, G4SUO

RADCOM (JULY/AUGUST 1992), featured a 2 metre synthesizer project by Bernie Pallett, G3VML. Selection of the appropriate switches produces a reliable output on the required channel. However, computer analysis revealed that it was possible inadvertently to program frequencies outside the 2m band. After consultation with the author, an amended interface was designed by Peter Barwick, G4SUO, which he felt would interest readers. The circuit now incorporates automatic repeater offset and switchable reverse repeater operation. Reprints of the original article are available to members, price £2.50 from the *RadCom* Editorial Dept, at RSGB HQ.

MY AGEING UNIDEN 2030 2 metre transceiver, is a typical 1970s 'black box'. G3VML's synthesizer feature appeared an ideal way of updating it. Having studied the circuit, I decided to write a computer program to model the operation of the interface. This provided printed output for all combinations of the thumbwheel switches and repeater switch, showing the input frequency selection, the binary output from the divider and the final transmit frequency.

In the original article, G3VML made it clear that only the 0, 2, 5 and 7 selections of the 10kHz thumb-switch are needed. These equate to frequencies of 14x.x00, 14x.x25, 14x.x50 and 14x.x75MHz respectively. I was interested to see what other selections of the 10kHz switch would provide, but apart from 8 and 9, other selections merely produce the adjacent 25kHz channel. Selecting 8 or 9 however, produces output 3 channels down. A simple circuit change will produce much more consistent results.

Returning to the computer model, the repeater shift works perfectly when repeater channels R0 - R7 are selected. However, if repeater shift is inadvertantly selected on a different channel, some very unexpected and undesirable frequencies are generated - some above 147MHz!

THEORY OF OPERATION

IN HIS ARTICLE, G3VML provided two circuits for the divider interface - one for transceivers whose local oscillator tracks above the receive frequency and the other for the local oscillator below the receive frequency. Both circuits are capable of creating out-of-band transmissions although on different frequencies. My own transceiver has a local oscillator below the receive frequency, and, with G3VML, I devised an amended divide interface for that circuit (**Fig 1**).

XOR gates IC11c and IC11d are used as OR gates between the 2^1 and 2^2 outputs and the 2^3 output of the 10kHz thumbwheel switch. Note that each input to the XOR gates now needs a 100kΩ resistor to take the input high when the switch is open-circuit. The outputs of IC11c and IC11d take the N1 and N2 inputs to the MC145151P high (and thus a frequency of 14x.x75 MHz), whenever the thumbwheel switch is in the 8 or 9 positions thus removing the inconsistency.

The divide interface works by pre-loading a bit pattern (29A8 hex where the local oscillator is below the receive frequency) into the Full Adders, IC9 and IC10. It also involves hard wiring the 'A' inputs to +5V or 0V, and adding the bit pattern of the MHz and 100kHz thumbwheel switches via the 'B' inputs. The result is the synthesiser divide ratio which is passed to the MC145151P. In the original circuit (*RadCom*, July 1992, Fig 4), repeater shift was achieved by inverting the 100kHz 2^1 and 2^2 inputs via the XOR gates IC10b and IC10c into inputs B2 and B3. Unfortunately, this will only work correctly when both the 100kHz inputs 2^1 and 2^2 are at logic 1 (ie selections 6 and 7). By moving the XOR gates to the A2 and A3 inputs of the adder and taking the thumbwheel inputs straight to the 'B' inputs, the repeater shift will work correctly whenever the MHz switch is set to 145. Thereafter, it only needs the MHz input to be added to the repeater shift logic to ensure that no out of band transmissions occur.

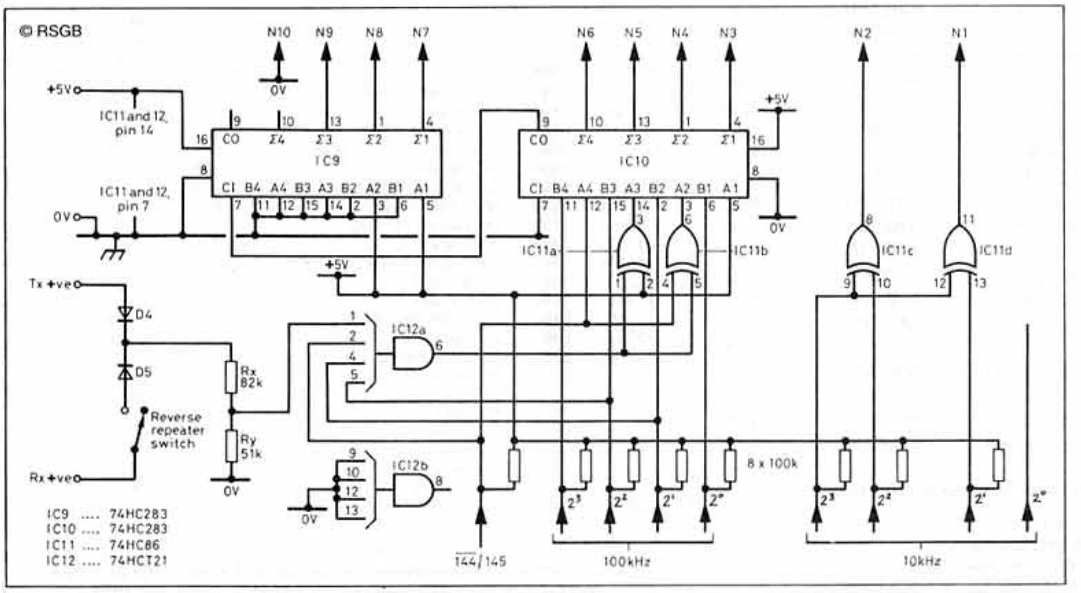


Fig 1: Amended interface for 2m transceivers with local oscillator below signal frequency.

DIVIDE RATIO SELECTION

IT WAS AT THIS POINT that I decided to arrange the logic so that a repeater shift was always obtained on a repeater channel. So came about the third change to the circuit. Repeater channels are characterised by the MHz and 100kHz inputs all being at logic 1. Repeater shift is required only on transmit (or on receive to listen on the repeater input frequency). Thus, by connecting the transmitter +13.8V positive rail through a voltage divider (Rx and Ry) into AND gate (IC12) with the other inputs connected to the thumbwheel switch contacts, repeater shift is switched in

automatically on repeater channels. D4 and D5 prevent a short circuit between the transmitter and receiver positive rails. A computer model of the amended circuit proved that all objectives had been met.

To achieve the same results where the local oscillator tracks above the signal frequency (*RadCom*, July 1992, p35, Fig 3) requires a different solution (see **Fig 2**). This is because the divide ratio for the synthesiser (2D00 hex - 2DA0 hex) creates a different range of bit patterns. XOR gates IC7c and IC7d (Fig 3) are used in the same way as IC10c and IC10d in Fig 2. They remove the inconsistancy of the 8 and 9 selections of the 10kHz thumbwheel switch.

REPEATER SHIFT OPERATION

FOR THE REPEATER shift, I tried to apply the same principle as for the lower local oscillator circuit. In other words, modify the pre-loaded bit pattern rather than the input from the thumbwheel switches. If one considers the divide ratio as a pre-loaded value plus the input from the kilohertz thumbwheel switches, then the difference between 144.xxx and 145.xxxMHz is 2D50 - 2D00 = 50 hex.

To obtain repeater shift it is necessary to subtract 30 hex from the divide ratio or, by restricting the repeater shift to 145MHz only, add just 20 hex (+ 50 - 30). Thus, the pre-load values are :- 2D00 (144MHz), 2D20 (145MHz with repeater shift) and 2D50 (145MHz). The 2D is constant and so is hard wired at N8 - N13. All that is now required is to feed the bit pattern of 0, 2 or 5 (000, 010, 101) to N4 - N6.

The remaining XOR gates (IC7a and IC7b) act as a flip-flop with inverted output. The two outputs are gated by AND gates (IC8a and b) and connected to inputs A2 - A4 of the adder. Thus repeater shift is effective on 145MHz and all selections of the kHz switches.

To fully automate the repeater shift on repeater channels, merely requires the two remaining AND gates (IC8c and IC8d) to route the output from the 100kHz switch 2^1 and 2^2 and the input from the voltage divider (Rx and Ry) to the XOR gates IC7a and IC7b.

This has made the synthesiser both easier to use and free from out of band emissions.

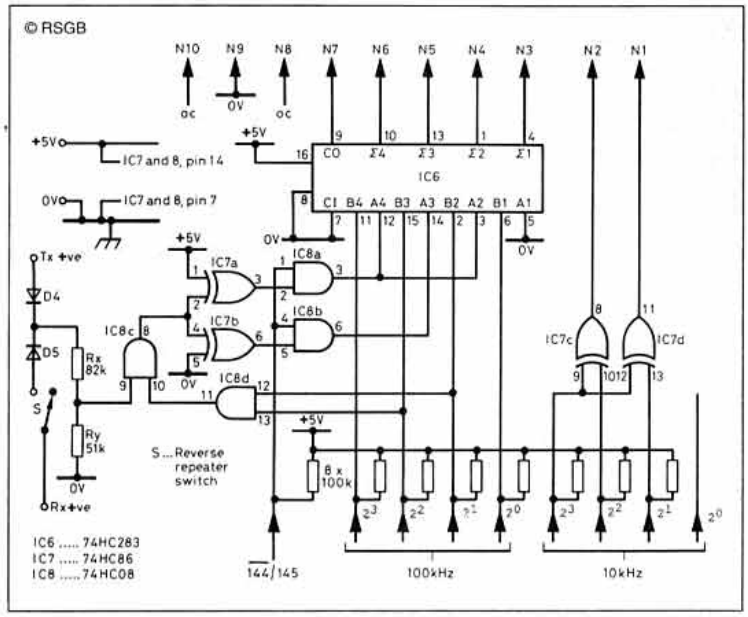


Fig 2: Use this circuit for transceivers with local oscillator above signal frequency.

Both circuits now require two diodes D4 and D5, as well as three additional 100k pull-up resistors at the inputs from the 10kHz thumbwheel switch. In addition the following will be needed:

Rx	82k 0.25W 5%
Ry	51k 0.25W 5%
Higher LO option:	IC8 - 74HC08
Lower LO option:	IC12 - 74HCT21

RADCOM EQUIPMENT REVIEW

Ten-Tec Scout 555 Transceiver

A user review by the *RadCom* team

TEN-TEC HAVE a fine reputation for their top of the range transceivers, but unfortunately these tend to be rather expensive in the UK. The new Scout 555 transceiver, on the other hand, is very much a budget product, with a number of novel and useful features. In essence, the Scout is an HF 50 watt SSB/CW transceiver with built-in CW keyer, adjustable filter and SWR/power meter.

It operates with plug-in front panel modules on any single band from 160m to 10m (including WARC bands). The Scout is supplied with a module to cover the 7MHz band but you can add others as required.

FRONT PANEL FEATURES

THE FRONT PANEL is not much bigger than the average VHF mobile rig, but has most of the features conveniently to hand.

At the top left is a large LED display. Rather clever, this, as the first digit of the operating frequency is printed on the plug-in module. The remaining four LEDs give 100Hz resolution which should be adequate for most users. To the right of this is an illuminated analogue S-meter. This is combined with an SWR meter, which will alternatively display RF output power when switched from the rear panel.

The Scout's main tuning control has a fixed tuning rate of about 25kHz per revolution. The control is a little stiff compared to some other rigs, but this is presumably due to the use of permeability tuning, rather than the more common synthesizer configuration.

Below the display are microphone and headphone sockets plus controls for AF gain and filter bandwidth. To the right of the knobs for RIT and microphone gain are switches for 'tune', noise banker, RIT on/off, CW keyer speed and power on/off. A small LED (marked ALC) indicates the correct microphone input level.

Besides the usual 13.5V power, and SO-239 connectors, the rear panel has 3.5mm CW key and paddle sockets together with a large earthing tag.

A SCOUT ROUND THE BANDS

IN USE, MOST features of the Ten-Tec Scout were very impressive. It appears to have been designed as much for the CW enthusiast as the SSB afficianado. On the receive side, background noise was low and audio quality good. Sensitivity was good and we were easily able to peak an external ATU on background noise during tests on 20m.

Next, we gave the Scout some evening use on the 7MHz band. The rig performed well with a good antenna, with few spurious products and good cross modulation performance. This indicated sound front end design and one great advantage of a single conversion circuit. Instead of a phase locked loop, the transceiver has a 'Frequency Lock System' which accurately measures the frequency at 200mS intervals and automatically compensates for VFO drift using a varactor diode.

The variable bandwidth filter was most effective, and had the feel of the phasing control on old valve receivers. This is an unusual facility to have on a relatively low-priced transceiver, but it performed well compared to a more expensive rig with a fixed filter (an optional but costly extra).

The sidetone when using headphones was *deafening* without an attenuator in the phones lead. The handbook warns of this and says it can be adjusted – but we couldn't work out how! The phones socket is very close to the volume control and sometimes gets in the way. However, the Ten-Tec has an internal upward-facing speaker which gives adequate volume, even for mobile use.

ALL ROUND PERFORMER

ON SSB WE CHECKED the transmit quality in conjunction with a Kenwood TS-850S. Tape recordings indicated a well balanced speech response, although there was a shade too much bass on the audio (this could have meant the CIO was mistuned a little, as the optimum CW tone was also rather low).

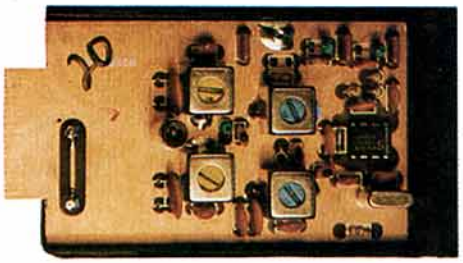
Full break-in CW was found to be useful, but as the handbook uncompromisingly says "it cannot be altered without circuit modification". Full break-in can be very off-putting for the beginner who would have to turn the audio down to avoid distraction. Surely a pot wouldn't have cost too much.

While on the subject of the handbook, this is well above the usual standard for amateur transceivers. Full circuit diagrams, photographs and explanations are given for each stage, and the Scout is one of the few modern rigs where fault finding by the user could be a realistic possibility.

The RIT range of only ± 1.5kHz isn't enough for most of the split frequency operation commonly used by DXpeditions. Again, surely a bigger swing would have been trivial to provide. On the plus side, the SWR bridge was easy to use (especially for portable operation).

NICE AND EASY

WE WERE VERY impressed with the overall performance of the Ten-Tec Scout 555, and with a little attention to detail, it could be even better. For the new licensee this rig seems ideal. The UK suppliers, Waters and Stanton Electronics, will adjust the radio for Novice power levels if required. The compact size



Internal view of one of the Ten-Tec's plug-in modules.

should make it a good choice for field days and DXpeditions.

To be honest, there isn't really a rig which is easy to compare with the Scout, and for this very reason it's popularity in the market seems assured. The Kenwood TS-50S (see May '93 *RadCom*) is probably the nearest rival, but although it covers all the HF bands the TS-50S is considerably more expensive and doesn't have the Ten-Tec's built in CW filter, keyer and SWR meter.

The Ten-Tec Scout 555 is available from Waters and Stanton Electronics, 22 Main Rd., Hockley, Essex SS5 4QS, tel: 0702 206835. The price is £589 plus p&p. The transceiver is supplied with a module for one amateur band. Modules for other bands are £39.95 each. The optional Ten-Tec microphone costs £41.95, although a connector for an alternative type is included free with the rig. All the above prices include VAT.

Our thanks to Waters and Stanton Electronics for the loan of the review model.

MANUFACTURER'S SPECIFICATION

General

Modes	CW, SSB
Frequency Range	All amateur bands 160 to 10m available through plug–in modules.
Frequency Control	Permeability tuned oscillator (PTO) mixed with a crystal oscillator on each band.
Offset tuning	+/– 1kHz nominal (RIT).
Frequency Accuracy	+/–100Hz at 25°C
Antenna	50Ω unbalanced
Power required	12–14 VDC; 600mA receive, 10A transmit at 50W o/p.
Dimensions	64(h) x 184(w) x 248mm
Weight	2.4kg

Transmitter

RF Output	50W, factory set. ALC controlled. Nominal 15W in 'tune' position. Output can be set to 3W by distributor, for Novice use.
Microphone Input	200Ω to 100kΩ, accepts microphones with 5mV output. Polarizing voltage for electrets.
T/R Switching	Push-to-talk (PTT) on SSB. QSK (full break-in) on CW.
Iambic Keyer	Adjustable 5–50WPM. Curtis type B, 15% fixed weighting.
Metering	SWR or FWD power, rear panel switched.
SSB Generation	Balanced modulator, 9-pole crystal filter.
Carrier suppression	–45dB typical
Unwanted sideband	–45dB typical at 1.5kHz

Receiver

Sensitivity	0.35μV typ. for 10dB S/N at 2.5kHz bandwidth.
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UR70, 6mm dia, 75 ohm transmitting coax	30p/m
Double screened, 75 ohm coax, 8mm dia	40p/m
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8 core rotator cable, heavy duty	65p/m
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RADCOM CONSTRUCTION FEATURE

Double Delta for 80m DX

by Tony Preedy, A45ZZ

FEW AMATEURS HAVE the opportunity to construct an effective beam for the 3.5MHz band, but this design may help you to join the lucky few. The most consistent DX signals which I used to hear on the HF end of the band were those using beams of the Yagi type or multiple monopoles. Initially I got plenty of contacts on the strength of the A4 callsign using an inverted-vee dipole but reports were never very encouraging until I built the antenna illustrated in **Fig 1**. Afterwards I could compete with the best and soon had over 100 countries on 80m. Working the grey-line long path to the West coast USA has almost become a daily event between October and April.

PRINCIPLES OF OPERATION

FOUR DIFFERENT radiation patterns can be obtained from this antenna using a double-pole four position switch (see **Fig 2**) at the operating position. An almost omnidirectional pattern is formed by driving a single loop. The feeder of the second loop is then left unterminated but for some feeder lengths it may be better to short circuit the second feeder. The object is to obtain minimal current in the second loop by avoiding a near resonant condition in this omnidirectional mode. The same pattern can be obtained by driving both loops in phase but this would complicate the switching.

The next mode is a figure-of-eight pattern obtained by driving both loops, out of phase. Because one feeder is twisted relative to the other the loops automatically have currents 180° out of phase when the driven ends are connected in parallel. In this condition horizontally polarised radiation, which could deform the pattern, is minimal because in all planes the significant horizontal components between loops and between sides of loops cancel leaving only vertical polarisation (**Fig 3**). In the unidirectional modes only the horizontal components within each loop cancel, incidentally.

The next two modes are the unidirectional patterns formed by driving one loop and terminating the feeder of the second loop with a reactance which makes the second loop function as a reflector.

CONSTRUCTION DETAILS

FIG 1 SHOWS THE general arrangement of my antenna which is essentially two delta loops insulated from each other. they are suspended from a single mast and connected via independent feeders to the radio through a control unit and tuner. This provides a choice of four radiation patterns which in theory should look like those in **Fig 4**.

In most parts of the world the best 80m DX will be worked via the grey line paths so if possible arrange the longest dimension to run east-west. This will put both morning and evening paths close to the direction of maximum gain (north and south). The switch in the control unit needs to be adequately insulated and should be a ceramic type if possible.

The reflector tuning reactance will depend on the type and length of feeder. Whatever the value at the tuner (ATU), that at the loop will be an inductive reactance of about 100Ω. For example if 75Ω cable is used and the length is electrically a quarter-wave a capacitor of about 400pF will be needed. Initially try using a series L C circuit which is known to resonate at 3.8MHz. Use a variable capacitor and note which way you have to change capacitance when adjusting for minimum back radiation (see later). If it is increased above the capacitance necessary for resonance you will require an inductor in the final arrangement.

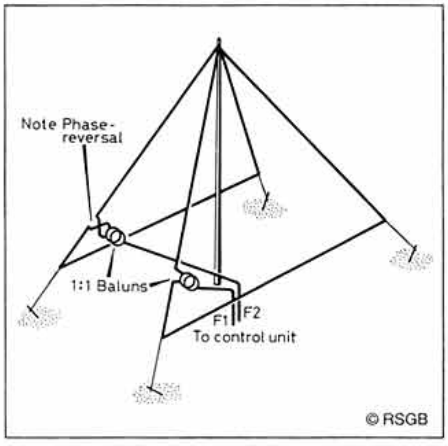


Fig 1: The Double Delta 80m antenna. Two feed lines determine the directional characteristics.

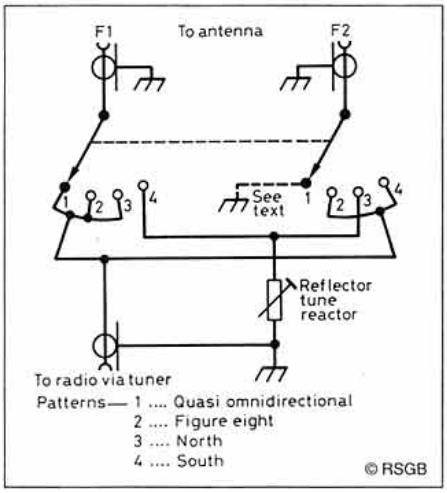


Fig 2: Four different radiation patterns are available from the switched ATU.

LOOP CONFIGURATIONS

BOTH LOOPS ARE identical so they can be interchanged between driven and reflector functions without retuning and also to allow a single reactance to be used to tune either loop as reflector. I did not bother to make the loops exactly resonant, only to make them the same length, because a tuner is always used to obtain unity VSWR at the transmitter.

The type of wire is not critical, bell wire will do, but the ideal material is miniature coaxial cable with a steel core such as UR95. This has the advantage of thickness, for low RF resistance, light weight and minimal stretch under tension. The feeder can be either 50 or 75Ω coaxial cable but it is important to use some form of choke to prevent RF from returning on the outer conductor. A proprietary sleeve balun or a coil of feeder on a ferrite rod is effective. The feeders should be of identical length and of the same type of cable but actual length is not important.

To support the loops I used two separate pulleys and halyards. Alternatively, it would be possible to use a single system and have short insulating lengths of rope fixed to the loop apexes to clear the mast and stays. This does waste valuable mast height, however.

Geometry of the assembly is shown in **Fig 5**. You will need to draw this out to scale if you are not familiar with Pythagoras and you want to adapt the design for another band. If a metal mast is used it must be insulated at the base to minimise current induced from the loops and any stays must also be insulated if the pattern of radiation is not to be corrupted.

At first, the height of mast required to support an equilateral loop one wavelength circumference is daunting but, as Fig 5 shows, this reduces when allowance is made for the loops sloping in two planes. An apex as low as 18m can be used, if the base is extended in order to maintain one wavelength loops. There is no significant performance loss.

WILL IT FIT MY PLOT?

MECHANICAL SIMPLICITY is the big advantage of my antenna – just one mast and some wire plus a simple control system. The only

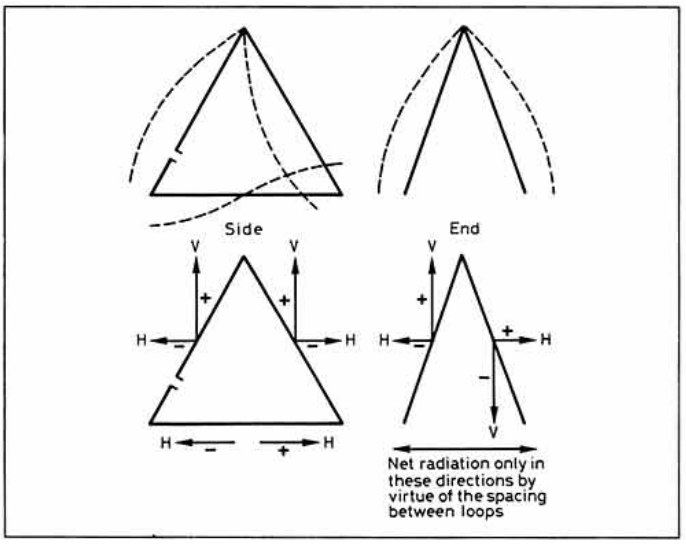


Fig 3; Spacing between the loops and the sides of loops affects polarization as shown.

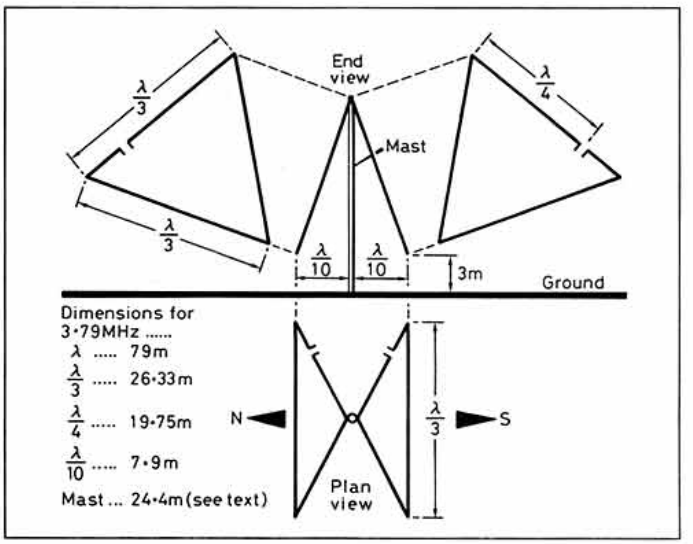


Fig 5: For a loop with a centre frequency of 3.6MHz dimensions should be multiplied by 1.055.

real snag is the space required over the ground. However this is probably no greater than that required for stays supporting an 80m Yagi and certainly less than that required for a phased array of comparable performance. By placing the mast on top of my flat-roofed bungalow and arranging for the loops to terminate on opposite sides it becomes quite manageable.

The minimum space required is a third of a wavelength by a fifth of a wavelength with a short pole at each corner of the rectangle. Alternatively, the four corners can be pulled out to ground spikes or, as in my situation, to large stones if more space is available. The height of the base of each loop is not very important, but 3m is a safe height to avoid contact with people or vehicles.

By mounting the mast on the house and using thin wire you possibly reduce local authority planning problems, but there will probably be a certain incompatibility with the TV. I can transmit, even with a linear, without TVI but I can't hear much with the TV working because of radiation from the TV sitting inside the array.

PERFORMANCE COMPARISONS

A VERTICAL TRIANGULAR loop fed one quarter wavelength from the apex is electrically similar to a pair of quarter wave monopoles spaced a quarter-wave apart and driven in phase. This combination has a gain of about 2dB over a single monopole. A second identical loop suitably spaced from the first and tuned as a reflector forms the equivalent of a four mast array. I measured 4dB gain for two loops compared with a single one. Total gain over a monopole is therefore about 6dB.

This will not equal the performance of a three element Yagi at optimum height unless you are over sea water, but it will be a better antenna than most of the competition will be using. In practice, the various modes provide flexibility in fighting QRM. I obtain a front to back ratio of 30dB or more for local stations, and when listening to DX signals arriving via the ionosphere the front to back ratio is seldom less than 10dB.

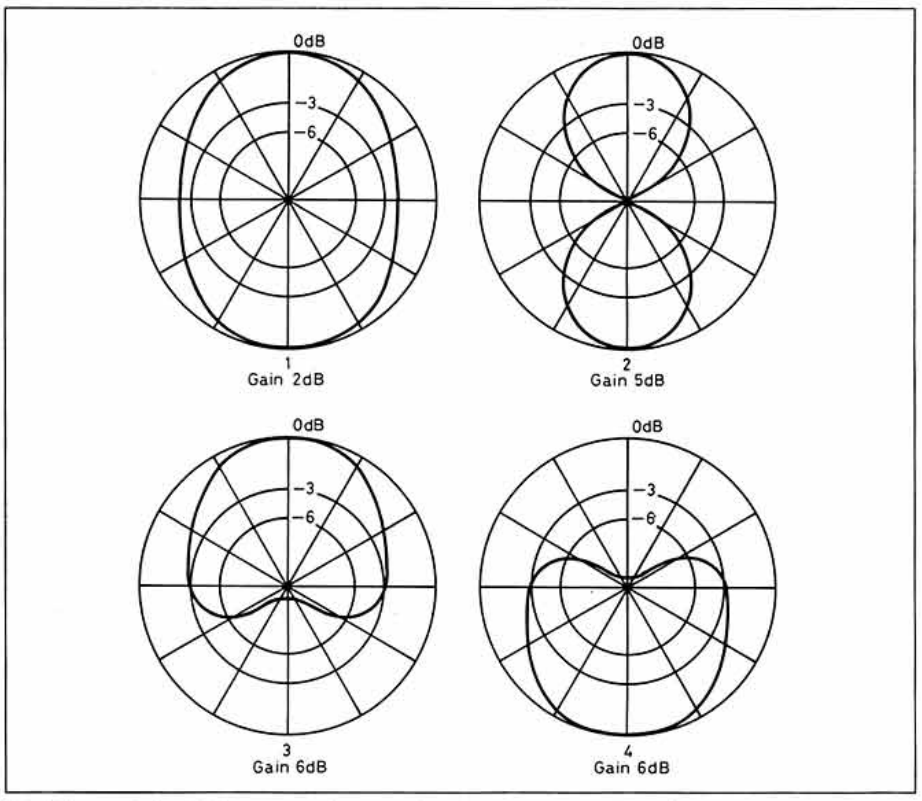


Fig 4: Theoretical radiation patterns for each of the four antenna configurations.

ADJUSTMENTS AND TUNING

TO TUNE THE REFLECTOR, I used a very low power 3.79MHz oscillator, powered by a battery. This was connected to a few metres of wire and hung from a tree about two wavelengths behind the array. The reflector reactance was then adjusted for minimum signal strength on the receiver. After obtaining the optimum tune point, I replaced my series tuned circuit with a single component which in my case was just a piece of wire! This just happened because my feeders were 80ft pieces of low-loss semi-airspaced 75Ω TV cable and the loops were just the right length.

I seldom work CW so my antenna is adjusted to perform best around 3.79MHz. If I go below about 3.60MHz the reflector turns into a director and the pattern reverses. This is a bonus I had not really anticipated, but occurs because directivity is only achieveable over a narrow band.

TUNING AND EARTHING

IT SHOULD NOT BE necessary to reset the tuner when switching between the unidirectional modes, but this may be required when changing from these modes to the omnidirectional pattern. When selecting the bidirectional pattern for maximum side rejection, it will almost certainly be necessary to retune. This is because this mode has quite a narrow bandwidth. In fact it is best to fine-tune the antenna in this mode. Make equal changes to the length of both loops and then optimise the reflector tuning.

Normally, one does not expect to use a ground system with delta loops but since writing the description of the Double Delta I had many requests for QSOs on 160m from A4 (Oman) and needed a good ground system for this band.

After a lot of testing of antennas and ground systems for optimum efficiency with the help of Bob, A45XF, we ended up with an inverted-L hung within the loops from the common mast.

The ground system used almost one thousand metres of 18SWG enamelled wire in the form of radials with their hub at the mast. These run over the house, down to the ground then over the ground out as far as 40 metres from the mast.

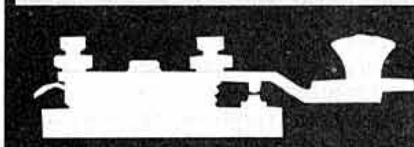
Interestingly, this had a beneficial influence on the loops, resulting in a back to front ratio of 18dB on 80m long distance signals. Another bonus was the screening effect which the radials had on the reverse TVI. If we ever need to, we can now watch television and operate on the amateur bands at the same time!

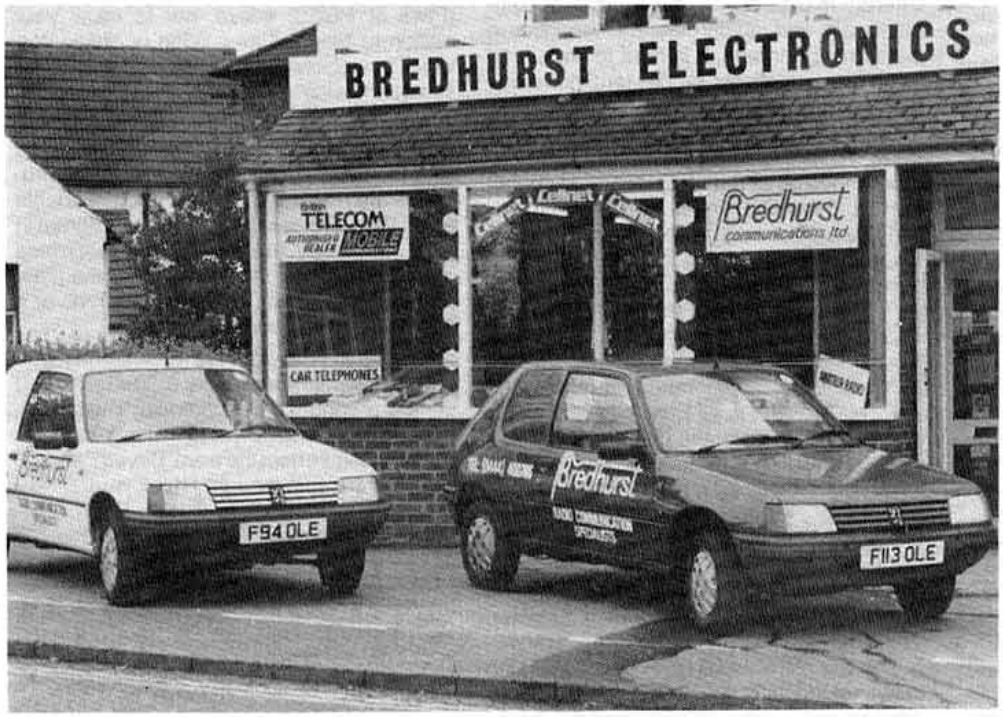
OPERATION ON OTHER BANDS

THIS DESIGN SHOULD be adaptable to operate on either the 7MHz or 10MHz bands by scaling the dimensions. However, when operating above 10MHz it is usually easier to obtain directivity and gain from more conventional antennas.

COMPONENTS LIST

Insulated wire	160 metres of 16 x 0.2mm RS Components (Electromail) No 356-505. Alternatively, 1mm enamelled copper wire could be used.
Coaxial cable	50 metres of 75Ω type CT100, RS Components No 388-782
Self amalgamating tape	1 roll eg RS type 512 317
Switch	2 pole, 4 way heavy duty, eg RS type 327-585
Ferrite Rod	Two required eg Maplin code YG22Y
Insulators	Eight, ribbed polythene eg Moseley
Inductor wire	One reel 16SWG TCW RS type 355-041
Housing for switch	eg RS type 509-709
Variable capacitor	500pF air-spaced type
40mm diameter former for inductor	
PL259 connectors as required	





Data Stream

RICK STERRY G4BLT
1 Wavell Garth, Sandal Magna, Wakefield,
West Yorkshire WF2 6JP

MORE CHAOS THAN USUAL has reigned at 'BLT Towers lately, due to alterations and renovation upstairs. The work is well behind schedule, thus depriving me of my shack at a critical time. The practical upshot of this has been that I have not been able to include much computing material this month, but I think you'll find the datacomms articles interesting and useful. I am very keen to hear of unusual or innovative computer software or hardware for amateur radio use, so please do get in touch if you know of anything that might be of interest.

USED PC CAVEAT

IN JULY, I GAVE some brief details of the differences between the various processor chips used in IBM-compatible TNCs. Since writing that article, machines using the Pentium processor have become available, and rally prices on previous machines have come down even further. There are several well-known dealers that sell PCs at many of the popular rallies, and these dealers clearly rely on maintaining a reputation for fairness. However, I really do think that one should be very wary indeed of purchasing cheap hard disk drives marked as "untested", particularly large capacity ones. In some cases this may indeed be a genuinely accurate description, but bearing in mind how much more valuable they would be if they had been tested and found to be working, one must question why this has apparently not been done. Need I say more?

PACCOMM V3·1 FIRMWARE

IN SEPTEMBER, I REFERRED to the long-awaited release of the version 3·1 TNC firmware from PacComm, as used in TNC2 clones such as the Tiny-2, BSX2 etc. Alas, it proved to have a number of bugs, (sorry, I mean 'undocumented features'), and some of the advertised improvements were not actually implemented.

Although the firmware is distributed in the UK by Siskin Electronics, they do not write the firmware themselves; this is all done in the USA. It seems that the beta-testing (carried out by British volunteers) was not thorough enough prior to release, and the documentation was inaccurate, which is very disappointing. A somewhat harassed Phil Bridges of Siskin Electronics will soon have another major EPROM-copying job on his hands when the next (corrected) version is released. I understand that he has made his feelings known to PacComm!

Still, the PacComm firmware is very cheap, (free as an upgrade to earlier versions), and it is still well worth having in its previous version.

TNC OPERATING MODES

THE DIFFERENT MODES in which TNCs can operate, are bewildering to newcomers, who will wonder what they all mean. I will try to explain the fundamental differences .

TERMINAL MODE

Most packet users' first experience of a TNC will be in what you could call 'Terminal' mode. The TNC is acting in a relatively intelligent and friendly manner, and responds to text commands with text replies. For example, if you type MYCALL G9XYZ the TNC might respond with MYCALL was NOCALL followed by the familiar cmd: prompt. The TNC can thus be driven by even a simple 'dumb terminal', such as you can buy at rallies for as little as £10. Although these superficially resemble personal computers, they are little more than a keyboard and a display. All the hard work is being done by the TNC. Computer programs which behave like one of these terminals are known as 'dumb terminal programs', although they will have added facilities such as being able to send text to a printer, or download/upload text and data to/from a disc, and so forth.

The advantage is that relatively little effort is required by the computer, so simple driver programs can be used, as well as most general-purpose 'comms' programs.

The disadvantage of such an operating mode, is that the program is not able to interpret the text being sent to it by the TNC easily. For example, if the text "Connected to GB7SAM" is received from the TNC, how is the program to 'know' if this is a direct connection, or a response from a node, or whether it is merely part of some text being read or monitored? It is much harder for the programmer to write driver software to carry out more complex operations, such as channel (stream) switching, remote command implementation, conference systems and so forth. Also, as different makes of TNC have different command sets, and slightly different responses to the same command, it is hard to write anything but a relatively simple terminal mode program that will work on all TNCs.

HOST MODE

'Host' mode gives the computer more control over what the TNC sends to it. The TNC will send specified information or text only in response to commands or codes from the computer, and the computer is able to 'ask' the TNC what its current status is at any time. This requires a more sophisticated driver program, (ie a Host mode program), but enables much more elaborate control over the TNC. Many TNCs have Host mode capability as standard, (though the manual doesn't always tell you much about it), and in other cases the firmware can be changed to one with host mode; eg the NORD<>LINK (WA8DED) firmware for TNC2 clones. Certain newer TNC2s will allow separate standard and Host mode firmware to be fitted at the same time, and you can switch between them, eg the Tiny-2 Mk2.

There is still a problem, in that there is no universal standard for Host mode; there are different versions for different makes/types of TNC. So, it is still difficult to write programs that can be used in a wide variety of different TNCs.

KISS MODE

'KISS' mode (Keep it Simple, Stupid) takes this process a stage further, and is fitted as standard in many TNCs as well as the more familiar Terminal mode. KISS mode hands over even more control to the computer, so that it is operating as little more than a modem plus just sufficient intelligence to send and receive packets, without interpreting them. (A modem - MODulator DEModulator - converts voltage levels to audio tones, and vice versa.) The TNC simply supplies checksums to outgoing packets, tests the integrity of incoming packets, and controls some of the main timing parameters. One great advantage of KISS mode is that it is standard, so that if a program is written in the standard manner then it will work with any TNC which has KISS mode implemented. Much of the hard work is done by the computer, allowing more advanced operation. For example, many BBSs and BPQ nodes use TNCs in KISS mode, as well as some software for packet users. Writing driver software for KISS mode is not something most of us would want to attempt, as a detailed knowledge of the AX25 protocol is required. However, if you are keen, the RSGB can supply the official AX25 protocol manual *The Amateur Packet Radio Link Layer Protocol* (ARRL) by Terry Fox, WB4JFI. The cost to RSGB members is £5·53 plus postage.

SIMPLE MODEMS

One can go one step further down this road, and that is to do without any computing power in the TNC at all, leaving just a modem to convert digital voltage levels to and from audio tones. This is exactly what programs like Digicom for the Commodore C64 and Baycom and Super Packet for the PC do. The disadvantage is that the computer has to do all the hard work, and so the program 'takes over' the machine completely. For example, it is not possible to leave the Personal Mailbox (PMS or PBBS) active, nor to allow your station to be used as a node or digipeater, while the machine is off, or being used for something else.

A recent development is that a BAYCOM type modem need not necessarily be used with the BAYCOM program. 'Interface' programs are now available for PCs, and enable a software author to write a driver program in Host mode. By using a different interface program the user can then 'match' the main program with either a KISS mode TNC or a BAYCOM type modem.

Incidentally, to impress your friends with your authentic knowledge of German, you should pronounce Digicom like "Diggicom", and Baycom like "Biycom" with a long "i". Baycom comes from the word "Bayern", meaning Bavaria. Just thought I'd tell you!

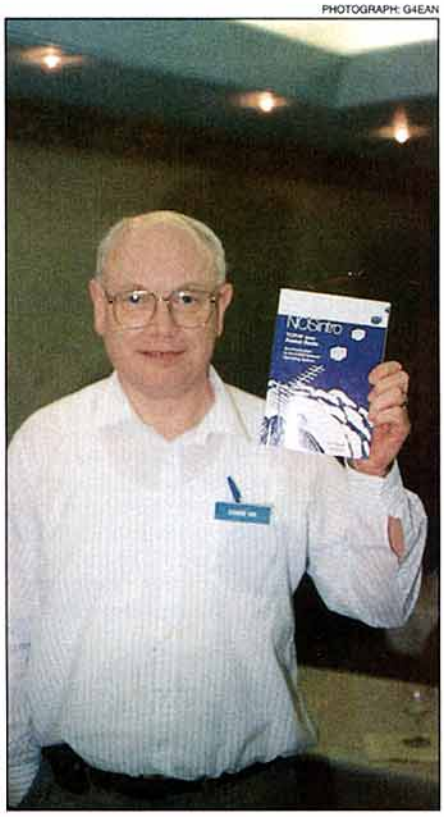
MODES WITHIN A MODE

I HAVE DISCUSSED three different major modes in which a TNC can operate: Terminal, Host and KISS. However when you are using your TNC in Terminal mode, you can find it in one of three, shall we say, minor modes.

COMMAND MODE

In this mode you are 'talking' to the TNC itself when you type, and not to anyone (or any-

PHOTOGRAPH: G4EAN



BARTG Committee Member Ian Wade, G3NRW, showing off his book *NOSintro* at the packet SysOp 15 meeting near Nottingham last March. [See *Book Case* pages for how to order this definitive book - *Ed*]

thing) with whom you are having a QSO. Nothing will be sent out on air, and the TNC will attempt to interpret any line you type as a command of some sort, such as changing a parameter. If you type something the TNC cannot interpret, it will reply with something like "Eh?" or "What?", depending on the particular type of TNC you are using.

CONVERSE MODE

If you type K or CONV, followed by a CR, (ie Return or Enter), the TNC will normally enter Converse mode, and now what you type will be sent out to your radio for transmission. For example, this might be text being sent during a live QSO, or commands etc. being sent to a local mailbox.

Returning to command mode is usually accomplished by pressing Control-C, though normally the TNC will enter Converse mode, and return to Command mode, automatically when you connect and disconnect from another station, provided the parameters NOmode and NEwmode are set appropriately.

TRANSPARENT MODE

If, when in command mode, you type TRANSP or just T followed by CR, the TNC will enter Transparent mode. The first time this happens it is usually accidental and causes a great deal of consternation to the new user. In this mode everything typed or uploaded from a disc file is sent out to air; the TNC intercepts nothing. Transparent mode enables the transmission of binary or program files using YAPP, or any other suitable protocol, to take place. Similarly, on receive, the TNC intercepts nothing but sends all received data unaltered and unfiltered, to the terminal program.

Because Transparent mode passes all characters out to air, including control codes, there is no simple character combination which can be used to exit from it. One way to return to Command mode from Transparent mode is to send three Control-Cs in quick succession, ie within the period set by the CMdtime parameter.

If you have been using the YAPP protocol to send or receive files and the transfer has been aborted you may find your TNC behaving in a very strange way. This is usually due to it remaining in Transparent mode, so you use the above method to return to Command mode.

Finally, not all TNC firmware operating in Terminal mode has these three minor modes. An alternative method is to precede every command with a special character, (usually <Esc>, which is ASCII character 27). Anything else is taken to be data, as in Converse mode. In this system Transparent mode does not exist, and in order to achieve transparency the firmware must be operated in Host mode.

AR SK

G4BLT @ GB7WRG.#19.GBR.EU (Packet) or DK0MHZ (PacTOR)

Microwaves

MIKE DIXON G3PFR
'Woodstock', Gazebank, Norley, Warrington, Cheshire WA6 8LL

THE CUSTOMARY NOVEMBER Round Table at Martlesham, courtesy of British Telecom management and the Martlesham Radio Society, is to be held on 14 November at BTRL, Martlesham Heath. Although there is no formal programme at the moment the entry arrangements are, as usual, by ticket only. More information and tickets are available, free, from Roy Smith, G0RRC, 'Lykkebo', The Street, Burstall, Ipswich, on receipt of a stamped, self-addressed envelope.

It is necessary, for security reasons, to give all the names of the applicants if you are applying for more than one ticket.

My apologies are due to the southern Round Table group who did send in details of their last Round Table for publication here: unfortunately this arrived too late for publication, too late for the July column and the meeting had been held before the September column!

I wonder whether I can remind organisers of these excellent events that the column appears in the January, March, May, July, September and November issues of *RadCom*, and that the 'deadline' for a column entry is about five to six weeks before the publication date, ie roughly the middle of November for January, January for March, March for May, and so on. Obviously I'd like to promote these events by giving you timely details here, as well as in the Microwave Newsletter and the RSGB news broadcasts. I can, unfortunately, only do that with sufficient forewarning!

CURRENT OPERATING LADDERS

THE POSITION ON THE ladders, as of September, is as shown in **Table 1** (1993 Operating Ladder) and **Table 2** (All-Time Squares/DX Ladder). There have now been quite a few changes from the opening offering in the September column.

Table 2 gives the 10GHz All Time Squares position. Remember, that for entry to this table, all contacts must be made from one location, unlike the Operating Ladder where entries can be made from any location, fixed or portable (the only thing being, please keep the fixed and /P entries separate!). In the all-time squares table the leading operators, the formidable G3WDG/G4KGC duo, have hoisted their score by five more squares, including the EI/G3UKV/P expedition in IO84, this latter contact raising the countries score to 10 – it almost starts to sound like a 2m score!

There has also been news of some more 10GHz EME contacts since I last reported activity on this mode some time ago. ON6JZ worked SM4DHN and WA7CJO on 27 April this year and immediately these contacts were finished, the gear was transported to PA3CSG's QTH where PA3CSG worked the same two stations in quick succession. It is of interest that the contacts were made using 20W to a 6ft dish, thus bringing EME capability well within the reach of many UK operators. In May the G4KGC/G3WDG duo worked two more countries by EME: G3WDG was reported as working DJ7FJ and I4CHY and getting his own echoes back from as little as 7W, even though he now has 35W available. However, for normal operation Charlie and Petra's set-up is top state of the art insofar as the HEMT preamp (G3WDG004) is giving a front-end NF of about 0.65dB, with an overall system noise figure of about 0.8dB, enabling the receiver to detect no less than 15.5dB of sun noise and 2.0dB of moon noise. The transmitter output has been raised to 40W from two 20W TWTAs and the dish steering mechanism automated. I guess it won't be long before G/VK happens!

MICROWAVE COMMITTEE NEWS

AT A RECENT (SEPTEMBER) meeting of the Microwave Committee one of the more important topics discussed was what technical support might be given to the other microwave bands now that developments at 10GHz and the supply of reliable and reproducible designs for this band have reached a point where most operators' needs have been met?

CE5SPR and OZ1UM – junior at JO5SWX. All of the OZ1UM/P stations are solar powered.

OPERATING LADDER 1993

Band GHz	Posn	Callsign	Stns Wkd	Best DX, km	Multiplied Score
10	1	G4KGC	56	783	43848
	2	G3JVL	34	717	24378
	3	G4RFR/P	42	413	17346
	4	G4BRK/P	44	324	14256
	5	EI/G3ZME/P	30	454	13620
	6	G8LSD/P	33	304	10032
	7	G3JMY	36	278	10008
	8	G3BNL	23	432	9936
	9	G3PHO/P	31	303	9393
	10	G3GNR	17	510	8670
	11	G4KNZ	33	247	8151
	12	G3JMB/P	26	304	7904
	13	G3GRO	25	296	7400
	14	G3ZTR/P	18	354	6372
	15	G4JNT	18	337	6066
	16	G4BRK	23	234	5382
	17	G3FNQ/P	17	313	5321
	18	G8AGN/P	17	303	5151
	19	G8KMH/P	21	197	4137
	20	G8DKK	17	234	3978
	21	G3UKV	13	242	3146
	22	G4LDR	17	178	3026
	23	G4KNZ/P	8	331	2648
	24	G4LDR/P	5	97	485
	25	G8AYY/P	1	57	57
24	1	G4KNZ/P	9	156	1404
	2	G3PHO/P	3	90	270
	3	G8AYY/P	4	65	260
	4	G3FNQ/P	3	40	120

Table 1

10GHZ ALL-TIME SQUARES WORKED

Posn	Callsign	Locator	Squares Wkd	Best DX (km)
1	G3WDG	IO92RG	29	1008
2	G3BNL	IO92KA	17	1027
3	G4DDK	JO02PA	16	626
4	G8KQW/P	IO91GA	15	390
5	G8LSD/P	IO90TV	15	304
6	G3JMB/P	IO90TV	14	304
7	G4RFR/P	IO80UU	12	414
8 =	G3PHO/P	IO93EH	12	330
8 =	G8AGN/P	IO93EH	12	330
9	G4FCD	IO91JV	11	1039
10	GW4MAP/P	IO82JG	11	311
11	G4PMK	IO93GT	10	739
12	G4BRK/P	IO91FN	10	234
13	G4JNT	IO90IV	9	337
14	G3ZME/P	IO82QL	9	292
15	G4KNZ	IO91PJ	9	247
16	G0API/P	IO80UU	8	277
17	G3UKV	IO82RR	7	242
18	G4LDR	IO91EC	7	178
19	G0API	IO80XS	5	184
20	G3JMB	IO91WA	4	48
21	G3NWU/P	IO94MJ	3	290

Table 2

You may have seen advertisements in both the *Microwave Newsletter* and *RadCom* for assistance with the design and testing of modules for some of the middle bands – 2.3, 3.4 and 5.7GHz in particular – and also in the bands above 24GHz. Is there anyone willing to assist? If so please contact the present chairman, Steve Davies, G4KNZ, at 14 Herondale, Birch Hill, Bracknell, RG12 7ZT.

Work is already well in hand by Andy, G4JNT, on a design for a simple, basic, general purpose 1.3GHz transverter which uses readily obtainable (in the UK, that is) components. Although I've already mentioned the KK7B designs in this column and there are kits available from LMW Electronics, several Committee members felt that neither of these designs was entirely suitable for many needs, both being fairly large boards in terms of being capable of integration into other equipment, for instance as a 1296MHz transmit and receive IF module. The new design is likely to have an output of 10 to 20mW and a receive NF of around 2-3dB, both the transmit and receive performance being easily and inexpensively improved by means of small external amplifiers. Watch out for further news!

Work is also going on with a view to producing a narrowband design for 24GHz similar to the highly effective G3WDG 10GHz designs. Again, some parts of basic receive and transmit converters, particularly the local oscillator source are progressing well.

Also at the meeting, the full range of papers to be presented in Committee C5 at the IARU Region 1 Conference was discussed. Since then, of course, the Conference has come and gone (just!) and the reader will find a fairly full summary account of the most important aspects of the meeting elsewhere in *RadCom*. The latest versions of the bandplans will be published in the 1994 edition of the *RSGB Call Book* which is going to press as I write. Some earlier inaccuracies have been corrected and you will find much more detail of the UK usage in several of the bandplans, so I won't comment further here.

DANISH ACTIVITY WEEK

THE PHOTOGRAPH OF OZ1UM'S three-band portable station published in the last column was one of a good collection of photographs which accompanied a full report by OZ9ZI, recently received. What wasn't obvious from that photograph was that the three-band set-up was solar powered, as this moth's photograph shows!

The event described took place between 6 and 12 June 1993 (yes, a whole week of it!) when various members of the North Zealand Work Group and Procom's Amateur Radio Club participated in the activity. The Activity Week was not only remarkable for the contacts made and bands covered, but also for the constructional activity surrounding it. No less than 18 'LMT1-24' 24GHz transverters (LMT standing for 'Last Minute Transverter') were completed and operated during the period. The design (see my earlier remarks) was based on ideas from OZ1UM and is made up from various modules from several amateur designers. The transverter produces 40 to 65mW of NB at 24GHz, with a choice of a 144 or 432MHz receive IF. The receive NF is about 6dB, which is pretty good for this band. Using 25cm dishes, an over-land contact of 180km between OZ/ON4AOD and OZ/DB6NT was made and an over-sea contact of 208km was made by OZ1UM and OZ/DB6NT.

OZ1UM had built two 47GHz stations with an output of 3 to 5mW and an attempt to better last year's DX of 90km was unsuccessful. OZ1UM and OZ/DB9NT made an 8.8km contact on 76GHz (3.7km better than last year) in apalling weather with a transverter output of 10μW and a receiver of unmeasured NF. A 3.1km CW contact using about 5μW between OZ/DB6NT, OZ/DF9LN and OZ/DJ5HN took place in the 145GHz band to create a Danish and World record. Going still higher, to 241GHz, OZ/DB9NT and OZ/DF9LN worked a distance of 0.5km, again a World record.

The group now plans to up-rate the LMT1-24 design to work at 47GHz, just in time for the 1994 event, no doubt. I wonder whether it will be called the *JIT1-47* transverter!

FINALE, 1993

I WISH ALL microwave operators a very Happy Christmas and a prosperous and successful 1994.

1993 has been quite an eventful year, microwave-wise, I'll review it in more detail in the next column. Take a look at the report on the IARU Conference – you'll find something there of microwave interest!

Satellites

ARTHUR GEE G2UK
21 Romany Road, Oulton Broad, Suffolk
NR32 3PJ

IT HAS BEEN customary to publish the *Proceedings of the AMSAT-UK Colloquium* so that those not able to attend but who are interested may get some idea of what went on. The *Proceedings* for the 1993 Colloquium give a good representative collection of those lectures which are submitted in time for their printing.

Pride of place must go to the update on Phase 3D presented by Dick Jansson, WD4FAB. The AMSAT International Phase 3D (P3D) spacecraft program met an unforeseen crisis in November 1992 when the European Space Agency decided to change the launch vehicle interface scheduled for P3D. This completely annulled the P3D design about to be constructed by the Weber State University at Ogden, Utah, USA. It did however offer the chance to revise the P3D to a much improved concept to which an Engineering Model is being constructed at Weber. Dick's paper was well illustrated with drawings of the new concept and covers in detail the new concepts which will create a spacecraft design that is much more likeable and workable, particularly in respect of the access to the electronic modules on the sides of the spacecraft.

Every effort to interest school children in space activities is to be welcomed and the paper by Geoff Perry MBE on 'A Simple Satellite Monitor Project' deserves commendation. The James Allen's Girls' School, Dulwich, cooperated in a project using worksheets produced by AMSAT-SA, a VHF receiver and a stop-watch which enabled the determination of mean orbital period, orbital height and velocity to be made, using formulas and supporting theory.

Eric Rosenberg's, WD3Q, paper on the results of the Digital Communications Experiment on UoSAT 2 makes interesting reading. This project, begun in 1984, proved that messages could be passed via satellites and gateway ground stations in the UK, South Africa, Australia and New Zealand. Tests carried out by Greenpeace at their Antarctic outpost and VITA (Volunteers in Technical Assistance) in Washington used the system as a test-bed for the further development of a non-commercial means of communication for private voluntary organisations world-wide. This fascinating account of VITA's activity in this sphere makes good reading.

It was good to see my favourite satellite - RS12 - being the means by which an investigation into 'A New HF Propagation Mode' by John Branegan, GM4IHJ and Robert Brown, NM7M. Observations of the 29.4MHz beacon have reported signals from this satellite up to distances of 7500Km across the dark, northern polar caps in 1991, '92 and '93. In a comprehensive article, the authors enlarge on the experiments undertaken to explain these observations and the conclusions reached. It is very good to see an amateur radio satellite being used for such experimental purposes, which have added considerably to an understanding of ionospheric radio propagation. These two authors are to be congratulated for this work.

Another contribution of a scientific nature comes from Tom Davis, EA2CLS/KB7HTA. This is about the WeberSat Light Spectrometer Experiment on the WO-18 Satellite. The concept of this instrument was to provide a simple, compact, inexpensive and accurate general coverage instrument to observe solar spectra and reflected spectra from the Moon's surface of the earth's upper atmosphere. Such a spectrometer was designed and built using a CCD photo-detector and worked out successfully.

Mike Dorsett's account of the optimisation of 'VHF and UHF Receiver Design', using the Yaesu FT-736R as an example, was a valuable contribution for those anxious to get the best out of their receivers.

The Helsinki University of Technology is to build a satellite which is primarily designed for education in satellite engineering and space science. Designated 'HutSat', it will be constructed to fit into ARIANE ASAP structures. Solar panels are to be mounted on the body and stabilisation will be by gravity gradient boom and magnetic torquers. GPS receivers may be provided for both attitude and position indication. The on-board housekeeping computer is based on the Intel 80C 186 processor and a Digital Signal Processor experiment is being supplied by a Finnish radio amateur group.

Details of 'Computers and Software for Amateur Satellite Stations' was presented by Eric Cottrell, WB1HBU, whilst Viktor Kudielka, OE1VKW, produced an in-depth account of the theory of satellite orbits, Kepler's Elements and such like. In a further contribution, entitled 'The Care and Feeding of MicroSat Ground Stations', OE1VKW gives a good summary of present-day satellite characteristics and equipment for using them.

Peleg L Lapid, 4X1GP, in 'The Integration of an Amateur Radio Satellite Station', shows how he managed to build an 'Integration Box' which enabled him to work a goodly selection of today's satellites without having to change coaxial antenna connections and power and computer leads!

Ray Soifer's, W2RS, presentations, complete this review with two excellent contributions on 'Terrestrial Propagation at 144MHz and Above' and 'Frequency Planning for Amateur Satellites - After Twenty Years'.

The 1993 *Proceedings of the AMSAT-UK Colloquium* are available at £11 plus postage at £2 (overseas £5.50) from AMSAT-UK, London E12 5EQ. But hurry as stocks are limitted.

PHOTOGRAPH: SURREY SATELLITE TECHNOLOGY LTD.

One of the 'new birds' from the University of Surrey.

NEW BIRDS

BY THE TIME you read this, there should be another MicroSat available for use. ITAMSAT from Italy was launched from Kourou on 26 September (and became OSCAR-26) and if all goes well, it should provide the amateur radio satellite fraternity with a very nice satellite indeed.

Alberto Zagni, I2KBD, of AMSAT-ITALY (ITAMSAT) says that the orbit will be sun-synchronous with an altitude of 800km. This microsat will share many of the characteristics of previous ones except that it will have the capability of allowing the use of 1200, 4800 or 9600 baud on both the uplink and the downlink. It will have the usual 'store-and-forward' bulletin board system as on the current microsats, eg AO-16 and LO-19. Those who are currently set up to use AO-16, LO-19 or UO-22 will not have to make changes to their stations to use ITAMSAT-A.

The modes and frequencies of operation are as follows: Downlink: 435.867MHz (primary); 435.822MHz (secondary). Uplink: 145.875MHz; 145.900MHz; 145.925 and 145.950MHz. The maximum downlink power will be approximately 4 watts and the antennas will be a 4-element slanted turnstile for UHF and a quarter-wave VHF dipole. The satellite weighs about 10kg and is about 25cm in length on each side of its cubic shape.

On the same launch were three other satellites of interest to radio amateurs. EYE-Sat (OSCAR-27), built by Interferometrics Inc of Vienna, Virginia carries an amateur radio package built in cooperation with AMRAD, an experimentally oriented radio club in Virginia, a suburb of Washington DC. It is a microsat type satellite and is said to incorporate both 9600 baud uplink and downlink and a 19.2 kilobaud experimental downlink. Uplink and downlink frequencies are stated to be 145.850 and 436.800MHz respectively. The transmitter can be programmed between 0.25 and 4 watts.

Also launched were two satellites built at the University of Surrey. One is KITSAT-2, which is similar to KITSAT-OSCAR-23 and the other is POSAT-1, a satellite built in cooperation with the Portuguese. The latter will include an earth imaging camera which should provide amateurs with the opportunity to download pictures from space. It is also said to include a GPS experiment which may provide valuable data for the use of GPS on the Phase 3D satellite. KITSAT-2 is OSCAR-25 and POSAT is OSCAR-28.

The AMSAT NEWS Service from which much of the above was taken, would like to thank Alberto Zagni and Bill Tynan, W3XO, for providing the details of the IT-AMSAT satellite.

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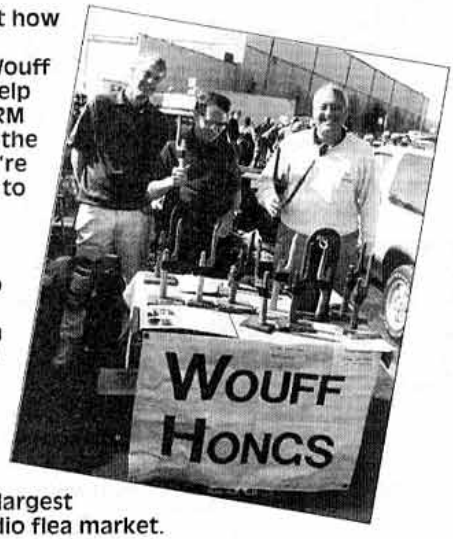

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The **PW** party returns home on Monday May 2, arriving at Gatwick on the morning of May 3. See the largest amateur radio gathering in the world, come fly with **Practical Wireless** to Dayton HamVention 1994!

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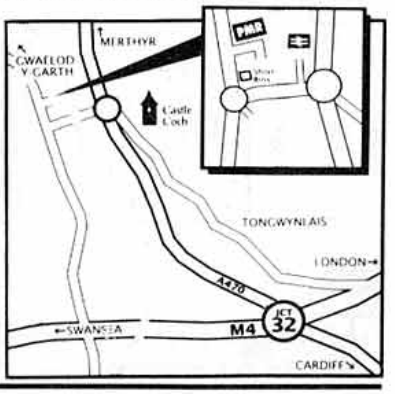


RADCOM CONTESTS FEATURE

National Field Day 60th Anniversary

Organised and reported by Chris Burbanks, G3SJJ, with band adjudication by G4IQM, G2HLU, G3SQX, G4BKI, G3KHZ and G3VHB.

FIELD DAY 1993 will be remembered mainly for the weather being hot and sunny. The many comments received can be neatly summed up by an observation from G4VRS/P: "What a lovely weekend. We had the weather, one member brought along his gas barbecue with loadsagrub, and suntan oil was much in evidence. We even had a few contacts too!"

Propagation favoured the lower frequencies and the much hoped for Sporadic-E openings into Europe did not materialise. With the now rapid decline in sunspot activity, inter-G traffic on 21 and 28MHz became important and benefited stations in high locations with almost line of sight transmission into the more populated areas. You could be forgiven for thinking that we were in VHF NFD.

One can't help but contrast the difference in early Field Days and indeed my own introduction to the event 30 years ago, with the present day contest. In 1963, we had separate transmitters and receivers, keys were either 'straight' or mechanical 'bugs'. The technology may have changed but the teamwork, friendship, camaraderie, competitiveness and most of all, the fun and enjoyment still live on.

G3KHZ operating G3KHZ/P in the wee small hours. The home-made pre-tuned ATUs are shown on the right.

THE OVERALL WINNERS, Reading and District ARC, G3ULT/P, have done it again! Congratulations to the team on their third successive resounding Open section and Overall win. They now equal the record and all eyes will be on them next year! The team co-operation to erect two mobile towers, two tubular yagis and four wire dipoles, plus 500m of coax, is immense. Operating skills play a vital part and the team spirit engendered by operators G3WGV and G3XTT is obvious. Attention to detail is not forgotten as can be seen from the comment: "We used W103 coax for the HF beam, it saves us 0.5dB!" Competition for second Open section spot was high with Addiscombe ARC, G4ALE/P back in the driving seat. Three teams were in the running for the Scottish Trophy with Stirling and DARC, GM6NX/P, succeeding for the second time. Aberdeen ARS, GM4SID/P, were just 98 points behind, a creditable performance considering they were in the Restricted section.

PHOTOGRAPH: G2KI

The way we were: Competing for District 7 (Guildford Area) is G5LA/P in the original 1933 NFD. G5LA is to the left of the tent and G2YL is in the centre of the picture.

Gravesend RS, G3GRS/P, triumphed again for **top Restricted** honours, their 'search and call' technique paying off well on 1.8MHz to give them a comfortable lead over Verulam ARC, G3VER/P, who were five contacts ahead overall.

It was pleasing to see continued interest in the **Low Power section** and this year **Echelford ARS, G3UES/P**, claimed first place. Thanks to the Reading group, they will be receiving the new Reading QRP Shield for their success. Mention must be made of the Leicester Radio Society's efforts in taking the Frank Hoosen, G3YF Memorial Trophy. The team battled against poor band conditions to gain their success. Well done!

Band Reports

1.8MHz

Band scores were up overall by nearly 50% on 1992 reflecting the decreasing sunspot activity and consequent lack of traffic on the higher frequency bands. Many groups recorded their best ever 160m score and several wished they had begun earlier on the band or stayed longer. The only DX worked consisted of a few USA and Asiatic Russians, although band conditions were generally reported as favourable with low static noise for the time of year. Open section band leaders, **G3VHB/P** emerged as the clear winners. Their 1445 points were gained in one major blitz on the band from 2034 to 0117, return-

Trophy Winners

NFD Shield	Reading & DARC	G3ULT/P
Bristol Trophy	Gravesend RS	G3GRS/P
G6ZR Memorial Trophy	Addiscombe ARC	G4ALE/P
Gravesend Trophy	Verulam AR	G3VER/P
Scottish Trophy	Stirling & DARS	GM6NX/P
G3YF Memorial Trophy	Leicester RS	G5UM/P
Reading QRP Shield	Echelford ARS	G3UES/P

ing for 30 minutes at 0207 to clean up the stragglers, whilst second placed G3PRC/P spent roughly the same time, leaving the band for several short periods. In the **Restricted** section, **G4BVH/P** gained their leading score also from one concentrated effort and again with a brief follow-up. **QRP** leaders, **G3UES/P** started later at 2203 staying on until 0117. As in recent years, it was noticeable that southern-based Restricted groups gained from the higher density of activity in that area.

3.5MHz

Again poor higher frequency conditions meant increased activity on this band. Propagation was good into all of Europe for most of the night with no DX apart from a couple of North Americans. This is exactly what is required to build up a high score, the main problem being to decide on when to be on the band. Winning groups use their skill to determine the most likely time to be on and then the rate meters on their computer logging program indicate when their scoring rate falls. The best policy seems to be in making 30 to 60 minute visits from about 1900, deserting the band at 0500. **Open section** leaders were **G0BRC/P** with a single band entry of 271 QSOs, operated by G0MIF, G0LJD, and G4ZRY. G3ULT/P were close behind with 224 high scoring contacts in six well timed visits using a pair of dipoles at right angles to good effect. In the **Restricted** section, **G3GRS/P** and G4WSM/P both claimed 776 points, but it was the former's greater accuracy that gained them the leading place. **QRP** winners **G3UES/P** made a respectable 152 contacts.

7MHz

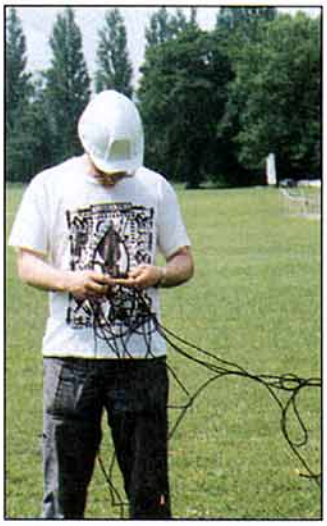
As always, a very busy band with night-time and the last two hours proving the most productive periods. Frequent visits were made by the leading groups with search and call techniques often providing a higher contact rate than remaining on one frequency. Computer logging helps greatly in this respect, just key in the suffix and press F8 or whatever for instant indication of whether the station has been worked before. **Single band** entries are always keenly fought and this year proved no exception, in the **Open** section, **G3BSN/P** managed by just one point to keep their lead over **G3CNX/P** despite a higher error rate. **G3GXI/P** always keen to fight for top honours on the band were successful in the **Restricted** section. **QRP** winners

G4ALE/P operated by G3VYI. The group were runners up in the open section.

were **G3WKS/P** with a faultless log. Multiband entrants G3KHZ/P made a creditable 1038 points in the Restricted section whilst the heavy metal brigade produced some interesting results with top honours in the Open section going to G3TBK/P using a pair of phased wire dipoles with great effect to Europe. In contrast, G3ULT/P used a 2 element tubular yagi successfully to the west with 14 W/VE contacts between 0200 and 0316.

14MHz

The **G5UM/P** team has concentrated on single band entries over the years and their perseverance has this time netted them the **Frank Hoosen G3YF Memorial Trophy**. Although propagation was poorer on the two higher bands, it was not reflected in any noticeable increase on this band since conditions here were also down, making the going hard for Low Power entrants. Main activity periods were from 1500 to 2000 and from 0530 until the end, although there was a useful opening to the west between 0500 and



"I get all the lousy jobs on Field Day". G4TSH gets G3UES/P out of a tangle.

0600 with some good six-point QSOs available. Stations with efficient band changing made as many as 19 visits, with G3ULT/P achieving the highest scoring rate averaging 65.3 contacts per hour for the 4.1 hours spent on the band. From overseas, VE3DZZ/P in particular, was very active. **Open section** band leaders were **G3PRC/P** with a comfortable lead over G3TBK/P, antenna gain probably playing an important part here. In the **Restricted** section **GM4SID/P** and GW3KDB/P were clear leaders with the former having a higher points to contact ratio. **QRP** section band winners were **G4ARN/P**.

21MHz

A very disappointing band for most, with only one station achieving over 100 contacts. Conditions were described as being from "bad" to "dreadful." When openings did occur they appear to have coincided with activity on 28MHz and propagation was more inclined to be within the UK with the south benefiting from the higher density of portable stations. In the **Open section**, **G3SDC/P** was the clear winner with 394 points from 118 QSOs, some gain from a 5-element triband yagi and a new higher site evidently assisted. **Restricted** and **QRP** section winners were **G3VER/P** and **G3UES/P** respectively, both again benefiting from the higher activity levels in the south. .

28MHz

Most groups would have been quite happy not using the band at all; several entrants gave it a miss or only scant attention. The north-south divide was again very apparent this year with southerly stations having the advantage of a higher density of stations. Sporadic-E was conspicuous by its absence, especially disappointing to those who monitored a good opening on the evening before. The southerly advantage did not appear to bother **Restricted section** band leaders **GW3KDB/P**, who lead by a good margin from 81 contacts with a perfect log. Their high location normally used to good advantage on VHF Field Day was of equal assistance on this occasion. Leading **QRP** group was **G3UES/P**, again in the middle of the activity.

Comments

Computer Logging

"All operators found it much more relaxing. Great advantage is the speed of duplicate checking" *G3ZME/P*. "After a short time everyone had been won over by the program (Super Duper)" *G4VRS/P*. "As before used PC logging *and* paper, gives the operator something to do" *G3GRS/P*.

G3XRE/P took no chances with the DX and brought along their own VK to do the logging, George Southgate, VK5QG (ex-G3LXO).

General

"First attempt at Field day, will certainly do it again" *G3IZD/P*. "Our youngest operator, 10 year old David, 2E0AFD, enjoyed his stint on the key" *G2NM/P*. "Is QSL really shorter than R?" *G3DIT/P*. "A real team effort with 12 club members involved in some way" *G0SOA/P*. "Our alternator manager was sure there was enough petrol in the tank for the last hour - there wasn't!" *G8GG/P*. "There were long periods when our CQs remained unanswered" *G2FKO/P*. "Were constantly buzzed by a light aircraft, was this the RSGB inspection team?" *G4FUH/P*. The whole weekend was a huge success with many members helping to erect and dismantle the station, as well as a large number of visitors" *G3NWR/P*. "This contest continues to

83

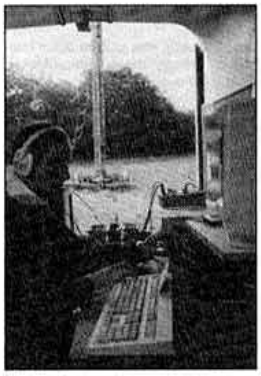
CONTEST CLASSIFIED

All rules should be read in conjunction with the General Rules published in *Contest News* January 1993

NATIONAL FIELD DAY 1993 RESULTS

82 be most enjoyable" *G3VCP/P*.

No rule changes are envisaged despite changes in technology and the decline in sunspot activity. The event is finely balanced and it is for the entrants to gain their competitive edge within the rules framework. A behind-the-scenes change is being considered, though, to ease the burden of checking some 500 logs. By next year's event, it is hoped to have a full computer checking system on line and entrants will be encouraged to submit entries on diskette. Paper logs will still be accepted and the data keyed in by hand.



G4DJX operating G3VER/P.

The 60th Anniversary of Field Day was a fitting tribute to the pioneers of 1933. Some groups will already be planning next year's event, developing strategy, building and checking antennas and similar activities that have taken place for the last 60 years. Probably the main difference is in the interconnection of equipment, with much effort now being put towards rapid band changing with single button control of transmitter, receiver, antenna and computer. There is one thing for certain, the computer will not over-ride the fun and enjoyment gained from the experience of Field day.

CLASSIFIED CONTINUED ON PAGE 84

RESTRICTED SECTION

Posn		Call	Club/Group	1.8		3.5		7		14		21		28		QSOs	Point
1	+	G3GRS/P	Gravesend RS	186	1357	204	768	251	885	194	632	63	214	56	390	954	4246
2	+	G3VER/P	Venturn ARC	157	1137	198	731	268	952	197	658	76	256	63	430	959	4164
3	*	G4MBC/P	Mid-Beds CA	169	1235	190	728	251	905	192	630	71	240	45	326	918	4064
4		GW3KDB/P	Lichfield ARS 'A'	159	1149	167	648	198	682	220	705	61	197	81	554	886	3935
5		G3KHZ/P	Park Air	141	1052	205	724	303	1014	171	571	42	148	32	242	894	3751
6		GW8GT/P	Red Dragon CG	158	1123	206	726	221	812	194	613	54	180	38	264	871	3718
7		G3WOI/P	Newbury & DARS	169	1098	174	646	223	802	147	493	43	147	66	468	822	3654
8		G3MXJ/P	Uckfield CG	164	1204	176	679	196	734	164	524	51	178	41	282	792	3601
9		G4BVH/P	South Downs CG	187	1376	172	656	206	748	146	470	57	198	18	130	786	3578
10		G3SFG/P	Southgate ARC	145	1066	186	706	146	551	162	534	64	194	53	248	756	3299
11		G4BLX/P	Limekiln CG	157	1081	185	691	185	648	134	447	21	75	28	190	710	3132
12		G3GLL/P	Tollesbury CG	116	860	183	714	211	773	95	314	51	178	40	290	696	3129
13		G3XRE/P	Medway RCG/Royal Eng RS	121	936	145	552	209	771	111	363	44	154	45	352	675	3128
14		GM4SID/P	Aberdeen ARS	132	998	134	504	190	687	212	713	29	107	16	116	713	3125
15		G0FBB/P	Windmill CG	131	892	91	375	242	844	122	399	41	137	43	328	670	2975
16		G4DQW/P	Chiltern DX Club	87	656	171	657	160	592	145	484	68	237	48	348	679	2974
17		G3ZRS/P	East Yorkshire CG	116	861	199	733	243	875	124	412	17	62	4	14	703	2957
18		G5BK/P	Cheltenham ARA	106	806	132	518	162	608	138	468	43	132	49	350	630	2882
19		G5RS/P	Guilford & DARS	121	829	175	662	180	656	97	325	18	60	39	272	630	2804
20		G3IZD/P	Cumbria CG	155	1061	57	220	202	702	190	640	6	17	15	100	625	2740
21		G3ZME/P	Telford & DARS	100	748	167	626	210	777	124	418	16	59	4	10	621	2638
22		G6RC/P	Crawley ARC	137	1013	116	452	170	633	74	214	28	103	26	200	551	2615
23		G4WSM/P	Weston-Super-Mare RS	59	460	205	765	204	739	161	549	5	18	7	50	641	2581
24		G2XP/P	Sutton & Cheam RS	155	1147	96	368	136	462	102	324	32	109	24	160	545	2570
25		G0SOA/P	Stratford On Avon	121	890	130	486	124	449	163	520	27	87	8	46	573	2478
26		G6UQ/P	Stockport RS	108	841	145	546	167	571	115	361	19	60	6	40	560	2419
27		G4HRC/P	Havering & DARC	89	626	130	483	191	716	82	274	17	51	34	244	543	2394
28		G4JXG/P	Braintree & DARS	121	876	121	472	153	574	75	238	25	75	20	158	515	2391
29		G3DIT/P	South Hampshire	121	867	114	428	180	672	55	201	13	50	23	158	506	2376
30		G4HRS/P	Horsham ARC	128	797	112	436	105	385	79	262	38	134	34	343	496	2357
31		G4RKO/P	Thatcham ARCG	112	762	103	386	192	696	99	355	7	21	9	66	522	2286
32		G0RSR/P	Reading & DARS B	48	373	112	428	124	420	203	656	26	89	44	320	557	2286
33		GM3NIG/P	Windy-Yett CG	73	552	98	379	177	658	161	549	13	46	12	92	534	2276
34		G3CAR/P	Chiltern ARC	113	835	68	246	165	620	62	210	19	69	28	222	455	2202
35		G4GCT/P	North Bristol ARC	52	400	107	402	180	659	155	520	5	16	1	8	500	2005
36		G3WQK/P	Southdown ARS	84	665	82	326	116	434	92	308	36	115	20	132	430	1980
37		G0CRW/P	Crowborough & DARC	62	485	113	442	103	394	108	349	64	220	9	60	459	1950
38		G2NM/P	Chichester & DARC	51	382	159	598	187	673	33	102			27	194	457	1949
39		G4APN/P	Easington ARS	71	537	61	234	172	641	142	481	14	44			460	1937
40		G4AYM/P	Gloucester ARS	70	464	82	310	130	478	166	553	9	29	11	76	468	1910
41		G3YDD/P	Hereford ARS	73	544	122	462	160	602	62	186	10	28			427	1822
42		G3BRS/P	Bury Radio Society	82	573	113	422	120	440	35	121	35	120	12	80	397	1756
43		GM3GG/P	Banff & DARC	93	456	88	330	152	563	109	323	21	72			463	1744
44		G4JS/P	Darwen ARC	104	748	64	238	143	534	44	145	8	28			363	1693
45		GM4ZRR/P	Aberdeen ARS 'B'	38	296	79	312	108	384	177	575	12	36	13	88	427	1691
46		G8GQ/P	Fylde	40	317	109	418	133	507	82	255	24	85			388	1582
47		G5LK/P	Reigate ARS	55	402	32	126	53	202	137	433	37	125	34	240	348	1528
48		G3GXI/P	Eccles & DARS				451	1367							451	1367	
49		G4UFK/P	Exmoor RC	85	661	41	156	63	244	65	227	4	13	5	40	263	1341
50		G4FBS/P	Horndean & DARC		97	375	112	424	52	182	5	20	3	20	269	1021	
51		G4ECT/P	Cheshunt & DARC		48	182	161	544	46	164	7	20	12	84	274	994	
52		G2FKO/P	Appledore & DARC			102	386	70	228	2	7			174	621		

OPEN SECTION

Posn		Call	Club/Group	1.8		3.5		7		14		21		28		QSOs	Point
1	+	G3ULT/P	Reading and DARC	167	1200	224	824	265	934	220	713	89	284	98	674	1063	4629
2	+	G4ALE/P	Addiscombe ARC	166	1198	201	739	232	806	195	625	61	215	78	544	903	4127
3	*	G3PRC/P	Plymouth Radio Club	175	1286	185	673	224	821	235	781	56	180	55	344	930	4085
4		G5LO/P	Oxford & District ARS	167	1210	184	649	213	800	223	701	73	244	53	386	913	3990
5		G3VHB/P	Lichfield ARS 'B'	200	1445	162	615	212	769	167	533	42	136	68	482	851	3980
6		G3TBK/P	East Notts CG	164	1208	174	660	270	949	223	724	37	136	26	184	894	3861
7		G3SDC/P	De Montford University	139	991	163	622	238	770	152	507	119	394	61	438	872	3722
8		G4AHG/P	Shirehampton ARC	115	852	172	646	172	632	169	544	55	175	59	404	742	3253
9	+	GM6NX/P	Stirling & DARS	103	798	126	491	216	808	194	677	71	259	28	190	740	3223
10		G3NJA/P	Torbay ARS	163	1161	112	400	144	522	196	650	60	156	33	226	708	3115
11		GM0ADX/P	Kilmarnock & Loudoun ARC	132	944	114	412	192	699	212	710	96	335	1	4	747	3104
12		G3ASR/P	Edgware & DARC	175	1274	142	536	129	474	101	330	49	160	46	318	642	3092
13		G3VGG/P	Bromsgrove & District RC	84	649	146	573	114	424	169	558	65	217	88	584	666	3005
14		G4FUH/P	Scunthorpe ARC	115	793	171	644	209	756	108	356	15	50	11	64	629	2663
15		G0FDX/P	Central Lancs ARC	104	770	129	494	110	412	194	633	19	69	25	176	581	2554
16		G0MWT/P	Chelmsford ARS	82	617	133	506	202	714	102	336	25	90	40	282	584	2545
17		G3YRC/P	Gt. Yarmouth Radio Club	86	579	153	564	104	821	101	323	24	78	15	114	483	2479
18		G4FOX/P	Melton Mowbray ARS	126	934	97	360	197	412	170	545	25	92	18	132	633	2475
19		G3CNX/P	Grimsby ARS	178	1250			358	1220						536	2470	
20		GW3JSV/P	Offa's Dyke CG	120	870	126	478	169	607	111	366	25	82	7	20	558	2423
21		G3NWR/P	Wirral ARS	96	647	129	484	138	525	157	526	31	107			551	2289
22		G3VCP/P	Crystal Palace & DARC	123	878	72	274	100	380	75	242	38	135	47	346	455	2255
23		G3WKX/P	Maidenhead & Dist ARC	128	985	97	374	87	323	105	363	18	67	12	84	447	2196
24		G4BP/P	Scarborough ARS	119	726	121	476	116	414	105	379	26	88	4	28	491	2111
25		G4RSE/P	South Essex ARS	77	579	100	373	144	544	59	180	19	65	29	192	428	1933
26		G3FVA/P	South Manchester RC	60	437	53	209	131	476	181	569	17	60	26	182	468	1933
27		G3XRT/P	Ilford RSGB Group	187	1269								96	654	283	1923	
28		G4EKT/P	Hornsea ARC	72	547	111	432	88	348	125	395	20	61	15	108	431	1891
29		G4VRS/P	Aylesbury Vale RS	71	545	78	304	106	416	75	271	29	106	31	238	390	1880
30		GM3USL/P	Cunninghame & Dist ARC	44	316	89	350	114	436	112	393	23	86			382	1581
31	+	G5UM/P	Leicester Radio Society							450	1393					450	1393
32		G3BSN/P	Clifton ARS 'B'					358	1221							358	1221
33		G3NFC/P	Burton & District RS			80	320	109	385	83	276			13	96	285	1077
34		G3WGC/P	Welwyn-Hatfield/Dynamics					270	971							270	971
35		GM4MFL/P	Easter-Ross ARC	5	0	49	188	117	436	56	212	33	121			260	957
36		G0BRC/P	Bredhurst RATS			271	848									271	848
37		G3GHN/P	Clifton ARS 'A'							193	590					193	590
38		G3SRC/P	Surrey RCC					58	224	79	259	1	4			138	487

QRP SECTION

Posn		Call	Club/Group	1.8		3.5		7		14		21		28		QSOs	Point
1	+	G3UES/P	Echelford ARS	123	947	152	592	143	552	61	221	41	142	22	160	722	2614
2	*	G4BUE/P	Adur DX CLub	117	877	114	446	200	720	42	152	26	85	18	124	643	2404
3	*	G4ARN/P	Norfolk ARC	61	441	136	536	178	671	77	229	12	40	13	92	694	2009
4		G3WKS/P	West Kent ARS			146	576	187	728	26	92	8	28	11	82	462	1506
5		G3HJF/P	Semper Paratus	38	304	18	72	74	290	30	103	15	57	19	148	282	974
6		G0TFU/P	Reading & DARC C			61	235	25	100	10	36	5	20	2	16	134	407

Checklogs gratefully acknowledged from: G0AAA, GM0GNT/P, GS0STB/P, G2FSR, G3HEJ/P, G3NKS, G3SXW, G3TVS/P, G4KGG, EA6ZY, VE3DZZ, YU7SF.

+ = Trophy Winner

* = Certificate winner

HF RESULTS

1ST SLOW CW CUMULATIVE 1993

This is the second contest of this type, it was good to see favourable comments, and calls for more practice for CW operating skills. It was pleasing to see a number of entrants returning from last year.

Congratulations to Thomas, 2E0ACY, for winning and Jenny, 2E0ABC, who is again runner up. G3MCK is the highest placed full call with G0HIN runner up in that section. In the first time entrants category John, 2E0ADL, is winner in the novice section with G3ZHE and Charles, G0FYP, taking the places in the full section. Certificates will be on their way to them.

In general the log keeping was good; however there are a few general problems which entrants could look at. Time keeping was quite variable in its accuracy, whilst this does not have to be to the nearest minute it should be within 10! Some stations were 60 minutes out as they logged in BST rather than GMT. No penalties were applied on this occasion, however one station was eight days adrift with the wrong date on the right logs! In this case a 10% penalty was applied to the offending log and points reinstated in the others. Take care to ensure that each contact is completed, ie both stations have completely received the exchanges and that you are working the station you think you are! Equipment codes are published with a minus sign used to indicate that the information was not given. Thank you to those stations that supplied the codes on their cover sheets. For reference to the meaning of the codes please see January 93 *RadCom* General Rules. *G4HTD*

Posn	Call	Code	5/4	13/4	21/4	29/4	7/5	Score
1	2E0ACY *	1C1-	CK	440	CK	454	440	1334
2	2E0ABC *	1C12			254	260	200	714
3	G3MCK *	2C1-		165	165	235	CK	565
4	G0HIN *	2Q12	CK	153	165	150		468
5	G3JSR	2W1-		148	150	168		466
6	2E0ADL +*	1W1-	141		160	154		455
7	G4BLI	2C1-		150	140		144	434
8	G3ZHZ	2C1-	110		CK	185	135	430
9	G0KKG	2C1-	CK		143	155	115	413
10	G2HLU	2C12	CK	130	125	CK	145	400
11	G4DDX	1C1-	100		133	139	CK	372
12	G3ZHE +*	2C13		CK	118	126	108	352
13	G0FYP +*	2C1-	CK	110	110	129	CK	349
14	GD0LQE	2C12	95	CK	CK	129	114	338
15 =	G3YAJ	1C1-			105	125	105	335
16	G4XPE	2C11	90		105	CK	140	335
17	G0IRL	2C12	CK	CK	90	107	120	317
18	G3XKD	2C1-	95		85	135		315
19	G0TAW +	2C1-	74		85		115	274
20	G0TDZ +	2C1-	CK	98	76	74		248
21	G0POZ	2Q12	CK		83	75	75	233
22	G0LUZ	2G10		60	50	90		200
23	G4PTE	2G10		70	48	75	CK	193
24	G0ROT	2C1-	CK	65	CK	50	55	170
25	G0IWZ	2C1-	CK	CK	71	71	26	168
26	G0BJT +	2C1-	CK	63	CK	68	28	159
27	G6OM	1C1-	CK	45	50		58	153
28	G0RWB +	1C1-	CK	43	45	47	CK	135
29	G0MRH	2C12		85				85
30	G0SJC	2G10	10	35			20	65

Check logs gratefully received from G0LKX, G3BPM, G3KAF, G5LP
* = Certificate Winner
+ = First Time Entrant

HF RULES

AFS TEAM CONTEST 1994

1. The General Rules for RSGB HF Contests as published in the January issue of *Radio Communication* will apply. The top 20kHz of the allocated band are dedicated as the 'QRS CORRAL' - it is intended that operators less experienced in CW and contest techniques should be able to make contacts here in a more relaxed environment .... experienced contesters using the segment are required to play fair and keep their speed down.

2. When: 1300GMT to 1700GMT on Sunday 9 January 1994.

3. Teams: Teams comprise up to five stations. Each team represents a society or group which is affiliated to the RSGB, and each society may enter as many teams as they wish. Which stations make up which team is determined by the society entering the event. Team placings will be determined by the total of the scores made by each station in the team, after checking. Club secretaries are responsible for the entry and must include a summary sheet (see 'Entries') for each team entered.

4. Eligible Entrants:

(a) Each entering society must be affiliated to the RSGB.

(b) Each operator of a team station must be a member of the club he or she represents. The operator is not required to be a member of RSGB.

(c) All stations representing a club must be located within a radius of 50 miles of the normal meeting-place of the club. Where a society has branches, eg RNARS, it may define separate branch meeting-places, and the team(s) entered by each branch will be considered to be entirely separate from those entered by other branches, except in respect of affiliation.

(d) Each station may be single- or multi-operator, as best suits the entrant, but no station or operator may represent more than one affiliated society, or branch.

5. Contacts: CW (A1A) only in the band 3,510 - 3,590kHz, with 3,570 - 3,590kHz reserved for slower-speed contacts (the QRS CORRAL). Any stations, including overseas, may be worked for points.

6. Contest Exchange: RST and serial number, commencing with 001.

7. Scoring: Each completed contact scores 10 points. Entrants are reminded that each unmarked duplicate contact for which points are claimed will be penalised at 10 times the claimed score, plus the score for the duplicate itself, (a total of 110 points) and entries containing more than 5 such duplicates in all the logs combined, may be liable to disqualification.

8. Entries:

(a) Each team entry must be accompanied by a *Team Summary Sheet*, which must contain the following information, and be signed by an officer of the affiliated society: Name of team (eg RNARS Copenhagen 'B'), callsign of each station in the team, individual claimed score for each station in the team, claimed score for the whole team. The normal meeting place of the club/branch, declaration that each operator is a member of the affiliated society. Each log within the entry should include a completed Summary Sheet (eg: form HFC2) as specified in the General Rules.

(f) All the entries from each competing society are to be sent in one package to RSGB HF Contests Committee (AFS), c/o S V Knowles, G3UFY, 77 Bensham Manor Road, Thornton Heath, Surrey CR7 7AF. Packages must be postmarked no later than 31 January 1994. (Please ensure that logs are well packed to avoid loss or damage in transit). As adjudication will be undertaken using a computerised cross-checking system, entrants are encouraged to submit logs on disk. One disk per team is acceptable providing it contains separate log files. Data format can be RSGB Standard, CT .Bin or .RES, EI5DI Super Duper or G3WGV Log. Paper logs are equally acceptable and data will be entered manually.

9. Awards:

(a) The Edgware Trophy will be awarded to the leading affiliated society.

(b) The Marconi Trophy will be awarded to the individual station having the highest checked score. (This is an outstanding trophy, and for the first ten years that it is awarded the winner will also receive an engraved miniature keepsake. For this reason, a particular operator will be eligible for the award only once in any period of five years; if the leader is ineligible he(she) will receive a certificate of merit, the trophy passing on to the next highest scoring entrant who is eligible.)

(c) Certificates of merit will be awarded to the second- and third-placed affiliated societies.

(d) A certificate of merit will be awarded to the highest-placed Scottish affiliated society.

SSB AFS TEAM CONTEST 1994

The rules for this event are the same as those of CW AFS, except as detailed below:

1. There is no QRS Corral!

2. When: 1300GMT to 1700GMT on Saturday 15 January, 1994.

3. Teams: Teams comprise up to *three* stations.

5. Contacts: SSB only in the band 3,600 - 3,750kHz. Any stations, including overseas, may be worked for points.

6. Contest Exchange: RS and serial number, commencing with 001.

8. Entries must be postmarked not later than 7 February 1994.

9. Awards:

(a) Certificates of merit will be awarded to the three leading affiliated societies and to the highest-scoring individual entrant.

(b) A certificate of merit will be awarded to the highest-placed Scottish affiliated society.

HF CONTESTS CALENDAR

30/31 Oct	*CQWW DX SSB (Oct 93,p16)*
1/7 Nov	*HA-QRP*
13 Nov	Club Calls (CCC) *(Aug 93)*
12/14 Nov	*JARL Int'l DX SSB*
13 Nov	*OK DX (Mixed)*
13/14 Nov	*WAE RTTY*
20/21 Nov	2nd 1.8MHz CW *(Aug 93)*
20/21 Nov	*All Austria CW*
27/28 Nov	*CQWW DX (CW)*
4/5 Dec	*ARRL 160m*
12 Dec	*ARRL 10m*
1994	
Jan/Feb	LF Cumulatives
7/9 Jan	*JA International DX CW (LF Bands)*
9 Jan	AFS (CW)
15 Jan	AFS (SSB)
15/16 Jan	*HA DX CW*
15/16 Jan	*AGCW-DL QRP*
29/30 Jan	*CQ WW 160m (CW)*
29/30 Jan	*UBA SSB*
29/30 Jan	*REF CW*
12/13 Feb	1st 1.8MHz CW *(Aug 93)*
12/13 Feb	*PACC*
19/20 Feb	*ARRL CW*
25/27 Feb	*CQ WW 160m (SSB)*
26/27 Feb	7MHz DX *(Sept 93)*
26/27 Feb	*REF SSB*
26/27 Feb	*UBA*
5/6 Mar	*ARRL SSB*
12/13 Mar	Commonwealth *(Oct 93)*
19/20 Mar	*Bermuda*
19/21 Mar	BARTG Spring RTTY
26/27 Mar	*WPX SSB*
2/3 Apr	*SP-DX SSB*
3 Apr	ROPOCO-1
8/10 Apr	*JA International DX CW (HF Bands)*

VHF CONTESTS

VHF CONTESTS

PLEASE NOTE:

Logs must be sent to the correct adjudicator.

Failure to do this will automatically disqualify your contest logs

However, logs for contests showing the late John Pilags, G8HHI, as the adjudicator should go to G0FCT, QTHR.

G4DEZ

RSGB 1993 VHF/UHF CONTESTS CALENDAR

20 Oct	1.3/2.3GHz Cumulative
28 Oct	432MHz Cumulative
31 Oct	2nd 1296/2320MHz Fixed (Apr 93)
1 Nov	144MHz CW Cumulative (Feb 93)
4 Nov	1.3/2.3GHz Cumulative (Apr 92)
6/7 Nov	144MHz CW, Marconi/6/24 hr (Apr 93)
12 Nov	432MHz Cumulative (Apr 93)
18 Nov	1.3/2.3GHz Cumulative
29 Nov	432MHz Cumulative
5 Dec	144 AFS / Fixed /SWL (Apr 93)
6 Dec	1.3/2.3GHz Cumulative
14 Dec	432MHz Cumulative
26,27,28	
29 Dec	70/144/432MHz Fixed (Apr 93)

For details of rules for European contests, contact G4PIQ, QTHR.

THE TYPEFACE in Contest News has been reduced at the request of the HF Contests Committee in order to do justice to the large amount of contest information requiring publication, whilst retaining the same page allocation.

DIRECTION FINDING

SOUTH MANCHESTER HF QUALIFYING EVENT

Ten teams set off from G8APB's, QTH near Stoke-on-Trent, but as nothing could be heard at the appointed time, Plan B was put into operation, and the competitors left with approximate bearings.

Transmitter A, G3FVA/P (Richard Brewer and Stewart), was located 32km from the start near the west edge of the map by Petty Pool in a boggy rhododendron thicket; half the teams went there first but it took most of them over an hour.

Transmitter B, G3UHF/P (John Jocys and sons with assistance from Dave Chippendale and Co) 12km from the start, eventually found something to load up (a barbed wire fence) as all the wire was up in the trees of Macclesfield Forest. Transmitter B was quickly found and teams then set off for the mire at transmitter A, which was rather difficult to find, even after the bushes had been well beaten up, so only one team found both transmitters.

Afterwards, all went back to G8APB's farm for barbecued chicken and home-made fruit pie. Thanks to all those who helped in the event.

Pos	Name	Club	Time of Arrival at Transmitters A	B
1	G Foster	Mid Thames	1624	1454
2	G Blomeley	S Manchester	-	1434
3	M Standen	Mid Thames	-	1450
4	G Wrenham	Coventry	-	1504
5	C Boyce	Mid Thames	1525	-
6	D Holland	S Manchester	1528	-
7	C Wells	Mid Thames	-	1530
8	B Bristow	Mid Thames	1532	-
9	J Hall	Ripon	-	1535
10	T Gage	Mid Thames	1542	-

G Foster and G Blomeley qualify for the National Final to be run in September

RESULTS OF FOREST OF DEAN VHF 144MHZ ARDF WEEKEND

60 people from all over the country attended this event at various stages on the 10 and 11 July 1993.

The RSGB event was held on the Saturday afternoon, when most teams started at 1600h from New Fancy View, a central viewpoint in the middle of the forest. One team, GW4JGU/GW1DTA, started an hour later.

The hunters split roughly 50:50 towards each fox. Fox A (GW7KIL) was located in ferns in a sparse woodland, near the top of a hill, 2.5km W of the start. Fox B (GW7KZS) was hidden in dense undergrowth in a wooded area 11km SW of the start point. Some hunters had problems with Fox B, who was running QRO.

This was an enjoyable and successful foxhunt (all hunters found at least one fox), with participants eagerly looking forward to next year's event. Anyone interested in this and other 144MHz direction finding events should contact Phil Smith, GW1XBG, QTHR. Tel: 0792 642001

Pos	Name	Time of Arrival at Transmitters A	B
1	Ian, GW0NLY	1831	1723
2	Andy, GW7IBT / Chris, GW7KBP	1737	1855
3	Phil, GW1XBG / Lynden, GW6KQC	1741	1901
4	Robert, G3ORI	1757	1901.05
5	Steve, G3ZVW / Brian, G0MEE	1747	1913
6	Richard, G8ZHA / Carl	1803	1922
7	Geoff, G8UKT	1743	1927
8	Tony, GW4JGU / Mark, GW1DTA	2036	1817
9	Phil, G0JSB / Janis, G6SNO	-	1650
10	Chris, GW7KKP	1831.05	-
11	Jonathan, GW7MMH / Chris	-	1849
12	Jeff, GW7MVR	-	1852
13	Carol, GW7OKK / Simon	-	1855.05

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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.*

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YAESU FT757GX with Cat system and matching FC757AT Unit, both boxed with instructions and technical manuals: £700. Also Dare PSU 24A: £75. All in gd condx and little used. Genuine reason for sale. Ieuan, G0SIR evenings after 8pm. (Bognor Regis) 0243 830671.

YAGI BEAM Antenna for HF, Rotator and Stand. Reconditioned by Clarke's IOW at cost of £350. Price: £485. (Guildford, Surrey) 0483 892222.

386, SX33 Colour Monitor, 1MB Ram, 40M H/Disk, Mouse, DOS5: £400. Yaesu FT411 DTMF, spare battery pack, lots of accessories: £200. (Ipswich) 0473 692525.

AEA ISOLOOP 10-30MHz including Controller and mains Unit: £150. G-Whip Multi-Band Vertical, no instructions: £25. G3GBN, QTHR. (Cheshunt) 0992 633822.

AEA PK232 Multi-mode data controller, Packet, RTTY, AMTOR, Morse etc, little used, no time!: £220. G4DXO, QTHR. (Hove) 0273 561616.

ALINCO DJ-120 2m H/held includes charger, Spkr/Mike and Telescopic Antenna also masthead switch box, 10 ele Sandpiper and light weight Rotator: £175, possibly split. (Birmingham) 021 722 3743.

AMSTRAD PC1640 Twin 5.25 Drives, VGA Monitor, Mouse, complete with Start-up Disks and manual: £150. G0DPT, QTHR. (Highams Park) 081 531 6649.

AMT-2 All mode, NOT Packet, Terminal Unit, complete with Eprom for Beeb: £70 ono. Sandpiper 3 ele Yagi for 28MHz, still in makers shrinkwrap, never been assembled: £80 ono. Buyer collects or pays carriage. Phone anytime. G0HAE. (Southampton) 0703 455777.

AOR AR1500 Wide Range Monitor, as new, little used: £250. Dave, G4LQT. (Stafford) 0785 662884.

ATARI STE Morse RTTY in colour STOS Basic 4, Beginners 0-30 and 25-50 Bauds. Send £3 P&P. They are free. Mr V McClure 43 Roman Way, Seaton, Devon EX12 2NT.

BBC B issue 7 Colour Monitor, Disk Drive, Printer, clean, unmarked and little used: £300. (St Annes on Sea) 0253 782339.

BBC MASTER 128 Computer with complete set of Reference Manuals, also 9 years of Beebug Magazines which are full of programs and hints. Akhter 40/80 Disk drive plus Microvitec Colour Monitor: £250 The Lot. G1HTT. (Coventry) 0203 222859.

BUTTERNUT HF6V, c/w WARC Add-on Kit, little used, mint condx. Planning problems force sale: £160. Buyer inspects/collects. G4RWD, NOT QTHR. (Burton-on-Trent) 0283 814207.

BUTTERNUT HF6VX Vertical, dismantled, ex condx, no corrosion: £70. ETM5C Keyer, perfect condx: £45. Prefer buyer collects antenna. GW4PTY, QTHR. (Abergavenny) 0873 831922.

COLLECTORS B40:£40. Ferrograph series Five Reel Recorder: £40. Pye Black Box Gram: £20. All working, buyer collects. BC453B: £20. (Southwell) 0636 813767.

COMPLETE 6 METRE Station; Yaesu FT690 Mk2, battery charger, Mobile mount, Nevada 6/50W Linear, 4 ele Yagi & HB9CV/6: £350. Yaesu FT203 H/held, battery charger, Spkr Mic: £125. FDK 750E M/mode Tcvr 2m: £225. Icom IC255 FM Tcvr : £150. Wycat MG8000 Terminal, ideal for Packet: £25. (Stone, Staffs) 0785 760296.

COMPUTER CLEAROUT - Amstrad 1640HD/20 ECD: £175. Amstrad 1512HD/30 CM: £150. Amstrad 1512/20 MM: £125. Casio FP8000 2x HDFD Mono: £75. Tandy TRS80 with H/disk: £50. AQ6-20 Minibeam: £95. 6m Pre-Amp: £20. Security Camera and Monitor: £95. G3XZO. (Stratford-on-Avon) 0789 740073.

DRAKE R7 updated to R7A 5 filters N/B, early model, mint condx, exc performance 400+300KC-AM 2.3/1.8/0.5 filters, bargain: £600. Exchange possible. (London) 081 813 9193.

DRAKE TR-7, PSU PS7, L/S, remote VFO RV-7, Antenna Coupler, speech Processor, Desk Mic AMAT5G, manuals, cables: £1375. Call Bob. (Deptford) 081 469 0273.

DRAKE TR4CW HF Tcvr, power supply, ext VFO, spare valves available, VGC: £275 ono. Phone evenings, (Devizes) 0380 724533.

DRAKE TR7A with Matching PSU, Spkr, Ext VFO, Base Mic: £750. Wanted Atlas 180 KW Vanguard. Telephone Dave, G3RCQ, QTHR. (Romford) 0708 374043.

EDDYSTONE Receivers for Sale. Various Models available. All in nice order. Please enquire, Peter Lepino, FAX 0372 454381 or telephone anytime (Surrey) 0374 128170.

FDK 2m All Mode Multi 750A/E FM SSB CW Transceiver: £200 ono. G3WGF. (Doncaster) 0709 588398.

FT101ZD 1.8-30MHz CW/SSB, CW filter, fan, No WARC Bands, with manual: £315. Phone after 7.30pm. Tony, GM4PNM. (Edinburgh) 031 556 6125.

FT200 HF Tcvr, new PA tubes, ex condx, with manual, Desk Mic: £235. (Coventry) 0203 450476.

FT209R 2m H/held, soft cover, handbook, box, little used, MH-12 A2B Spk/Mic, PA3 Car adapter, all ex condx: £160. G4MWP, QTHR. (Coventry) 0203 462035.

FT470: £225. Linear 2 2m SSB rig: £35. Icom ICB1050 10m FM rig: £20. 10m 100W Amplifier 12v: £40. All with manuals. G4APV. (Shelfield) 0742 363641.

FT726R HF MODULE, perfect order, boxed: £100. CT410 Noise Generator 15KHz to 160MHz Audio Power Meter: Offers. Himound 'Bug' Key, perfect, boxed: £20. 17el 2m Tonna: £20. G4JBH. (Yeovil) 0935 28341.

FTDX401, mint condx with Shure Desk Mic: £275. Cheetah Telex with PAG Terminal(new), modified for 50 Baud: £85. Silver Reed Electric Typewriter with handbook: £70. Alinco DJ-F1 H/held, boxed as new: £200. Hal D/mode Keyboard RTTY/CW with comprensive handbook: £95. (Oakham) 0572 85457.

G4ZPY D/L Twin Paddle Key: £45. Kent Electronic Keyer 5-40 WPM: £35. Little used. Telephone G0HTJ. (Halesowen) 021 550 6050.

G4ZPY VHS Paddles in Brass. Six months old, as new condx: £75 ono. Telephone (Plymouth) 0752 339738.

HAMMERLUND HQ192X HF Receiver: £75. Tektronics RM527 TV Waveform Monitor: £50. Ferrograph 5AH Taperecorder: £50. All above with handbooks. Hallicrafters S270 VHF Receiver: £35. Muirhead D-297-A RF Bridge: £25. Prefer buyer collects. Enquiries invited. (Huddersfield) 0484 681963.

HEATHERLITE HUNTER Linear Amp, as new, handbook, boxed: £700 ono. Leather case for AVO 8 and Bare Fibreglass Parabolic Dish: Offers. (Yeovil) 0935 862505.

HEATHKIT HW-9 QRP CW Tcvr 80 - 10m (WARC): £215. Trio TR2300: £95. Yaesu FR67: £95. Homebrew 6inch Newtonian Telescope. Offers? G0AIN. (St Annes on Sea) 0253 720160.

HEATHKIT HW101 HF Tcvr, Mic, Power Supply, gd condx: £150 ono. Call evenings G4DVF. (Broadstairs) 0843 864364.

HEWLETT PACKARD 616B Sig Generator 1.8-4.2GHz: £75. Boonton AM/FM Sig Gen 54-216MHz: £80. Rohde & Schwarz Power Sig Gen 30-300MHz: £80. R & S Polyskop: £65. Muirhead Wave Analayser K134: £35. Quantity X-Band Waveguide incl Couplers, Attenuators etc. (Offers). (London) 081 459 1413.

HF LINEAR Amplifier (Home Brew) Pair 3/500Z, separate PSU. With valves: £400, without: £250. Buyer inspects, tests and collects(large). (Scarborough) 0273 370532.

HOMEBREW VK2ABQ 2 ele Beam for 10/17m complete: £55. Or will split:- Tennamast Quad Centre: £14. 4 No. 9ft Fibreglass Spreaders: £30. Ferromagnetics choke Balun (G5RV model), as new: £20. Assembled wire elements FOC to purchaser of any collected item. G0EOL, QTHR. (Cheshire) 0606 554857.

IC211 All Mode 2m Base Tcvr: £150. Brand new Azden PC700H 55W Mobile 2m Tcvr: £200. Icom AH7000 25-1300MHz Diskone Antenna: £20. (Scunthorpe) 0724 858184.

ICOM 740 HF Tcvr, FM fitted, excl condx: £660. Drae 24Amp PSU: £65. Capco SPC 100: £70. Yaesu FT2700RH, exc: £280. Baycomm 4port TNC, internal: £200. Drae 6Amp PSU: £25. (Evesham) 0386 710494.

ICOM 745 with FM, as new: £700. Also IC2E H/held: £85. Yaesu 230 FM, all gd: £150. Collect or Plus carriage. G0IMK, QTHR. (Nr Kidderminster) 0299 832279.

ICOM 751A HF Tcvr, Gen Cov Receive, all mode incl FM, built in keyer, full break in and 500Hz filter. A well looked after rig in super condx, including RC10 Keypad Controller for: £895. G4PHC, QTHR. (Minehead) 0643 706936.

ICOM IC2SE 2M H/held c/w Antenna, Mic, case, two batteries, AC charger, manuals, little used, VGC: £175. Yaesu 480R Base/Mobile, c/w AC PSU, Mic, gd condx: £225. Call Ann. (Reading) 0734 694429.

ICOM IC725 Tcvr with HM12 Fist Mic, manual, box, original receipts, also with 350W Advance Power Supply (Fan cooled and current/voltage protected) purchased from new and in first class condx: £550 ono. Buyer collects or Post Extra. (Warrington) 0925 262999.

ICOM IC751, int PSU, two CW filters, ex Condx: £750. SEM 2 Match: £40. EPROMS (RTTY/CW/AMTOR/Fax) for C64 Computer: £50. GW4ACO, QTHR. (Colwyn Bay) 0492 515240.

ICOM IG100 Auto ATU, mint condx: £225. QTHR. (Barnoldswick, Lancs) 0282 812288.

ICOM R7100 Comms Receiver 25MHz - 2GHz, only six months old as new: £750. G4RCG, QTHR. (Wakefield) 0924 362144.

ICW2E BC72 charger, CTCSS, three Nicads, expanded coverage: £375 ono. No time wasters please. Peter Crosland, G6JNS, QTHR. (Langport) 0458 250970.

JAYBEAM 8el 2m Beam Antenna, gd condx: £25 ono. Des, G4NEK, QTHR. (Kempston, Beds) 0234 852865.

JRC JST-100 top quality HF Tcvr 100W o/p: £425. Trio TR7800 2m FM Mobile (or cheap

Packet rig), 5/25W: £135. PK-88 Packet Controller with 1990 firmware update: £90. All ono, in gd condx. G0RKT. (Buxton) 0298 71020.

JRC JST125 HF 100W Tcvr, general coverage, W/M/N CW filters, RTTY, AM, FAX. Matching NBD500 PSU, NFG97 ATU, handbooks, workshop manual, see review *Ham Radio Today* January 1988. Half Price bargain: £975. Adonis Desk Scanning Mic 503G: £50. ETM8C Iambic Memory Keyer: £60. AR900 H/held Scanner: £115. All equipment mint condx. Prefer buyer collect or split carriage. G0MHQ, QTHR. (Nr Peterborough) 0733 230088.

KENWOOD AT130 Antenna tuning Unit: £70. Yaesu FP757GX slim power supply, wired for Kenwood TS430: £60. Both Hardly used as second station based in EA7 for holiday use and rig now sold. Phone Valerie, G4WIS, QTHR. (Edgeware) 081 958 7586.

KENWOOD R5000 HF Rx 150Hz - 30MHz, all mode, mint condx with box: £650 ono. Icom 24G 2m FM Mobile 10W, ideal for Packet: £100. Bird Thruline Watt Meter with carrying case, mint: £100. G4RCG, QTHR. (Wakefield) 0924 362144.

KENWOOD TS520S Tcvr, CW filter, Mic, manual, recently fitted new 6146B's: £310. (Newark) 0636 892384.

KENWOOD TS680 All mode Gen Coverage + 50MHz Tcvr, exc: £625. Heatherlite Hunter QRO Linear, current model, exc: £492 Half price. Tokyo HX-240 VHF-HF Transverter: £175. RN Electronics 144 - 50MHz Transverter 25W: £149 half price. Yaesu FT480R Tcvr 144MHz M/mode: £230. All Manuals. G4JXK. (Fareham) 0329 230737.

KENWOOD TS930S slight fault - occasional Dial lock, hence: £675 (boxed). Yaesu FTV901R Transverter 2 & 6M: £195. SSB DCW15A 2m Pre-Amp 0.7dB NF, ok 400W: £75. (Hatfield) 0707 265025.

KW ATLANTA Tcvr AM/SSB/CW 500W, manual and circuit, one owner, KW Ezematch ATU: £150 the pair. G3TNQ, QTHR. (Northwich) 0606 77550.

KW VESPA mk2: £25. KW 202 Rcvr: £50. KW 2000A Tcvr: £100. KW 80 metre Traps: £10. Heath SB610 Monitor Scope: 330. Heath IO12U Scope: £25. Yaesu FT200 Tcvr x2 : £125 each. G3RCO, QTHR. (Devon) 0297 21016.

KW2000B Power Supply, Mic, Operating manual: £95. Pair Mission Loudspeakers: £30. G0JFY. (Coventry) 0203 491245.

LARKSPUR Equipment in beautiful condx. C13 with No 7 ATU. C45 complete. C12 complete. Various Boxes etc. Angry Nine, nice condx. Eddystone 730/A GWO. EC10 GWO. Burndept BE401 new. Aircraft Receiver RU16. Marinetta Gibson Girl distress transmitter. German R2 Officers Rx. RGD Model 1050C. Lissen 1929 Upright Radiogram. Various domestic Receivers. R1125B fair. Most sets with manuals. PCR2 new. G4XWD, QTHR. (Kidderminster) 0562 823674.

LINEAR AMP c/w PSU, 1KW 80-10m, spare new Tubes: £200. Large Transformer, OK for 12v PSU 40A+: £30. Pye Westminster DM FM on 2m R6, S20, S22, S23 and S15: £50. SEM Z Match 160-10: £30. Drake SSR1 Com Rx: £60. MM 50W 2 Metre Linear + Preamp, slight fault: £25. GW0BNN, QTHR. (Pontypridd) 0443 400355.

LT25 SSB Electronics Transverter: £300. Mutek TVVF 144A Transverter: £160. SSB Electronics TM1300 RF Power Meter: £150. (Co Down) 0247 468442.

MICROWAVE Modules 4m - 10m Converter, ex condx: £15, postage paid. Trio 9R59DS HF Rx 0-30MHz VGC: £70 postage paid. Halicrafter HF Rx, old but works: £15, prefer buyer collects. 100W SWR/PWR Meter: £6 postage paid. (Gt Yarmouth) 0493 853089.

MIZUHO MX-14S 20mtr QRP Tcvr, inc Spkr Mic, Nicads, additional crystals, leather Case, VGC: £100. G0NQU. (Leicester) 0533 354918.

MIZUHO MX7S 40m H/held QRP Tcvr SSB/CW, mint: £125. G3ZJF. (Shepton Mallet) 0749 830926.

NRD535 Rx, mint condx, as new: £750. Buyer collects. (SW London) 081 876 2070.

OLD RADIO ITEMS. Valves, some unused, valve holders, Morse keys, magazines 1947 - 1987, small homebrew Power Units, unused 80 ohm light weight Coaxial and much more. Phone for lists. (Durham) 0207 283242.

OPUS PC3-XT Computer 2x 5.25 FDD, Amber Monitor (ideal Packet), gd condx: £115. Citizen 120D Dot-Matrix Printer, bargain: £70. (Dunstable) 0582 605693.

PK 232 unused, still in box! £300. GW4OUU, QTHR. (Cardigan) 0239 614711.

PK232MBX TNC mailbox, Pactor, yes latest 1993 Rom, original 1991 Roms included also, Pakratt V5.5 Software, leads, cables, manuals etc: £265. Genuine offer, have won a Kam plus. Triplexer 6m, 2m and 70cm: £35. SEM QRM Eliminator: £60. AEA ETI ATU, mint, boxed: £95. MFJ 1278 memory Expansion 128k with version 3.6X Rom: £30. Wanted HF set for Pactor. Paul. (Abergele, Rhyl) 0745 833847.

PORTABLE PACKET/AMTOR A4 Notebook Computer Toshiba T1200XE 286/12Mhz 20Mb HDD (40Mb with Superstore) 3.5/1.4Mb Floppy, 4Mb internal Ram, DOS-5, charger, carry case. Also Desk station expansion Adaptor with BT approved FAX and CGA Graphics cards installed. Also IBM colour Monitor. Add your own TU and favourite radio S/ware: £900 the Lot, might consider split. (Southampton) 0703 260584.

QRM ELIMINATOR Mk1 SEM unused, complete with Instructions: £50 post paid or offer. GM3AWW, QTHR. (Glasgow) 041 639 2370.

RADCOM BACK Issues. 1981 to date. Two missing (1982), some soiled (1982-3): £25. Possible delivery. (Preston) Office 0772 855828, evenings 0772 734110.

REGENCY MX7000 Scanner 25-550MHz, 800-1300MHz with accessories, exc condx: £175. Beckman HD110 Digital Multimeter, yellow case, heavy duty, with leads, manual, mint condx: £90 (new price £223). Avo 8 Mk 4, leads, manual, VGC: £30. Video Monitor, NEC JB121ME, 12 inch green screen, VGC: £20. Radio & TV servicing 1972/76 four Volumes: £20. Steve, G6AQC after 7pm (Oxford) 0865 243634.

ROBOT 400C Slow Scan Colour TV Converter, complete with documentation: £250. Ring Tony, G4LLQ, QTHR. (Oxfordshire) 0608 811102.

SIGNAL GENERATOR Marconi Instruments TF2015, solid state, 10-520MHz AM/FM/CW, gd working order, nice condx, bargain: £160. G0PUR. Phone 07842 59149 or 081 391 0514.

SILENT KEY GW4OKR. Trio TS830S with Hand Mic: £530. ATU AT230: £115. Trio R1000: £200. Zetagi Dummy Load DL150: £25.. Buyer collects or pays Securicor. (LLangollen) 0691 773147.

SILENT KEY SALE FT757GX, FC757AT ATU, as new: £600. Kenwood ATU AT200: £75. Hawsen FS-200 PEP Power Meter. See and collect. G4TLY, QTHR. (Malmesbury, Wilts) 0666 822935.

SILENT KEY Sale. TH5 Mk2: £250. Trio SM220 Monitor: £210. FT290R: £200. Trio Spkr: £45. Weltz 400W Dummy Load: £25. IF232C Interface: £38. Datong Morse Tutor: £35. Datong FL3 Filter: £95. ICS AMT-2 Terminal: £100. Scanner VHF /UHF: £250. Cafco ATU: £100. CS1566A Oscilloscope DT: £100. 60 foot, 2 Winch Tower: £400. 2 Rotator: £15 each. KR500 Elev Rotator: £95. Yaesu ATU: £75. Butternut 40/80 metre Vert: £50. Kempro KP 200 Mem Keyer: £120. Computer, Colour Monitor and Panasonic KX P1125 24pin Printer: £750. CP4 Pre-set Rotator: £100. Tower complete with ground post. (Bracknell) 0344 890626.

SILENT KEY Sale. Yaesu FT102 c/w matching ATU - 2 Paddle Keys - VGC: £625. Vintage Trio TR515 Tcvr, ex condx with PSU: £100 (various items extra). HRO with set Coils + PSU: £50. All ex W/Order. GM0DZW, QTHR. (Ballater) 03397 42341 anytime.

SILENT KEY. FT767GX: £595. SMC Station Monitorscope, handbook: £80. KW107 Supermatch ATU: £100. Tech-40 Vacum Tube Voltmeter: £10. FTV901R VHF/UHF Tx boxed: £120. SEM Tranzmatch VHF: £19. SMS PSU 12V /8A: £35. Kantronics Siskin All-mode Communicator (Packet), boxed, handbook: £199. Scarab System RTTY: £20. Commodore 1531 Data Cassette: £15. FDK Multi 725 2m, Mic, handbook: £195. HB Linear 2/813s, PSU (Collect Only). Offers. Also Other items. Collect or carriage extra. G2WQ. (Nr Oswestry) 0691 623675.

SIXTY FOOT LATTICE Tower, three sections with heavy duty Post. Reasonable Condx. Wanted G-Whip. Ring G3NSI for particulars. QTHR. (Peterlee) 091 586 5259.

SONY 2001D. Original packing, manuals, mint: £150. G0BUC, QTHR. (Torksey) 042 771340.

SONY PRO80 Receiver, FRQ80 Converter, Nicad battery pack, AC power Pack, DC cable, all VGC: £250. Or PX FT480R. 10 Bound Vol's PW Jan 63 - Dec 63: £35. Buyer collects or carr extra. Transformer 15v 25A, rect, Ammeter, case: £30. G4IDF. (Worcester) 0905 351568.

SORENSEN Voltage Regulator, i/p 190-260v AC, o/p 220-240v AC, Single Phase, 3000VA: £100. GW3IEQ. (Caernarfon) 0286 831340.

STANDARD C7900 70cm Tcvr 10W, scanning, Mic, memories, Mobile Antenna and bracket, manual: £100. Magnetic Loop, homebrew, 6ft Diameter 32mm Aluminium, capacitor gearbox, motor, cables, full data: £80. Archer Rotator, Control Box, cables, 60kg load. Dilecon 300pf: £3. G3XKA. (Woking) 0483 773620.

STUDIO Camera Ikegami, 3 tube Plumbicon 10x Zoom, internal Colour Bar Generator, Broadcast standard resolution, capable of sparkling pictures, with manuals: £180. (Gloucester) 0452 610083.

TAU ATU 1kW new £190, bargain: £90. Icom R7000 Scanner remote: £650 ono. (Christchurch) 0425 274274 or 0202 421670.

TEKTRONIX SCOPE 545A (Faulty) Type B, D, H Amps. Also Tektronix 1L5 Spectrum Analyser Plug-in, some manuals. EI6AU, Moerlaan Straat 9, 3090 Overijse, Belgium. (Belgium) (32) 268 78420.

TELEQUIPMENT D67A Dual Beam, delayed sweep Oscilloscope, gd condx: £75. Trio AG202A Audio Signal Gen: £35. CWR-610E Telereader: £50. G0BII. (Oxford) 0865 880229.

TENTEC Century 22 CW Transceiver (incl calibrator): £220. SP300 SWR & Power Meter: £30. Bnos Power Supply 12v/25A: £75. 200W Dummy Load: £10. HF Lowpass Filter: £10. Jaybeam VR3 Vertical Antenna: £15. G3HRY, QTHR. (Newport Pagnell) 0908 616519.

TET HB33 3 ele Tri-band Beam, complete: £110 (Buyer collects). 2 off Cetron 572B Valves, one brand new, one little used: £135 for pair. HAM-50KU HF twin needle SWR/Power Meter: £25. AEG HF twin meter SWR/Power Meter: £15. Bob, G3MSL, QTHR. (Fleet, Hants) 0252 811720.

TL922 boxed in as new condx with manual, leads, very seldom used: £1000. GM3MZX, QTHR. (S Scotland) 0671 2268 home, 0671 2190 office.

TONO 5000E Data Terminal, no computer needed, just plug in this terminal for RTTY, AMTOR, ASCII, NAVTEX, Morse. No Programs just push button controls for everthing, size 14x14x5 inches, only: £375. Bearcat 220FP Desktop Scanner 66-88, 118-136, 144-174 and 420-512MHz, 12 or 240 volts, Air band and Marine band channels, 20 memories, boxed with Antenna, only: £40. Ring/Fax for further details. (Uxbridge) 0895 234126.

TOWER Lattice Construction. 3, 30ft sections and fold over Base. Suitable VHF, Medium HF Beams: £50, but will haggle! G3III. (S. Warwickshire) 0295 680543.

TRIO TS430S gd condx, complete with hand mic MC43S and manuals: £600 ono. Phone. (Stockport) 061 449 9176.

TRIO TS830S: £525. R600 Receiver: £130. Inc carriage on each. (Paddock Wood) 0892 838184.

TRIO TS930S with ATU, SP930 and MC60. Boxed with manuals, mint condx: £1100 ono. Contact Paul. (Abingdon) 0235 530940.

TS440S internal AATU, CW & SSB Filters, Adonis Desk Mic, SP520 spkr: £695 free Securicor. Ken, G4RVD. (Weybridge, Surrey) 0932 859253.

TS830S Tx/Rx, CW filter, boxed, good basic rig, going QRP: £595. Buyer collects or will deliver locally. This rig is clean and purchased from Lowes as second buyer by myself. Bob, G3JJU. (Fleet) 0252 615831.

TS930S fitted with 500Hz and 270Hz Filters, selection from front panel. Operators handbook and service manual included, GWO: £750. GM4SID. (Aberdeen) 0224 584774.

TWO INCH DIAMETER Support Bearing Channel Master FH200: £15. Alinco Amp/Pre-amp ELH230-2, 1W i/p 15Wo/p, 5W i/p 50W o/p: £50. Leson Base Mic with Scanning facility, ideal for FT290: £15. All in gd condx. G0PDD, QTHR. (Coleford, Glos) 0594 836503.

WW2 COLLECTORS Items. T1154, WS19, No 38, AFV and PSU. All clean 19 and 38 GWO. Please phone G3LEO. (N Yorks) 0845 567519.

YAESU 290R1 Nicads charger, original, no mods, boxed with Alinco 230D11 30W Linear: £230. Tokyo HX240 Transverter mint, little used: £200. AKD WA1 Wavemeter: £15. Palomar Noise Bridge, mint: £50. All with manuals, plus Postage. Offers. GD0ADV, QTHR. (Isle of Man) 0624 822144.

YAESU FL2100Z Linear, mint: £375 or Exchange for 386 PC with cash adjust. Please write. G4PCH, QTHR. (Grimsby).

YAESU FRG-7700 Rx plus FRT7700 Tuner and FRV7700 VHF Converter. Ex condx: £295. (Welwyn G City) 0707 326060.

YAESU FT102 All Mode Tcvr, 100W o/p, filtered SSB, CW, AM etc, tech supplement manual, parts list, user books. KW107 Supermatch ATU With Instructions. Nearly new Cushcraft AP8, 8 band Powerwave Vertical Antenna with instructions and Ground Radials: £550. G0MYT. (Norwich) 0508 494136.

YAESU FT200, Spkr, Power supply, mic and handbook: £200. 14/21MHz Dipole: £15. Realistic DX400: £50. (Penistone) 0226 764545.

YAESU FT209R + charger: £140 ono. Clarke pump-up Mast, Heavy-duty: £200 plus carriage. Avo Mk7: £7. (Drewsteignton, Devon) 0647 21631.

YAESU FT290R Mk1 plus all Accessories: £175. Yaesu FT200 PSU ATU: £165. G4ZUL, QTHR. (Basildon) 0268 541251.

YAESU FT560 HF Tcvr, gd condx, manual, pair of 6JS6C Toshiba, brand new. SR345 Twin Meter SWR Meter 50/432MHz BNC. G-Whip Multimobile, unused HF Ant. QQVO750 New Base. Johnson 124-0113001 GCX250 Caps, new. Bases Chimneys. Pye UHF Westminster W15V, complete, working, manual. Geoff, G4DED, QTHR. (Oxford) 0865 372215.

YAESU FT690R2 Complete with Clip-on Linear Amp and Nicads, boxed as new: £300. Howes 10W Linear 20/30MHz, built, tested: £150. Kenwood AT200 Tuner 160 - 10m, matches TS520/30 and 820/830 Series: £75. (Bude) 0288 354564.

YAESU FT707: £320. FT290R with Mutek: £220. FT790R: £225. IC202S with Digital readout: £125. Star IC24/10 Printer: £110. G4JNZ, QTHR. (Winchester) 0962 772633.

YAESU FT736R 2m, 70cm, and 6m All Mode. Boxed with Mic, manual, circuit diagrams. Exc, hardly used on Tx: £1100. Derek, GW8PGL. (Holywell) 0352 781311.

YAESU FT73R 70cm H/held, three Battery packs, charger, DC car adaptor/charger, two carrying cases, gd condx: £225 ono. G0GKL. (Hastings) 0424 444376.

YAESU FT757GX: £500. FP757 PSU: £50. MMT 2M Tcvr: £50. 17 ele Tonna, Rotator, 50 ft cables: £70. Himound Paddle Key: £10. Ham Intl M/mode CTS (10 metre) with DTI Auth: £30. All items ono. Neil, G4SEN. Please leave message on answerphone. (Congleton) 0260 275192.

YAESU FT980 mint condx, minimal use, Mic, manuals, boxes: £850. Part Ex for Icom IC740, IC720A + cash. Phone evenings. GW4RLP, QTHR. (Caernarfon) 0286 675264.

YAESU FTV901R Transverter 2 & 6M: £195. SSB-DCW15A 2m Pre-Amp 0.7dB NF, ok 400W: £75 HF LPF: £5. Linear 2m 100W: £15. C Band LNB: £15. Motorola H/held HT220 UHF: £15. Kent brass Key: £15. Kenwood TS930S slight fault, hence: £675. 10GHz Wave Meter, scratched: £15. (Potters Bar) 0707 643879.

YAESU G-400RC Rotator and Controller Unit, 2 months old, little used, boxed, mast clamps and 10 metres of rotator cable: £150. Cushcraft 3 ele 6m Beam, 2 months old: £40. G7OAJ. (Wallington) 081 647 1659.

WANTED

£200 for WS18 Yes, £200 offered for GOOD WS18, WS48, WS68 or WS62 with Kit. Call Graeme, G3GGL, QTHR. (Bewdley, Worcs) 0299 403372.

AP1086 Issue 1 (RAF Radio Stores Ref No's) Also Air Publications relating to Radio, Radar equipment. Exc price offered. Would purchase Post-War to current Magnetrons, Klystrons, T/R cells, Photo-Multipliers, Microwave and special CV types. Required Static or Rotary Inverter, AC or DC I/P with O/P of 80/115v 1500/2000 Hertz. Also Rx Type R1355 10D/13032 unmodified. Please phone any time. (London) 071 511 4786 or 071 790 2846.

WANTED COMMAND Receivers 1.5 - 3.0MHz. Working or otherwise. Also seeking other models and hardware and accessories to buy or trade. WHY? Anything in Command equipment considered plus other US WW2 gear. Ken Perfect, G3FIK, QTHR. (Litchfield area) 0889 22319.

ALIGNMENT Information and circuit Diagram (or circuit diagram only) for Dymar Lynx M2001A HB 12.5 (serial 1907). Mike, G4GSY. (Bury, Lancs) 061 705 5425 or 061 761 5083.

ANTENNA IMPEDANCE or Admittance Bridge, Wayne Kerr B801 or Equivalent. Must measure both Restive and Reactive Components. G4HHZ, QTHR. (Chandlers Ford) 0703 268705.

AT940 Auto ATU for TS940S. Good price paid. Jim, G3KAF, QTHR. (Manchester) 061 439 4952.

AUXILIARY BASS Radiator from Celestion Ditton 15.25.66 Speaker(1970's) or Complete Unit Bandor 150mm Bass Speaker Ref BD139B. G2FXZ, QTHR. (Halesowen).

B40 SSB Unit. R216 with PSU. Type 618 HF Tx. AP100333. Pye CAT Rx. Any Marconi Marine Equipment. G4FUY, QTHR. (Wokingham) 0734 733633.

BS-8 PAN Display for Kenwood SM220 Station Monitor. Seasons Greetings to all. Keith Ritson, G0PKR, QTHR. (Newcastle u Tyne) 091 237 1963.

CONNECTORS "N" Type male/female for Andrews LDF550 Co-ax, new or used, also for LDF450. Racal RA217 Receiver, working or

MEMBERS' ADS

Not working. (March,Cambs) 0354 741168.

DRAKE T4XB with or without AC-4 PSU. Also intersted in R4B Rx, any condx considered. Has anyone a Magum Six RF Speech Processor for above please. Geoff, G4DED, QTHR. (Oxford) 0865 372215.

DUAL BAND Mobile. A Loop, Capco Cobweb, etc. A Pump up Mast. VHF/HF Absorption Wave Meter. Phone (Newcastle on Tyne) 091 488 2995.

EMPTY TAPE Reels 10.25 inch and Library Cases. GW3IEQ, QTHR. (Caernarfon) 0286 831340.

FOR ROYAL NAVAL Museum, RAF VT104 (CV1104) and VT105 (CV1105). Also other Spares from T1154. Contact Museum Curator. (Fareham) 0329 822329.

FT101ZD or Similar Tcvr, Digital Readout, WARC Bands. Phone John. (Coventry) 0203 450476.

FT401 DX. Must be in gd condx and at a realistic price. Will collect in London. G3KPM, QTHR. (London) 081 368 0188.

GARRARD 301 TURNTABLE with or without Arm. Old Callbooks. Battery Pack type Yaesu FNB-4A for old Yaesu H/held. Small Ceramic stand-off Insulators in strip form or singly. Information on the whereabouts of G4BXM. (Edinburgh) 031 447 9979.

HEATHKIT SB610. Tel or Fax. G3HZP, QTHR. (Willingham) 0954 261339.

HELLICRAFTER SKY Ryder or similar wanted. Dead or Alive. Can collect. G4ILR, QTHR. Please phone. (Norwich) 0603 782396.

HX 640, Must be in VGC. Also manual for Hameg HM512, purchase or loan, postage etc will be paid. Also TIS69. (Londonderry) 0504 352804.

ICOM TV-R7000 TV Receive Adaptor for use with Icom R7000 Receiver. Bill, G1LDG, NOT QTHR. (Manchester) 061 320 8577.

MAINS PSU for Hacker Hunter, i/p 240 volts AC - o/p 18volts DC and plug for same. (Bishops Stortford) 0279 850458.

OPUS DISK Drive for ZX Spectrum Computer. Please write. Will pay postage if too far. G0NFK, QTHR. (Burnley, Lancs BB11 5LL).

R5 CUSHCRAFT Vertical Antenna in gd condx or Similar Type required. No room for Ground Radials! Details to G0HHH, QTHR. (Kidderminster) 0562 67026.

RACAL TA-99 Linear Amp. Will pay delivery charges. Chris, G3NRZ, QTHR. (Erith) 0322 334699.

SHARP POCKET Computer PC1360, spare Ram-Packs, 8, 16, 32k also Peripheral Tape/Printer Units. Servicable condx preferred. Call/phone any time. G3JMY. (Bristol) 0454 772384.

SPY CLANDESTINE Radio's BP3 Tx/Rx, AP4 Tx/Rx, MCR1 Rx, B2 Tx/Rx, S-phones. 53/1 Rx, 51/1 Tx, Paraset. MK123 Tx/Rx, 301 Rx, MK328 Rx. Complete or In-complete Units for spares. Good price paid by private collector. (E London) 081 505 0838 after 6pm.

STAR RADIX-10i Print Head DP860. Used OK. (Welwyn) 0707 331340.

STILL WANTED Spectrum Analyzer up to 1GHz. Must be GWO with manual. Good price paid for right one. Also Wanted. Yaesu FTV901R with 2m Module, SP901P. Trio SP230, VFO240. All in unmarked condx. G3HRH, QTHR. Fax 0962 714990 or telephone (Winchester) 0962 712045.

SWAN 350 Mains Transformer. Or possible complete PSU (230XC). Also Tonna 2m 13 ele Yagi. G8NEY. (Corsham) 0225 810138.

YAESU FC707 ATU to match a FT707. G4UTH. (Ashford) 0233 733591.

YAESU FT102 AM Xtal Filter 6kHz Bandwidth part number XF8.2GA or XF2002. Will consider alternative if on 8.2MHz centre Frequency. Advise Bandwidth please. (Stockport) 061 437 3045.

YAESU FV75 VFO Unit, working or repairable. G3SMW, QTHR. (Marlow) 0628 482508.

EXCHANGE

DRAKE THX Transmitter required, also FT690 or any Six Metre Multimode in exchange for ADI-450, 70cm H/held or/and cash. Ring Roger, GW4BCD anytime, QTHR. (Porthcawl) 0656 788359.

EARLY BRITISH VALVES (1920's, some sealed, first time buyer) Offered for some similar UX American Tubes. G4IMT, QTHR. (Chippenham) 0225 891254.

NEWTONIAN REFLECTOR. Part finished Project, 6 inch Sindon Mirrow, Brass body Equitl. For parts for Radio/Test Gear, WHY! Keith Ritson, G0PKR, QTHR. (Newcastle upon Tyne) 091 237 1963.

PK232 PAKRATT M/mode TNC, 8 months, hardly used, as new. Swap for FT290 or similar 2m M/mode. G0NCZ. (Cramlington) 0670 730106.

EVENTS DIARY

CLUB NEWS

DEADLINE - Items for inclusion in the **January 1994** issue must be sent to HQ marked "Club News - DIARY", to be received by **19 November** 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

RSGB CITY OF BRISTOL GROUP - 29, Annual Homebrew Construction Contest. Details 0272 672124.

SOUTH BRISTOL ARC - 3, Top Band Activity; 10, Voice your Opinion on Club matters; 17, Annual General Meeting; 24, Free Ice Cream. Details 0275 832222 Wednesday eve only.

BEDFORDSHIRE

SHEFFORD & DARS - 4, Activity night; 11, Talk by Nic, G4TGX; 18, Activity night; 25, Quiz night. Details 0462 700618.

BERKSHIRE

NEWBURY & DARS - 24, Home Construction evening. Details 0635 863310.

READING & DARC - 25, Construction Contest and Alignment Evening. Details 0734 476873.

BUCKINGHAMSHIRE

AYLESBURY VALE RS - 3, Mini-Construction evening. Details 0296 81097.

CHESHAM & DARS - 3, General Meeting; 10, Night on the Air; 17, Annual General Meeting; 24, Technical Topic 'Spectrum Analysers 2' with Robert, G4JNA. Details 0494 676391.

MILTON KEYNES & DISTRICT ARS - 8, Bring and Buy night. Details MK & DARS, PO Box 817, Springfield, Milton Keynes, MK6 3LE.

CAMBRIDGESHIRE

CAMBRIDGE & DARC - 5, HF Operating evening; 12, Table Top Sale & Junk Auction in the School Hall; 19, Using Wind Tunnels to design Aircraft by Robin Webb; 26, A HomeBrewed HF Transceiver by Mark, G4AXX. Details 0763 243570.

CHESHIRE

STOCKPORT RS - 24, 'Ladies Night' and an Audio visual by Howard Gregory. Details 061 439 4952.

CO ANTRIM

CARRICKFERGUS ARG - 20, Rally Bring & buy + refreshments. Starts 12 noon. Talk-in on S22; Dec 7, talk on Packet by GI3TLT. Details 0232 835650.

CO DOWN

BANGOR & DARS - Dec 3, Christmas Surprise Talk at Bangor Tech College, Room A13, ground floor. Please note new venue for future club meetings. Details 0247 883315.

CO DURHAM

DARLINGTON & DARS - 6, Equipment & Junk Sale, Hurworth Community Centre, Croft Rd, Hurworth from 12 noon to 6pm. Details G8MTV 0325 720031.

CORNWALL

CORNISH RAC - 5, monthly general meeting NOTE Friday not Thursday, followed by Bring & Buy. 8, Talk 'Weather Satellites' by G3VGO, after the Computer Section meeting.

MID-CORNWALL BEACON & REPEATER G - 10, Annual General Meeting at Treviglas School, Newquay at 7.30pm. Details G4XOP 072663048.

CUMBRIA

EDEN VALLEY RS - 25, Informal evening, Tufton Arms, Appleby; Club meets, odd months at BBC Club, Penrith. Details 07683 52106.

DERBYSHIRE

BUXTON RA - 9, Annual General Meeting; 23, Discussion/Demo of Amateur TV. Details 0298 25506.

DERBY & DARS - 3, Junk sale; 10, Demonstration of Video Surveillance equipment by G3XER; 24, Illustrated talk 'Orkney & Shetland G4ZAP Expedition' by Martin, G6ABU; Dec 1, Junk sale. Details G7PXA 0773 856904.

DEVON

APPLEDORE & DARC - 15, Club Radio Quiz. Meetings 3rd Mondays of each month. Details 0237 477301.

EXMOUTH ARC - *** The club meeting place has returned to The Scout Hut, Marpool Hill, Exmouth.*** - 10, Club Construction Competition; 24, Talk 'Weather Satellities' by Gary, G0RIY. Details 0395 279574.

TORBAY ARS - 19, TARS Nostalgia - slide show by Derrick, G3LHJ. Details 0803 526762.

DORSET

SOUTH DORSET RS - 2, SDRS Hamfayre preparation; 12, Visit to Bournemouth RC - Quiz; 14, Hamfayre'93, Wessex Stadium, Weymouth Football Club. Details 0305 773860.

DYFED

2 Nov; ***OPEN MEETING***. An invitation for Amateurs in Dyfed - Clive Trotman, GW4YKL RSGB Zone Representative for Wales will give a talk entitled 'The RSGB' at the Civil Protection Planning Unit building, Hill House, Picton Terrace, Carmarthen, next to the CPPU bunker. The meeting is to enable Clive Trotman, as Zone Rep. to meet as many Amateurs living in Dyfed as possible, and to allow them a Forum for any comments they may have on the future of the RSGB. For further details contact Martin, GW8ZMU (RLO Dyfed) on 0437 764009.

EAST SUSSEX

CROWBOROUGH & DARS - 23, Quiz night. Details 0892 661807.

ESSEX

BRAINTREE & DARS - 1, Wavemeter - (Design & Construction, part 1); 15, Wavemeter (part 2); Dec 6, Quiz - Visit to Dengie Hundred Club. Note **** New Club Venue ***. The Braintree Hockey Club, Church Street, Bocking. Details 0376 327431.

CHELMSFORD ARS - 2, Junk Sale; Dec 7, Talk 'Radiation hazards that the Amateur may experience' by Ron Kitchen. Details 0245 260831.

DENGIE HUNDRED ARS - Meets 1st & 3rd Monday each month. Details 0621 783629.

LOUGHTON & DARS - 12, Talk 'National Trust' by J Archer. Details 081 508 3434.

VANGE ARS - 4, Junk sale; 11, Homebrew Comms Receiver by Ray, G3IOI; 18, Talk by Roy, G3ASH. Details 0268 552606.

GRAMPIAN

MORAY FIRTH ARS - Meets every Thursday, 7.30pm. Details 0343 86395.

GREATER LONDON

BROMLEY & DARS - 16, Stereo Slides of RAYNET in Romania by G0ILW. Details 081 658 2988.

COULSDON ATS - 8, Home Entertainments up to 1925 by Jon Weller, G0GNA. Details 081 684 0610.

CRAY VALLEY RS - 4, China - G3DCC; 18, Another view of Sri Lanka - G3VLX. Details 081 850 1386.

CRYSTAL PALACE & DRC - 20, Surplus Equipment Sale. Details 081 699 5732.

KINGSTON & DARS - 17, Annual General Meeting and Constructional Projects-G6BI Cup. Details 081 398 1128.

The R S of HARROW - 5, Construction Contest - judging evening; 19, Visit to Haydon Communications(Prov date); Dec 3, Christmas Junk Sale & Social evening - bring along & buy plus. Details 0895 632377 eve.

SILVERTHORN RC - 12, Construction Contest; 26, Junk Sale. Club meets every Friday at 7.30pm. Details from The Sec, Silverthorn RC, Chingford Adult Educ & Community Centre, Friday Hill House, Simmons Lane, Chingford E4 6JH.

SOUTHGATE ARC - 11, Construction judging for the G6QM Trophy; 25, Demo of G6QM entrants; Dec 9, Annual General Meeting. Details 081 360 2453.

SURREY RCC - 1, talk 'Fibre Optics' by Alan Ogdon; Dec 6, Talk 'PCBs made easy' by G3ZPB & G8TB. Details 081 660 7517.

WIMBLEDON & DARS - (Oct 29, AGM); 12, Meet the Committee; 26, Club Quiz. Details 081 397 0427.

GREATER MANCHESTER

ECCLES & DARS - 2, Lecture 'The Lincolnshire Poacher' by G4AEO; Dec 7, Annual General Meeting. Details 061 773 7899.

SOUTH MANCHESTER RC - 5, Discussion night; 12, Annual Dinner; 19, The RSGB AGM Presentation; 26, Talk by G0BJK. Details 061 969 1964.

GWYNEDD

DRAGON ARC - 1, Amateur Radio videos; 15, Sale of surplus equipment. Club meets on the first and third Mondays each month. Details 0248 600963.

HAMPSHIRE

BASINGSTOKE ARC - 1, Construction evening - "Make a UHF Reflectometer"; 28, 2m DF Competition; Dec 6, Christmas Soc. Details 0256 25517.

HORNDEAN & DARC - 4, Video evening. Club meets on first Thursday in each month at 7.30pm. Details 0705 472846.

ITCHEN VALLEY ARC - 12, Talk 'Food Hygiene' by John, G7DYV (meeting open to visitors); 26, Talk 'Home Construction from Kits' by Keith, G3XUO. Details 0703 732997.

HEREFORD AND WORCESTER

BROMSGROVE ARS - 9, Night on the Air; 23, Tech Topics. Club meets on the second and fourth Tuesday in the month. Details 0527 546075.

HEREFORD ARS - Club meets on first and third Friday of each month. Details G4MET, QTHR.

VALE OF EVESHAM RAC - 4, Club Quiz "Brain of VERAC" with Dave, G3UEY in the chair; Dec 2, Club Christmas dinner, The Angel Inn, Pershore. Details 0386 41508.

HERTFORDSHIRE

CHESHUNT & DARC - 10, Talk 'WAB awards' by Robert, G4OBE; 24, Annual General Meeting. Club meets every Wednesday. Details 0992 464795.

DACORUM AR & TS - 16, Talk on Amateur TV by Dave, G4NJU. Details D Boast, 8 Juniper Green, Warners End, Hemel Hempstead HP1 2NQ.

HODDESDON RC - 11, Talk 'Good Housekeeping' by Robin Page-Jones; 25, talk 'History of Morse Code' by Tony, G4FAI. Visitors most welcome. Details 081 804 5643.

WELWYN-HATFIELD ARC - 1, Constructors Contest; 15, 'Shock Tactics' St John A Brigade; Dec 6, Annual General Meeting. Details 0920 462241.

HUMBERSIDE

GOOLE R & ES - 5, 'On Air'; 12 talk 'Mobile Operating'; 19, Christmas Dinner; 26, Soc eve; Dec 10, Junk Sale. Details 0405 769130.

GRIMSBY ARS - 11, RSGB Matters by G3DOT; 25, Video and Camcorder operating. Details 0472 825899.

NORTH FERRIBY ARS - 12, Equipment Sale; 26, Talk 'The Novice Licence' by Duncan, G3TLI. Details 0482 650410.

ISLE OF MAN

ISLE OF MAN ARS - 1, A talk & video 'DX-peditions, the Committed Approach'; Dec 6, Annual General Meeting. Club meets weekly at The Royal Naval Association, Regent Street, Douglas, IOM. Details GD3UMW, QTHR.

KENT

DARENTH VALLEY RS - 10, Talk 'Back to Basics'; 24, Video; Dec 8, Christmas Dinner. Details 0474 703322.

MEDWAY AR & TS - 12, Fish & chips Supper, YL & XYL welcome; 19, Kent Repeater Group - Current and future developments. Details 0634 710023.

SEVENOAKS & DARS - 15, talk 'Homoeopathy' by Mrs Jean Cole; Dec 6, Annual General Meeting. Details The Secretary, Sevenoaks & D ARS, c/o Sevenoaks Dist Council, Council Offices, Argyle Road, Sevenoaks TN13 1HG.

SOUTH EAST KENT (YMCA) ARC - 3, Novice evening; G2CJC inter Club Quiz(prov); 17, Oper Eve; 24, Presentation Icom(UK) or video(prov). Details 0304 852030.

WEST KENT ARS - 19, Talk 'Packet Radio for the Beginner' by Martin, G1DVU. Details 0892 664960.

LANCASHIRE

BURY RS - 9, Junk Sale; 15, Quiz with Rochdale ARS; 16, Quiz - Results & discussion; 23, Operating; 30, Video evening. Details 0204 883212.

FYLDE ARS - 11, Construction Competition; 25, Informal. Details G7CUL, QTHR.

HESKETH ARC - 9, Rubber products; 23, Mystery Topic. Details 0704 63344.

NORTH SEFTON ARC - Club meets 2nd Wednesday of each month. Details G1DFT on 0704 579017.

THORNTON CLEVELEYS ARS - 1, Quiz; 8, Construction evening; 15, Computers in amateur Radio; 22, Operation of Club station; 29, Talk 'Stacking Aerials' by Dave, G8KBH. Details from G4BFH, QTHR.

ROCHDALE & DARS - 15, Guest speaker. Details 0706 32502 or 061 653 8316.

LEICESTERSHIRE

CHARNWOOD ARCC - 7, Contest Planning; 13, Clubs Calls Contest; Dec 5, Review of Years Contests. Details 0509 232927.

LOUGHBOROUGH & DARC - 2, Talk 'Model Helicopters' by Derick, G7OXA; 9, Construction/NOA; 16, Talk 'Flight' with Andy the Pilot and Steve from Rolls Royce; 23, Discussion 'Aerials'; 30, Quiz - Just for fun!. Details 0509 218259.

LINCOLNSHIRE

GRANTHAM RC - 2, Talk 'Trunked Radio Systems; 16, Annual General Meeting; Dec 7, Christmas Dinner. Details 0476 65743.

LOUTH & DARS - Meets 3rd Tuesday in month at The Wellington, Louth. Details G1XWD, QTHR.

LOTHIANS

LOTHIANS RS - 10, Junk Sale; 24, Talk 'Air Traffic Control at Edinburgh Airport' Phil Jackson & Kel Kirkland. Details GM4HWO, QTHR.

MERSEYSIDE

LIVERPOOL & DARS - 9, Club on the Air; 16, Open Night; 23, Open Night; 30, Surplus Sale. Details G4WWX, QTHR.

WIRRAL DARC - 10, Talk 'Microwaves' by Mike Dixon, G3PFR; 24, Home Construction Competition, Social & Presentations. Details 051 648 5892.

NORFOLK

FAKENHAM ARC - Dec 7, Christmas Party bring the Family for a social evening. Club meets on the 1st Tuesday of every month, Trinity church room, Hempton. Details 0485 528633.

NORFOLK ARC - 10, 'Science for All' by Arnold, G3PTB; 14, Surplus Equipment Auction & bring and buy; 17, On & Workshop; 24, Talk 'Archeology and the metal detector' by Dr John Davies - re-scheduled. Details 0603 618810.

YARMOUTH RC- 4, Family History Research; 11, Informal; 18, Annual General Meeting and Homebrew Competition for OEP Prize; Dec 2, Talk 'Development of TV technology' by G3OEP. Details 0493 721173.

NORTHAMPTONSHIRE

KETTERING & DARS - 2, A visit from Castle Electronics; 23, Talk 'Communications in the Fire Service and Advice on Fire Precautions' by D Johnson, Fire Control Officer, Northamptonshire CC Fire and Rescue Service. Details 0536 514544.

NOTTINGHAMSHIRE

ARC OF NOTTINGHAM - 4, Forum & night on air; 11, Talk by Martin, G6ABU on his Dxpedition to Shetland and Orkney; 18, Surplus Equipment sale, Dave G3YUT as auctioneer; 25, Construction evening. Details 0602 232604.

MANSFIELD ARS - 8, A talk by Pete Garrard, Supt Air Traffic Controller from East Midlands Airport. Details 0623 755288.

SOUTH NOTTS ARC - 5, Construction; 12, Talk 'VHF Linears and Power Supplies' by Martin, G6ABU; 19, Open forum - members only; 26, Construction + On Air. Details 0602 216342.

NORTH YORKSHIRE

HAMBLETON ARS - 4, RAE course; 11, Practical/Ops night; 18, RAE Course; 25, Talk 'Ultrasound Detectors' by Nick, G7COC. Details 0609 776608.

OXFORDSHIRE

OXFORD & DARS - 24, Talk & Demo 'Optical Coatings & Thin Films' by Chris Goodwin. Club meets on the 2nd and 4th Wednesdays of the month. Details 0865 863526.

SHROPSHIRE

TELFORD & DARS - 3, Station on Air; 10, The construction & layout of modern PC by Eric, G7KZB; 24, Videos. Details (Telford) 588878.

SOMERSET

WEST SOMERSET ARC - 2, 'A CW Contest on 40 metres'; Dec 7, Videos including Japanese Amateur Satellite. Details G4AJU, QTHR.

WINCANTON ARC - 1, Talk 'The RSGB' by RSGB President - Peter Chadwick, G3RZP; 15, General discussion; Dec 6, Talk 'Slow Scan TV' by G3UGR. Details 0963 34360 or 0747 51381.

YEOVIL ARC - 4, Antenna Problems Aired; 11, The Yeovil Rig on the Air, G3PCJ; 18, PMR Conversion, G7LNJ; 25, Club station on Air. Details 0258 73845.

SOUTH GLAMORGAN

CARDIFF RSGB G - 8, Talk 'Reflections (RF)' by John, GW4HWR. Details 0446 773212.

SOUTH YORKSHIRE

SHEFFIELD ARC - 8, Bring & buy sale; 15, Quiz; 22, Talk 'Test Equipment on a Shoe-String' by Tom, G4KMA. Details 0742 446282.

STRATHCLYDE

TELEGRAPH RC LONGRIGGEND - Club meets every Tuesday. Details 0506 31645.

SUFFOLK

FELIXSTOWE & DARS - 8, Talk 'Radio Propagation' by Jim Bacon, G3YLA; 22, Talk 'HF Antennas' by Richard, G0OZG. Detail 0394 273507.

IPSWICH RC - 10, Junk Sale; 24, Discussion; Dec 8, Quiz (Ipswich vs Stowmarket). Details 0473 742072.

LEISTON ARC - 2, Annual General Meeting. Details 0986 874800.

SURREY

DORKING & DRS - 23, 'Wartime Britain with Exhibits' by David Ford, of the DGF Museum. Venue: Friends Meeting House, South Street, Dorking. All welcome. Details 0306 631236.

TAYSIDE

DUNDEE ARC - 2, Lecture 'All you wanted to know about Packet' by GM0PQV; 9, Construction night; Lecture 'The UK Independent Broadcasting Scene' by Ian Suart, GM4AUP; 23, Construction night; 30, Members 'Questions & Answers' night. Details from GM4FSB, QTHR.

WARWICKSHIRE

MID-WARWICKSHIRE ARS - 9, Program Discussion. Details 0926 424465.

STRATFORD UPON AVON & DARS - 8, talk 'British Red Cross Society' by Ray Beardsmore; 22, talk 'Radio amateur Relief Expeditions' by Geoff, G0PMI. Details 060 882 495.

WEST GLAMORGAN

SWANSEA ARS - 13, To enter 'Club Calls Contest'; 18, Talk 'Analogue/Digital' part 2 by GW4ADL. Details 0792 403527.

WEST MIDLANDS

RS of BLOXWICH - 8, Annual Quiz; 22, Visit to Castle Electronics workshop. Details 0922 683877.

SOUTH BIRMINGHAM RS - 3, Annual General Meeting. Details 021 458 1603.

SOLIHULL ARS - 18, Annual Surplus Sale. Details 021 777 9965(eve).

WEST SUSSEX

HORSHAM ARC - 4, Talk 'Antenna Modelling' by Derek, G3GRO; Dec 2, Annual General Meeting. Details 0737 842150.

WEST YORKSHIRE

HALIFAX & DARS - 16, Talk by Ron, G3OTE. Details 0422 202306.

KEIGHLEY ARS - 4, Discussion night; 11, talk 'Raynet' by G3RXS; 18, Discussion night; 25, Talk 'Vintage Radio' by Bob Rawlings. Details 0274 496222.

SPEN VALLEY ARS - 4, 'Mischief' on Air; 18, S.M.PSU, G8HUA. Details 0532 534437.

WILTSHIRE

SALISBURY R & ES - Meets 7.30pm, Tuesdays. Tuition all aspects amateur radio. Details 0722 329481.

TROWBRIDGE & DARC - 3, Judging of Construction Projects; 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'.

5 NOVEMBER (FRIDAY)

BANGOR & DARS Annual Surplus Sale - Hamilton House, Hamilton Road, Bangor, Co Down. Usual traders in attendance, QSL bureau, RAIBC and bring & buy. Talk-in on S22. Doors open 7pm. Details Keith, GI0SSA 0247 883315.

6/7 NOVEMBER

7th NORTH WALES Radio & Electronics Show - Aberconwy Conference and Exhibition Centre. Entrance £1 adults, under 14 free. Details GW7EXH, 0745 591704.

7 NOVEMBER

BISHOP AUCKLAND Radio Amateur Clubs Rally. ***NEW DATE***. Originally scheduled for Sunday 31 October. Spennymoor Leisure Centre. Doors open at 11am, 10.30 for disabled visitors. Usual stalls, all on one level. Bar & refreshments available. Details Mike, G0PRQ on 0388 766264.

DONEGAL TIR CONAILL ARS Annual Radio Rally - Jacksons Hotel, Ballybofey, Co Donegal. Details Ken, EI4DW, QTHR or Tel: (from UK) 010 353 74 31109 or 074 31109.

13th NORTH DEVON Rally - Holsworthy Memorial Hall. Doors open 10.30am. Bring & buy stand etc. Details G8MXI, QTHR.

TYNE & WEAR REPEATER GROUP AUCTION - Fence Houses & District Community Centre, Fencehouse, Nr Chester-le-Street, Co Durham. Doors open at 10.30am for booking goods in. Auction starts at 12 noon. Details Brian, G8FBQ, QTHR or Tel: 091 388 2913.

13 NOVEMBER

THE ALL MICRO SHOW, Electronic Fair and Radio Rally - Bingley Hall, Staffordshire Show Centre, Stafford. A diverse mix of exhibitors ranging across the computing and electronic spectrum, including national PC suppliers, local computer user groups, software, books, electronic components suppliers, TV & video items, computer media etc. Details 0473 272002.

14 NOVEMBER

BARNSLEY & DARC Amateur Radio Rally - Willowgarth Senior High School, Brierley Road, Grimethorpe, Barnsley. Mid-way between Pontefract and Barnsley, just off the main A628 Barnsley/Pontefract Road. Doors open 11am (10.30 for disabled). Traders; radio clubs and specialised groups; bring & buy; food and drink; licensed bar, car parking. Talk-in S22. Details Ernie, G4LUE, 0226 716339 (6pm-8pm please).

BRIDGEND DARC Amateur Radio Rally - Bridgend Recreation Centre, Bridgend, Mid Glam. Details Mike, GW7NIS, 0656 722199 or GW3RVG on 0656 860434.

MARS/STOCKLAND Radio Rally - Stockland Green Leisure Centre, Slade Road, Erdington, Birmingham. Doors open 10am. Trade stands, bring & sell tables. Refreshments and bar. Free raffle. Details Peter, G6DRN 021 443 1189. Trade stands info from Norman, G8BHE 021 422 9787.

21 NOVEMBER

SOUTH DORSET RS Hamfayre'93 Event - (***NEW DATE & NEW VENUE***). To celebrate, display and promote the modern hobby of amateur radio. New venue: The Portland Heights Hotel, (on A354) Portland, Dorset. Doors open 10am to 4.30pm. All club callsign will be active on air; Novice, SWL, ATV, Morse, and specialists stalls. Radio components, kits and computer traders. Special interest and vintage radio displays. Bring and buy, raffle and refreshments. Talk-in on S22, with a listening watch on GB3SD (RB14). Details Mike, G7HNY on 0305 773860.

WEST MANCHESTER RC "Winter Rally" - Bolton Sports & Exhibition Centre, Silverwell Street, Bolton (town centre). Doors open 11.00am, 10.30 for disabled visitors. All the usual trade stands, societies, bring and buy, etc. Refreshments/meals available. Admission £1, children free. Details Dave, G1IOO on 0204 24104 (evenings only).

4 DECEMBER

RSGB ANNUAL MEETING, Manchester Conference Centre, UMIST, Manchester.

5 DECEMBER

LEEDS & DARS (Pudsey Rally). **CHANGE of VENUE**: now Allerton High School, Kings Lane, Leeds 17. Details 0532 552344 or FAX 0532 393856.

12 DECEMBER

CENTRE OF ENGLAND CHRISTMAS Radio, Satellite Computer & Electronics Rally - ***NEW VENUE*** Sports Connexion Centre, Leamington Road, Ryton. On Dunsmore Coventry A45/A423. Doors open 11am, Admission £1 (Concessions for RAIBC members & Senior Citizens) Disabled visitors through side door from 10.30am. Over 80 trade stands, bring & buy and a Christmas special 'Spot the Cracker' on many trade stands to win a prize. Bar and hot food served all day. Talk-in on S22. Details from Frank, G4UMF on 0952 598173.

23 JANUARY 1994

OLDHAM ARC Radio Rally - Queen Elizabeth Hall, Civic Centre, West Street, Oldham, Lancs. Doors open 11am, 10.30 for disabled. Features many trader with a good variety of items for sale and a bring & buy. Refreshments available from 11.30am in the Failsworth Suite, on the balcony over looking the main hall. Morse Test available on application, bring two passport photos. Talk-in on S22 via GB4ORC starting at 7.30am. This year will features a Mobile Contact prize for operator on the way to the rally. Details from Kathy, G4ZEP, QTHR or Tel: 061 652 8617 home or 061 633 0550 work.

30 JANUARY

THE 4th LANCASTRIAN Rally - University of Lancaster, Lancaster. Doors open 11am, 10.30am for disabled visitors. Trade stands, bring & buy. Ample car parking and a car wash service is available, provided by the Scouts. Admission £1, children under 14 accompanied by an adult admitted free. Details from G1OHH on 0524 64239.

6 FEBRUARY

SOUTH ESSEX ARS Radio Rally - The Paddocks, Long Road, (A130), Canvey Island, Essex. Details G0BBN, 0268 755350.

13 FEBRUARY

CAMBRIDGE & DARC Radio and Computer Rally - Addenbrookes Hospital Ambulance Station, Cambridge. Details from George, G0OEL on 0954 719273.

NORTHERN CROSS RALLY - Rodillian School, on the A61 between Leeds and Wakefield, near the junction M1/M62. Details from Dave on 0532 827883.

20 FEBRUARY

RSGB VHF Convention - Sandown Park Exhibition Centre. Details from Les Hawkyard, G5HD, 0409 281342.

TRAFFORD Rally - G-MEX Manchester. Details 061 748 9804.

27 FEBRUARY

7th TAW & TORRIDGE Rally - Details from Mike, G3PGA, QTHR.

12/13 MARCH

LONDON AR & Computer Show - Picketts Lock Centre. Details 0923 893929.

13 MARCH

WYTHALL Radio Club Rally - Details G0EYO on 021 430 7267.

20 MARCH

NORBRECK AR Electronics & Computing Exhibition - Details G6CGF on 051 630 5790.

27 MARCH

THE 1994 MAGNUM Rally - *****NOW CANCELLED*****. Details GM0FCI on 0294 72253.

PONTEFRACT & DISTRICT ARS - Spring Rally and Components Fair. Details G0NQE 0977 677006

3 APRIL

LAUNCESTON 8th AR Rally - Details 0409 221624 or 0566 775167.

28th WHITE ROSE ARS Rally - Details G7ELS on 0850 690189.

4 APRIL

CENTRE OF ENGLAND Rally - Details 0952 598173.

17 APRIL

BURY RS Radio Rally - Details 061 762 9308.

1 MAY

BRITISH AMATEUR TELEVISION CLUB (BATC) Rally. ***NEW VENUE*** The Sports Connextion, Leamington Road, Ryton-on-Dunsmore, Coventry. Details Tel: 0788 890365 or Fax 0788 891883.

2 MAY(MONDAY)

MID-CHESHIRE ARS Rally - Details G4XUV on 0606 77787.

8 MAY

MARS/DRAYTON Mobile Radio Rally - Details G6DRN on 021 443 1189.

10th YEOVIL QRP Convention - Details G3CQR, QTHR. Tel: 0935 813054.

12 JUNE

The 25th ELVASTON CASTLE Mobile Radio Rally - Elvaston Castle Country Park, near Derby. Details Ken, G3OCA 0332 662818.

19 JUNE

NEWBURY Boot Sale - Details on 0635 863310

9 JULY

CORNISH Rally - Details 0872 222605.

10 JULY

SUSSEX AR and Computer Fair - Details G8VEH, QTHR, tel: 0903 763978 or 0273 415654 office hours.

24 JULY

COLCHESTER Radio & Computer Rally - Details Frank, G3FIJ, QTHR 0206 851189.

28/31 JULY

AMSAT-UK Colloquium - The University of Surrey, Guildford. Details from G3AAJ, 081 989 6741.

SILENT KEYS

WE HAVE BEEN advised of the deaths of the following radio amateurs:

G0CNZ	Mr I R J Sharkey	13.07.93
G2IZ	Mr S Martin	19.07.93
G3ARM	Capt R L Ramsey	
G3GTH	Mr E R Cooper	27.07.93
G3IAM	Mr F H Hearnden	
G3JMV	Mr G Easton	29.07.93
G3VSD	Mr J Rimmer	21.07.93
G4AOZ	Mr F Sherwood	23.07.93
G4ZEQ	Flt Lt J Nolan	21.07.93
G8BQ	Mr A Oughton	19.07.93
G8GI	Mr C B Raithby	21.07.93
GM0OFG	Mr D G Gittings	17.07.93
GW4UXK	Mr P J Nicholson	29.04.93
LA9MF	Mr F E Svendsen	
RS94136	Mr R W Barnes	

MR A MILNE, G2MI

MEMBERS will be saddened to learn that Arthur Milne, G2MI, passed away on 6 October 1993. A full obituary will be published in December's *RadCom*.

GB CALLS

The list below shows all special event stations licensed for operation during this month and up to 30 November. It was taken from the HQ computer on 28 September. These callsigns are valid for use from the date given but the period of operation may vary from 1-28 days.

NOV 4		
	GB2RCC	Radio Caravan Club
NOV 5		
	GB4CIN	Children In Need
	GB4RSL	Royal Signals Llandudno
	GB6CIN	Children In Need
NOV 8		
	GB4RSL	Royal Signals Llandudno
NOV 9		
	GB50NCA	North Cape Action
NOV 15		
	GB4BPS	Bridekirk Primary School
NOV 16		
	GB4SWS	Sixth Wednesbury Scouts
NOV 19		
	GB0TOV	Transit of Venus
NOV 21		
	GB1NC	Needy Children
	GB2NC	Needy Children
NOV 25		
	GB0SEG	Scottish Expedition Group
	GB2SEG	Scottish Expedition Group
NOV 26		
	GB8SA	St Andrew
NOV 27		
	GB0PF	Pilgrim Fathers
	GB1PF	Pilgrim Fathers
NOV 30		
	GB2SEG	Scottish Expedition Group
	GB4SEG	Scottish Expedition Group

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Council, Committees and Honorary Officers

The Society has a large number of volunteer experts available to help and advise members on a wide variety of subjects. Each month we will be focussing on a different section of the volunteer workforce, whilst still giving brief details of the main office-holders. See also the Information Directory section of the *RSGB Call Book*.

• RSGB Policy Matters (Zonal Council member):-

Zone A (North of England):

Peter Sheppard, G4EJP, 89 St Catherines Drive, Leconfield, Beverley, North Humberside HU17 7NY. Tel: 0964 550397.

Zone B (Midlands):

John Allen, G3DOT, 4 Philip Avenue, Waltham, South Humberside, DN37 0QD. Tel: 0472 825899.

Zone C (SE England and East Anglia):

Neil Lasher, G6HIU, 8 Highwood Drive, Mill Hill, London NW7 3LY.

Zone D (SW England):

Julian Gannaway, G3YGF, Dean Hill Barn, East Dean, Salisbury, Wiltshire SP5 1HJ. Tel: 0794 40008.

Zone E (Wales):

Clive N Trotman, GW4YKL, 19 Park View, Dolau, Llanharen, Pontyclun, Mid Glamorgan. CF7 9RZ. Tel: 0443 226198.

Zone F (Northern Ireland):

Ian Kyle, GI8AYZ, 1 Portulla Drive, Pond Park Road, Lisburn, Co Antrim BT28 3JS. Tel: 0846 665034.

Zone G (Scotland):

Ian Suart, GM4AUP, 37 Meldrum Mains, Glenmavis, Airdrie, Lanarkshire, ML6 0QG. Tel: 0236 765937.

• For general advice and details on local clubs, or if you don't know who to contact:-

Your RSGB Liaison Officer. See the *RSGB Call Book*, your membership card or *RadCom*, May/June 93.

• Antenna Planning:

Need for permission and how to apply – booklet free to members from the Amateur Radio Dept at RSGB HQ.

Planning application refused – RSGB Planning Panel, via RSGB HQ.

Planning Advisory Committee Chairman: Geoff Bond, G4GJB, QTHR.

• Awards:

For contest awards, refer to the appropriate contest committee. For other awards, enquiries and applications go to either:

HF Awards Manager – Bill Ricalton, G4ADD, QTHR.

IOTA (Islands on the Air) Awards Manager – Roger Balister, G3KMA, QTHR.

VHF (and Microwave) Awards Manager – Ian L Cornes, G4OUT, QTHR.

• Band Plans and operating practices:

See the *RSGB Call Book* or March 93 *RadCom* for latest bandplans. For policy, contact the appropriate spectrum manager or committee chairman:

HF Manager – Martin Atherton, G3ZAY, 41 Enniskillen Road, Cambridge CB4 1SQ.

HF Committee Chairman – David Evans, G3OUF, PO Box 599, Hemel Hempstead, Herts HP3 0SR.

VHF Manager – Dave Butler, G4ASR, Yew tree Cottage, Lower Maescoed, Hereford HR2 0HP.

VHF Committee Chairman – Peter Burden, G3UBX, 2 Links Rd, Penn, Wolverhampton, WV4 5RF.

Microwave Manager – Mike Dixon, G3PFR, Woodstock, Gaze Bank, Norley, Warrington, WA6 8LL.

Microwave Committee Chairman – Steve Davies, G4KNZ, 14 Herondale, Birch Hill, Bracknell, Berkshire RG12 7ZT.

• Beacons:

See *RadCom*, Oct 93

• RSGB Contests:

First contact the contest adjudicator (see the contest rules). For policy, contact the respective Committee Chairman:

HF Contest Committee – Chris Burbanks, G3SJJ.

VHF Contest Committee – Bryn Llewellyn, G4DEZ, QTHR.

ARDF Committee – Brian Bristow, G4KBB, QTHR.

• EMC:

Advice on solving breakthrough and other electromagnetic compatibility matters:

Committee Chairman: Robin Page Jones, G3JWI, QTHR.

Local EMC Coordinators - see *RadCom* Oct 93.

• Emergency Communications:

Emergency Communications Officer: Gregg Reilly-Cooper, G0NAM, 0606 783270

• Exhibition & Rally Committee:

Chairman: Norman Miller, G3MVV, QTHR.

• Honorary Historian:

George Jessop, G6JP, QTHR.

• IEE:

Liaison Officer – Prof Peter Saul, G8EUX, QTHR.

• Intruder Watch (IARUMS):

Non-Amateur Service operation in exclusive amateur radio bands.

Co-ordinator – Chris Cummings, G4BOH, QTHR.

• Licensing:

Licensing Advisory Committee Chairman (RSGB Policy) – John Bazley, G3HCT, 'Brooklands', Ullenhall, Nr Henley in Arden, Warwickshire, B95 5NW.

Renewals – Subscription Services Limited, PO Box 885, Bristol BS2 8RH.

New Licence Applications - Subscription Services Ltd, PO Box 884, Bristol BS2 8RH. SSL Help Desk – 0272 258333.

• Membership Liaison:

Membership Liaison Committee Chairman – Clive Trotman, GW4YKL (see Zone E above).

• Morse:

GB2CW Co-ordinator – David Pratt, G4DMP, QTHR.

Chief Morse Examiner – Roy Clayton, G4SSH.

• Novice Licence/ Project YEAR:

Hilary Claytonsmith, G4JKS, QTHR.

N.B. For details of training courses and examinations, write direct to RSGB HQ, quoting your postcode.

• Packet Radio:

Datacomms Committee Chairman – Tom Lilley, G1YAA, QTHR.

• President:

Peter Chadwick, G3RZP, 'Three Oaks', Braydon, Swindon, Wilts, SN5 0AD.

• Propagation:

Propagation Studies Committee Chairman – Charlie Newton, G2FKZ, QTHR.

• QSL Bureau:

Outgoing cards – PO Box 1773, Potters Bar, Herts, EN6 3EP

Incoming cards – your QSL Submanager (see *RSGB Call Book*).

• Repeaters:

Repeater Management Group Chairman – Geoff Dover, G4AFJ, QTHR.

• Spectrum abuse:

Amateur Radio Observation Service Co-ordinator – Geoff Griffiths, G3STG, QTHR.

• Technical queries:

Technical and Publications Committee Chairman: Dick Biddulph, G8DPS, QTHR.

• Training and Education:

T and E Advisory Committee Chairman - John Case, GW4HWR, QTHR.

• Trophies:

Trophies Manager – Bob Harrison, G4UJS, QTHR.

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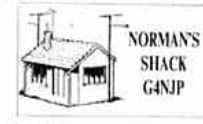

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The LAST WORD

COMPONENTS SOURCES

I wonder how many radio constructors are frustrated or deterred from pursuing that element of the hobby by their inability to obtain radio and electronic components. Some construction articles do list suppliers of critical components such as ferrites, crystals, inductors etc but most do not. Several articles are written and published with the express intention of selling kits. This is fine except that most ardent constructors will already have many of the components included in the kit.

It would be most useful if a classified list of components vs suppliers were available. I am sure that many readers of *RadCom* would find such a list most useful even if only published and updated say six monthly or annually. Compiling such an index would be facilitated by declaring an intention to do so, after which most suppliers would beat a path to *RadCom's* door to be included!

Mike Wood G8MTV, Chairman Darlington & District ARC

[Over the past two years we have increased the number of references to suppliers in component lists, particularly for critical components such as ICs. Components available only from the junk box or a rally are not included. As for a classified list of suppliers . . . watch this space! -Ed]

PROPAGATION DATA

How to get the most on the HF bands from linear amplifiers, highly directional antennas, sophisticated speech processing and from modern receivers are all subjects which have been and are very well covered in *RadCom*. Many thousands of words have been written on how to get the very last decibel from every element of the system except one, the ionosphere!

Sure there is the monthly prediction which is extremely useful; however, I have not seen a description of how it is produced or, even more importantly, from what source data. How many readers know what a 'SIDC adjusted value' is or what is meant by 'classical method'?

Every week we get information from *GB2RS* which talks of M6 storms and AA indices in nano Teslas. Does anybody except the Propagation Studies Committee know what they all mean? And how do we use the information to make sure that we get the best out of the medium which provides us with the biggest opportunity for system gain or more accurately, less system loss? If they do they certainly didn't learn it in *RadCom*.

I think the time has now arrived for you to persuade someone to write a series of articles for *RadCom* so that we have a better understanding of how to make the best use of the data which is available?

Jack Gentle G0RVN

[Recent propagation items have included 'Plotting of Magnetic Deviation and Aurora', 'An Invitation to Moonbounce' and 'Ionospheric Research by Radar' and several Technical Topics *items. But you are right, the basic information hasn't appeared in* RadCom *for some time. It is, however, covered in the* RSGB Call Book *with special reference to the* GB2RS *report and forecast. A more detailed description can be found in the* RSGB Handbook, The Amateur Radio Operating Manual, The VHF/UHF Manual *and others. - Ed]*

BROADCAST SATURATION

First of all I wish to thank G3VA for his efforts in presenting us again and again with interesting information. *Technical Topics* is always my first thing to read.

Further to 'Super-Linear HF Receiver Front Ends' (*Technical Topics* Sep 93) p 54-56, I would like to remind members that the non-linearity of switching diodes and possibly saturation of the dust iron cores of the filters ahead of the mixer cause 2nd-order modulation products from strong broadcasting stations. The result are carriers every 5kHz in the evening hours on the higher bands, especially on 18 and 21MHz. Sometimes even on 14MHz. You could use the birdies as 5kHz frequency markers.

It has been found that an ATU will greatly reduce the effect. DK9PY has modified his FT-1000 so that the built-in ATU is effective also on receive (*CQ-DL* July 93). U Rhode wrote recently that these switching diodes are in fact the limiting factor of even high-priced amateur receivers, and not the mixers.

It surprises me that the phenomenon is rarely mentioned or explained in most test reports. Possibly only in Central Europe we have such a combined HF Energy and not, for instance, in the US (I have seen no US test reporting on this).

Hans Kreuzer DL1AN

LIVE RADIO

May I thank the Society for the opportunity of being present at LIVE '93.

It was a valuable experience. Many times when manning or visiting stations at *radio* events, I have found that the operating becomes somewhat automatic; a set of people 'going through the motions', and the opportunity of promoting amateur radio often goes by the board. The visitors, being 'radio aware' are similarly blasé.

At LIVE '93 the situation was startlingly different. Most visitors, with obvious exceptions, were so unaware of the purpose of the station (in fact many had no idea of what we were doing) that in their naivety they were asking questions that made me (us) think! In some cases it even made us re-evaluate our own view of 'radio amateurship'; the whys and wherefores! Yes, a valuable experience - amateur radio in the 'real' world!

In closing, I would also like to thank the HQ staff present at the show, not only for their assistance and general good nature, but also for their happy enthusiasm for the hobby. It was obvious that their commitment went beyond simple professionalism; which is remarkable in as much as they themselves are not 'protagonists'.

Thanks again. See you next year?

David A Gilligan G1OGY

FORCES GREETINGS

For the foreseeable future there will be contingents from our Armed Forces scattered about the world acting in the role of peacekeepers, providing disaster relief services or guarding other agencies similarly engaged.

From the point of view of the individual soldier, sailor or airman taking part in such endeavours the most important factor affecting their morale is up-to-date contact with home.

Amateur radio can provide such a facility at an affordable cost through the medium of Service signals personnel who are also radio amateurs deployed with our Forces overseas. To provide direct person-to-person contact it would also necessitate a home-based amateur radio phone patch facility, strictly limited to this purpose, through licensed operators who are members of the Service amateur radio societies or designated by them.

Surely the authorities concerned can foresee the benefits of such a concept and will do everything within their power to bring it to fruition, even to the extent of promoting any enabling legislation that may be necessary.

Bryan Wells G3MND

INVERSE LOGIC

Can anyone please explain the wayward logic of many Japanese transceiver manufacturers in placing the LSB mode button *above* that for USB. Fortunately good sense usually prevails in the professional world.

Michael O'Beirne G8MOB

Please note that the views expressed in *The Last Word* are not necessarily those of the RSGB. We reserve the right to edit letters for publication. All letters are acknowledged and may be passed to the relevant department or committee.

CHECK THOSE VOLTS

Some time ago I purchased an HF Linear amplifier from a supplier of amateur radio equipment on the understanding that it had been thoroughly checked on arrival from the manufacturer (it was brand new). I proudly took my new piece of gear home and carefully read the operating instructions several times before attempting to use it.

Everything worked just fine until one day it suddenly exploded. Had I done something wrong or made an incorrect adjustment? No I most certainly had not. The inside of the case was a mass of molten components with hardly anything intact. Go back to the supplier? No chance - gone out of business and owing lots of people money. So what to do next? I took my now defunct expensive box to an independent repairer and awaited his verdict.

He said that instead of the mains transformer being wired for 240 volts it had been wired for 200V. A simple fault which meant that everything was slowly cooking until it just couldn't take any more. OK I should have checked it myself but it wasn't exactly easy to get to and I trusted my supplier, who had 'thoroughly checked' it on arrival.

So next time you decide to buy a piece of equipment, new or used, from any supplier *check the mains transformer!* Don't end up in my situation with a useless piece of expensive equipment and no recourse to anyone else!

P F Zipzer G4MJM

RMS POWER - UGH!

I was sorry to see *RadCom* promulgating the pernicious, incorrect and misleading term 'RMS Power' (*In Practice*, October 1993). I nevertheless sympathise with the writer, G3SEK, because he had to take into account that many publications, including those from some reputable international companies, continually use the idiotic term. They do so either out of ignorance or because it is just too much trouble to explain to the general public that disreputable advertisers use it as phoney 'techno-babble'.

It began at least 40 years ago when some less reputable audio firms specified *peak* power instead of *average* power to try and make their wares look better than they really were. Then some well-meaning but ill-informed advertiser tried to expose the ruse, but alas got it wrong and others have followed like sheep ever since.

Whoever it was who first got it wrong all those years ago, probably knew that it is indeed correct to use RMS voltage and RMS current when calculating power in an AC circuit but apparently didn't know that the unqualified term 'power' refers to the average power over one or more complete cycles as G3SEK correctly states. But there just ain't no such animal as 'RMS Power' and it only adds to beginners' problems to use the term.

R H Pearson G4FHU

['RMS power' is a perfectly reasonable concept, but considering the abuses it has been subjected to by the audio industry, I can understand why some people hate the very sight of it.

I agree that RF power is normally defined as the average over one complete cycle, and should not need any additional qualifier. Also the definition of PEP in our licence speaks of "average power during one RF cycle". But from the number and the nature of the questions received by In Practice, *it is clear that the definition of PEP in the licence is not at all self-explanatory.*

The problem lies in the word "average" , which is wide open to misinterpretation. I've even heard a professional RF engineer (and heaven help us, also an RAE instructor) holding forth about "average PEP"!

Hence when trying to explain the meaning of PEP I decided to use the extra qualifier 'RMS RF power' which allows no misinterpretation. Although this usage is tautological, it is not otherwise incorrect.

This particular method of explaining PEP has already been extensively field-tested in The VHF/UHF DX Book *[see p34 - Ed] in a chapter co-authored with John Nelson, GW4FRX, a professional audio consultant well known as a 'technological hard-liner'. From conversations with people who had not previously understood what PEP means, it seems that our explanation does the job, and the term 'RMS RF power' has not created any new misconceptions of its own* - Ian White, G3SEK*]*

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There is also an RSGB diamond car sticker. (Members only). **£0.64**

EMC Filters

FERRITE RING TOROID
Pack of 2. **(£4.25) £3.63**
Size: outer 37mm, inner 25mm approx.
(Postage pair: UK 50p, Overseas: 75p)

FILTERS
Filter 1 - Braid Breaker. Filter 2 - High Pass for FM Broadcast Band 2. Filter 3 - High Pass for UHF TV. Filter 4 - Notch Tuned to 145MHz. Filter 5 - Notch Tuned to 435MHz. Filter 6 - Notch Tuned to 50MHz. Filter 7 - Notch Tuned to 70MHz. Filter 8 - Six Section for UHF TV. Filter 10 - Notch Tuned to 28MHz. Filter 15 - Notch Tuned to 21MHz. Filter 20 - Notch Tuned to 14MHz.

Filter 8 prices are **(£21.50) £18.28**
(Postage each: UK 60p, Overseas: £1.50)
All others are **(£8.50) £7.23**
(Postage each: UK 50p, Overseas: £1.00)
Filters are despatched post free if ordered with a book

REMEMBER TO ADD POSTAGE TO ALL PURCHASES

HOW TO ORDER

PRICES. Retail prices are in (brackets) followed by members' discounted prices. If you are a member, please quote your call sign or RS number when ordering. All prices include VAT (where applicable) and are subject to change without notice. Except where otherwise stated, please add postage as follows:

Amount of Order	UK Post and Packing	Overseas Surface
Up to £1	post free	post free
Up to £5	£1.00	£2.50
£5.01-£10.00	£2.00	£3.50
£10.01-£15.00	£3.00	£4.50
£15.01-£20.00	£4.00	£5.50
£20.01-£25.00	£5.00	£6.50
£25.01 and above	£6.00	£7.50

Newsletter and magazine prices include postage. Overseas Airmail and first class UK post prices are available on request.

AVAILABILITY. Goods are available over the counter at RSGB Headquarters 9.15am to 5.15pm, Monday to Friday. However, you are strongly advised to confirm availability of goods by telephone before visiting Headquarters.
PAYMENT. Payment may be made by post, enclosing a cheque or postal order. These should be crossed and made payable to 'Radio Society of Great Britain'. If sending cash please use registered post. We accept Visa and Access (Mastercharge) cards and our telephone number for credit-card orders is (0707) 659015. Our Giro account number is 533 5256.
DELIVERY. Goods will be despatched to UK destinations by 2nd class letter post or parcel post, or surface mail to overseas destinations. Please allow 28 days for delivery.

ORDER FROM:
RSGB SALES (CWO)
Lambda House,
Cranborne Road, Potters Bar,
Herts EN6 3JE

Access VISA **plus AMEX & DINERS CLUB**

Credit card hotline: 0707 659015

CLASSIFIED ADVERTISEMENTS

Classified advertisements 55p per word (VAT incl) minimum 14 words (£7.70). Please write clearly. No responsibility accepted for errors. Latest date for acceptance — 5 weeks before 1st of issue month.

All classified advertisements MUST be prepaid.

NB: CHEQUES SHOULD BE MADE PAYABLE TO RSGB.

Copy and remittance to: **Victor Brand Associates Ltd, 'West Barn', Low Common, Bunwell, Norwich, Norfolk, NR16 1SY.**

NB. Members' Ads must be sent to "Members' Ads," RSGB Hq.

FOR SALE

CUSTOM DRAWN QSLs etc to your instructions £12.99. GW3COI QTHR Abersoch 712675. SAE samples.

G3LLL FOR NEW & S.H. ICOM & Yaesu. Blackburn (0254) 59595 — see Page 79 for valve offers. Closed Sun, Mon & Thurs. Phone first.

QSLS 1000 £27.50 (SWLS. Logos. Colour cards. Stamps. Patches — S.A.S.E. for samples) Currie, 87 Derwent St, Consett, DH8 8LT.

"RAYNET" YELLOW REFLECTIVE TABARDS with "RAYNET" like Police, Ambulance. Medium £10.00. Large £10.50, XLarge £11.00. "RAYNET CONTROLLER" 50p extra. EPSON PX4+ lap top computer, built in printer, charger £45 incl. pp. Non-reversible Battery Connectors Line/panel mounting (10 pairs/pack) £5.50. Mike Watson G8CPH, Ipswich (0473) 831448.

MOSLEY ANTENNAE — All the famous British Manufactured Antennae, direct from us including spares/replacements. Mustang, Elan, TA-33Jnr etc. Full details shown in our Handbook, price £1.25 refunded upon purchase of Antennae, Mosley Electronics, 196 Norwich Road, New Costessey, Norwich NR55 0EX (Administrative address only).

G2DYM CUSTOM BUILT AERIALS, trap-dipoles, anti-TVI, anti-interference, multiband, baluns, ATUs, traps, parts: Data 36p sae, aerial guide £1. Reconditioned HF/VHF, Kenwood, Yaesu, Icom transceivers, receivers, ATUs. G2DYM, Uplowman, Devon EX16 7PH. Phone 03986-215 anytime.

QSL CARDS. Gloss or tinted cards. SAE for samples to Twrog Press, Penybont, Gellilydan, Blaenau, Ffestiniog, Gwynedd LL41 4P.

ALUMINIUM TUBE. Heavy-duty (scaffold) tube approx. dimensions 20' long, 2" dia. 11/64" (4.5mm) wall thickness. 20' and 10' lengths available @ £1.80 + VAT per ft. C.W.O. Rusper Hire (Crawley) 0293 87 1621 office hours only.

SOLAR/WIND POWER. S.A.E. or two 1st class stamps for catalogue/info sheets, available from GW4IED, 4 Glanmor Crescent, Newport, Gwent NP9 8AX.

AMIDON/MICROMETALS TOROIDAL CORES, Ferrite, Beads, Rods etc. Send 50p for catalogue. Ferromagnetics, P.O. Box 577, Mold, Clwyd, N.Wales CH7 1AH.

QSL CARDS. Try me for quality and price. SAE for samples. C. A. Bailey, Brean Down Press, 26 Hazeldene Road, Weston-super-Mare, Avon BS23 2XL. Tel: (0934) 644771.

CALLSIGN MUGS AND PLAQUES personalised with your name. Ideal gift. Low cost. Call 'Characteristics' on 0262 673635 or write 44 Hildethorpe Road, Bridlington, E. Yorkshire YO15 2BG.

QSL CARDS — low cost, quick delivery, superior designs, quality guaranteed, personal designs our speciality. L.S.A.E. for samples: The Standfast Press, 5 South Drive, Inskip, Preston PR4 0UT.

G4TJB QSL CARDS, CARDS printed to your specifications, send large S.A.E. for samples and full product list. Unit 6, Worle Industrial Centre, Coker Road, Worle, Weston-super-Mare, BS22 0BX. Tel: (0934) 512757, (0850) 707257, Fax (0934) 512757.

BUDGET 2M FM RIGS with conversion data: PYE CAMBRIDGE FM10B boot unit only: £7. PYE WESTMINSTER LW15FM boot unit only: £15. UK mainland carriage £8 any quantity. VAT inclusive. Callers welcome (phone first). Garex Electronics, Station Yard, South Brent TQ10 9AL. 0364 72770.

RACAL RA-17L mint and superb working condition, not refurbished or renovated but as new £385. Aerial and mains plugs POA. Complete set valves-list. JRC NRD-535 — £965. NRD-525 — £575. Stock of RA-117, RA-1217, RA-1218, RA-1772 and RA-1792. Used Hewlet Packard and Tektronix test equipment-list. Stock of valves-list. Wanted urgently — Hallicrafters SX-28 in VGC. Europ-Navaids Ltd. Tel: 081-391 0545 Fax: 081-391 5258.

QSL. SWLS ECONOMY CARDS. Very low prices, quick delivery. Sample enquiry to: G3ETU, 34 Park Lane Court, Salford, Manchester M7 0LF. 061-792 9144.

DIY Z MATCH ATU 80 to 10 and other radio projects. SAE Rylands, 39 Parkside Avenue, Southampton S01 9AF.

SHORTWAVE RECEIVERS, all refurbished. CR100; HA350; HA600; 640; EA12; Gannet; Electra; JR60; HRO's; Pye; and many more. (Receivers wanted, any condition). S.S.B. Products. 0872 862291.

THE RIG REVIEW contains details of over 400 rigs. Unravel those small ads. Price £5 post free from Twrog Press, Penybont, Gellilydan, Blaenau Ffestiniog, Gwynedd LL41 4EP.

I.C.2.E. H.D. NICADS NEW 600M/A 9-6 volts inc 8AA rechargeable so repairable. £54.50. G4WMP. 0932 846139.

FRG7 FOR SALE. Due to silent key. Serial No 7I120839, v.g.c., offers, also quantity old valves free to good home. Mr Duckett, 0952 505943.

JVFAX HAMCOMM and PC-HF-FAX. For just £16.99 (inc VAT and P&P) a demodulator to plug into the 25-way connector on your PC. Pervisell Ltd, 8 Temple End, High Wycombe, Bucks. HP13 5DR. Tel (0494) 443033. Fax (0494) 448236.

RSGB AMATEUR RADIO INSURANCE SCHEME

"ALL RISKS" INSURANCE for portable/mobile/base station amateur radio and ancillary equipment. A service for RSGB members only. Also public liability and equipment insurance for affiliated clubs and societies. Details and leaflets from Jennifer Lawson, Amateur Radio Insurance Services Ltd, Shepheards Hurst, Green Lane, Outwood, Surrey RH1 5QS. Tel: 034-284-4000. Fax: 034-284-4554.

COMPUTER SOFTWARE HARDWARE

G4UXD'S MORSE TUTOR/PRACTICE: IBM-PC's, BBC's. Random everything! Adjustable speed, delay, letter frequency; 100 tests, attach your key. Novice/Standard modes, £9.50. SAE details/free trial. D. Brandon, 1 Woodlands Rd, Chester, CH48LB.

G4BMK PACTOR — See display advert this issue. Grosvenor Software, 2 Beacon Close, Seaford, Sussex.

SHACKLOG3 THE PC logging system. Real time & post event QSO logging. Country needs alert. QSL labels. Rig control. Database analysis, reports, import etc. Optional IOTA database (G3KMA). Plus lots more!! SASE for full details. G3PMR, 30 West Street, Gt. Gransden, SANDY, SG19 3AU. 0767677913.

SUPER-DUPER, THE PC CONTEST LOGGING PROGRAM for RSGB and international HF Contests. "Highly recommended" — RadCom September 1993. £20.00. Paul O'Kane EI5DI, 36 Coolkill, Sandyford, Dublin 18. (01 0353 1295 3668).

HOLIDAY ACCOMMODATION

FLYING FROM GATWICK? Stay at Mill Lodge Guest House. 4 minutes from airport. Transport available. Telephone (0293) 771170.

NORTH WALES. Elevated site, B&B, caravan, bunkhouse, camping, open all year, use of shack. "Tynrhos", Mynytho, Pwllheli, LL53 7PS, (0758) 740712.

MISCELLANEOUS

COURSE FOR CITY & GUILDS, Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCSE, career and professional examinations, etc) write or phone — THE RAPID RESULTS COLLEGE, Dept JT106, Tuition House, London SW19 4DS. Tel: 081-947 7272 (9am-5pm) or use our 24hr answerphone service 081-946 1102 quoting JT106.

0% COMMISSION, G3RCQ Electronics will sell your equipment at no cost to you! Interested? Phone Dave/Alan, 0708 374043/0268 752522, or send s.a.e. for information pack, 9 Troopers Drive, Harold Hill, Romford, Essex RM3 9DE.

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BUYING, SELLING, P/EX, contact G3RCQ Electronics for the best deal. Alan/Dave, 0708 374043, Mobile 0850 320134.

VIDEO TAPE CONVERSIONS to and from all modes N.T.S.C.; S.E.C.A.M.; P.A.L.N.; P.A.L.M. Digital processing. Fast and economical service. Phone G4WMP 0932-846139.

PROFESSIONAL SERVICES

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Readers are also reminded that the use of radio transmission and reception equipment (including scanning) is subject to licencing and the erection of external aerials may be subject to local authority planning regulations.

ADVERTISERS INDEX

NEXT COPY DATE

The display advertisement copy date for our January 1994 issue will be 10th November 1993

FLY 707

IC-707 HF ALL-BAND TRANSCEIVER

The key words are operating simplicity and convenience with this new HF transceiver from ICOM. The IC-707's compact proportions provide operating versatility in a variety of locations, while the front, panel-mounted loudspeaker allows installation with no loss of audio quality.

Controls have been kept to a minimum and the well spaced switches will help you fly around the front panel to provide simple operation. The large, easy-to-read function display shows all necessary information including frequency, mode, memory channel etc., a bar meter indicates S/RF levels.

If you're new to HF operation, this is the transceiver for you. But, even if you're an experienced HF operator, the IC-707's convenient size and simple operation will make it a great transceiver for portable or mobile use, or even as a second transceiver at a competitive price.

- 32 memory channels
- 100 watts output power
- High sensitivity
- Band stacking register
- Covers all WARC Ham bands
- 500kHz~30MHz general coverage receiver
- 10dB preamp and 20dB attenuator
- RIT control
- Noise-blanker
- 2 VFO system
- 2 types of scan
- **IT'S JUST GREAT! FLY ONE AND SEE.**

ICOM

ICOM manufacture a full range of base-stations, mobiles and handheld transceivers and receivers to cover all popular frequencies and beyond.
No matter what your requirement ICOM have the radio for you.
For more information and the location of your local Icom dealer contact:

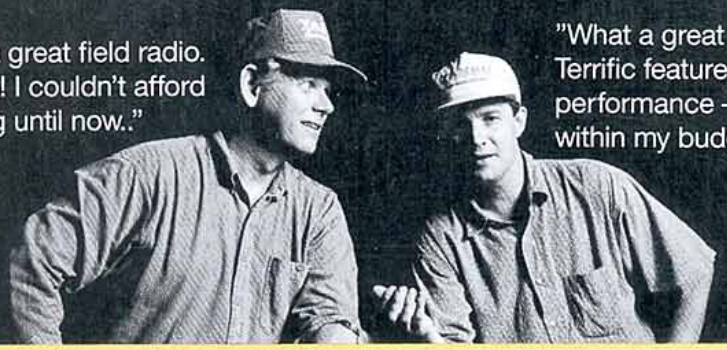
Icom (UK) Ltd. Sea Street
Herne Bay Kent CT6 8LD
Telephone: 0227 741741 (24hr).
Fax: 0227 741742

NEW

"What a great field radio. Mobile, too! I couldn't afford an HF rig until now.."

"What a great price! Terrific features, high performance – and within my budget."

"Yaesu did it again!"



FT-840
Compact HF Transceiver

- Direct Digital Synthesis (DDS)
- Frequency coverage:
  RX: 100 kHz-30 MHz
  TX: 160-10 m
- IF Shift
- 100 Memory Channels (Independent TX/RX per memory)
- Twin Band Stacking VFOs
- FM Repeater Operation Automatic 10-Meter Repeater Offset w/Selectable CTCSS Encode
- CW Reverse Feature
- Choice of Two Optional Antenna Tuners:
  FC-10 Matching External Antenna Tuner
  FC-800 External Remote Antenna Tuner
- **Accessories:**
  Contact your Dealer for full details.

It's a small price to pay for such a wealth of features.

If you're trading up from an older rig, but have a budget, you want the most you can afford in top-notch HF. Then the FT-840 is for you. It's right on the money! Considering a mobile HF or field radio and doubt the quality and features of tiny HF rigs? Then the FT-840 is for you. It won't disappoint you!

Built to handle rigorous field operation, the new intense LCD display affords sharp visibility in bright sunlight. Die-cast heat sink and internal thermally switched fan keep the FT-840 running cool. Modular design circuit boards ensure operating efficiency – manufacturing excellence you'd expect in much higher priced radios.

For high performance, the FT-840 features a low noise front end that uses the latest in FET RF amplifier design. Two DDSs and magnetic encoder for silent, smooth tuning and fast switching. Twin band-stacking VFOs. And, automatic 10-m FM repeater offset with selectable CTCSS. Even two optional external antenna tuners to customize your rig.

Top of the line quality and features at a remarkably low price. Just what you'd expect from Yaesu! For high-tech performance, and a wealth of features that won't break your budget ask your dealer about the FT-840.

YAESU

Performance without compromise.℠

Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.