Radio Communication

October 1989

ELECTRONIC COUNTER MEASURES:

How a moth, a 40 year-old aircraft and the RAF join forces to cause confusion

FLYING DUTCHMEN!

The ingenious Dutch get HF QRV from 600ft

LEICESTER SHOW PREVIEW

Oct 27-28th

KENWOOD

TS-950S. This is DX-clusive

Rumours have abounded for some months that Kenwood were once again about to take the HF transceiver market by the throat, and with the announcement of the TS-950S those predictions have proved to be true. It is an undisputed fact that Kenwood HF transceivers have always led the way, and it seemed almost impossible for their design team to make significant advances on the success of the TS-940S, — but they have.

We don't have to tell you that the receiver performance is outstanding; a noise floor of -140 dBm will do that. Nor do we have to mention the ease of use; Kenwood has an enviable reputation in this area. What we must give a few hints about are some of the new operating aids which Kenwood have included, such as a dual receiver which allows you to listen up to 500 kHz away from your operating frequency — even during transmitting; such as the revolutionary digital signal processing option which gives improvements of up to 10 dB in carrier and unwanted sideband suppression; variable transmit bandwidth; adjustable rise time of the CW envelope; and much more.

The photograph and this brief text can only give a hint of what the TS-950S can deliver — the full story can only be told by a visit to your Kenwood approved dealer or a browse through some detailed literature, but take it from me that once again, Kenwood have shown the way forward in HF transceiver design.

John Wilson G3PCY/5N2AAC

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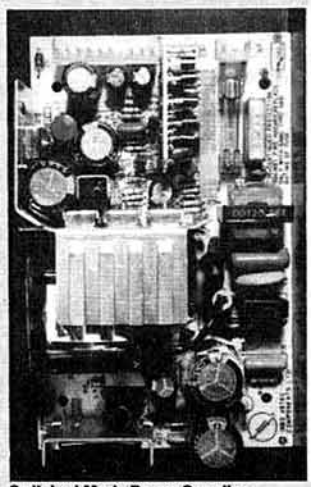

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RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY WHICH REPRESENTS UK RADIO AMATEURS

Founded 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 secretary, from whom full details of Society services may also be obtained.

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Membership application forms available from RSGB HQ

COUNCIL BRIEF

30 March 1989 Council Meeting

■The policy of Council to move the Society's Annual Meeting to different parts of the UK, to give more members an opportunity to attend the Annual Meeting, was discussed at length.

A decision on the location of the 1989 Meeting would be made at the next meeting of Council.

■A new Chairman for the VHF Contests Committee, Bryn Llewellyn, G4DEZ, was appointed following the resignation of John Quarmby, G3XDY. Council thanked G3XDY for his great contribution to the work of the Society.

■Prodcedures were agreed whereby the Society would be represented at Rallies by locally based officers of the Society.

■The Tartan, Scottish and Founders Trophies were discussed.

■Council discussed the Editor-in-Chief's letter to Mr Willis, G8VR, in which he had asked Mr Willis to stand down as the contributor of the VHF bands column. Mr Willis attended the meeting of Council to put forward his views. After much discussion, Council thanked Mr Willis for his attendance and agreed that in future columnists would be appointed annually by the Editor in association with the Technical and Publications Advisory Committee.

■The terms of reference for the Finance and Staff Committee were discussed and clarified. The Committee Chairman, Willie McClintock, G3VPK, attended the meeting to describe the work of the Committee and to seek closer liaison with Council on financial matters and reporting.

■An ad hoc Committee was set up to discuss ways of seeking better publicity for amateur radio. John Greenwell was appointed Chairman.

■A long discussion took place for plans for Project YEAR and Novice Licence frequency allocations.

■Other matters discussed included: the half yearly accounts, the co-ordination of external events, the opening of a Dollar Account, the RSGB Legacy Fund, the International Beacon Project, VHF Contests matters, RAE Manual revisions, RSGB representation at the IARU Region II 1989 Conference and the ARRL 75th Anniversary celebrations, EMC and DiY-Radio.

News from the HF contest committee

AFS AND CUMULATIVE RESULTS

For the members who enquired about the late publication of these results, the AFS Results appeared in the September 1989 issue of *RadCom*, and the LF Cumulatives appear in this issue.

CONTEST LOG AND DECLARATION SHEETS

A number of clubs have asked if there is any objection to them using photo-copies of the RSGB contest stationery, as they often need extra copies for NFD and SSB FD etc. The HFCC will always accept photo-copies provided they are A4 size. The samples in the *RSGB Callbook* are undersized, but as the reduction applied to both width and length, a small amount of enlargement during the copy process brings them up to A4 size. Computer-derived logs may also be used for all RSGB HF contests, but again they must be formatted to the standard contest log sheet (40 entries per page) and use the A4 paper size. There is no restriction on the paper size for the declaration (cover) sheets. There have been enquiries as to why the standard log sheet is not formatted to line-printer or daisy-wheel standards. The format was agreed some ten years ago during the IARU Region 1 Brighton conference and was supposed to be a standard for all IARU Region 1 societies. The line-spacing was based on a typewriter standard, which was thought to be suitable for most uses. This has not proved correct as the introduction of electronic, golf-ball and daisy wheel typewriters, together with the mass use of word-processors and printers have made the spacing non-standard and difficult to use. To overcome this the HFCC will shortly be producing a revised log sheet with altered line-spacing which should make things easier for those who wish to use it on their printers. There will also be a revision of the declaration sheet. Further details about the changes and availability of the new sheets will be announced in *Radio Communication*.

CLUB CALLS CONTEST
A reminder to Club Secretaries and Contest Managers that the next CCC will be on 11 November. Now is the time to plan your entries for this popular event (all modes including SWL section).

ROPOCO TIMINGS
Judging by the comments from competitors, there are mixed feelings about changing the start and finish times and it seems the majority wish to keep the status quo. The HFCC will decide about this when reviewing the rules for ROPOCO 1.

28MHz CUMULATIVE CONTESTS
By the time this news is published, the next series of these combined CW and SSB events will be starting. Sessions are on 9, 17, 25 October and 2, 10 November. Rules are unchanged from the last set of sessions earlier in the year and were published in Contest News for August.

EMC news

The Chairman of the EMC Committee will announce the EMC Co-ordinators Scheme at the HF Convention at Oxford on 1 October 1989. The organization of the scheme is to provide local contact points for general EMC advice, with the neccessary support from the Committee, Corresponding Members and the EMC Committee members. This service will in the first instance only provide a telephone/mailing contact for advice and will not provide for local visits without authority from the EMC Committee Chairman. It is hoped that a full list of the EMC organisation will appear in the next issue of *RadCom* and the *RSGB Call Book* with a full description of the services provided.

Raynet Zone 2 Election Results

Results of the Raynet Zone 2 election are hereby announced:
Mr W F Marshall G4IOD received 9 votes.
Mrs P M Smith G4ZWQ received 30 votes.
There were 7 spoilt votes.
Mrs P M Smith G4ZWQ is therefore elected as representative for Raynet Zone 2.

Installation of the 1990 President

Mr Frank Hall, GM8BZX, will be installed as the Society's President on Saturday 9 December 1989.

The ceremony will take place after the Society's Annual Meeting. Tickets for the evening dinner are priced £9 per person. Those applying for tickets will be sent a map of Dunoon, in Scotland, together with full details of accommodation if required.

Please mark you envelope 'Presidential Installation.'

Fine Tuning the UK Licence

Last January saw the culmination of two years of work by the DTI and the RSGB aimed at bringing the UK Amateur Licence up to date. Improvements included the addition of CEPT privileges, relaxed identification requirements, permission for digital repeaters, plus unattended beacon operation, direction finding, low-power remote control, and digital communications.

In September this year, the US licence went through a similar change following ARRL and FCC discussions. Some of the improvements to the USA licence were based on those which the RSGB had already obtained in the UK. Of particular importance was the adoption of the UK Government's view that traffic generated by, and intended for, licensed radio amateurs is not Third Party in the sense intended by the International Radio Regulations. This should considerably improve the passing of packet radio messages between US amateurs and those in the rest of the World. This is another example of the RSGB's work having a positive influence on amateurs worldwide.

Despite our general satisfaction with all of the benefits of the new UK licence, there remained a number of areas where further negotiation was felt to be necessary. Accordingly, the Society recently met with the DTI to argue the case for changes, in some cases minor but nevertheless important.

In brief, the Society's requests were for:

1) Clearer numbering of paragraphs
2) Club stations to allow greetings messages from non-licensees
3) Unattended operation to be permitted in various sub-bands in the 430MHz band
4) Clarifying the wording of the sections relating to Unattended Operation
5) Operation by visitors from overseas under supervision
6) Updating the Schedule to reflect the full release of 18MHz and 24MHz bands
7) Better wording for the period of identification requirements when at a temporary location
8) Maximum carrier power to be 26dBW (400 watts) on CW to align with SSB operation
9) Unattended stations for Amateur Radio Direction Finding to be permitted on 3·5MHz and 1·8MHz
10) Validation Document to include list of countries with whom 3rd party messages can be exchanged
11) Changes since last renewal to be noted on Validation Document
12) Incorporate full details of 28MHz equipment restrictions in Notes

The DTI's response to many of these has been favourable and the results of the discussion concerning unattended digital communications can be seen in the News pages. The full list of revisions will appear in a future edition of *Radio Communication* once the DTI have considered our representations further. In fact, it now appears that there will be an annual opportunity to 'fine tune' the new UK licence.

Whatever is finally agreed, there will always be further improvements which amateurs would like to see. Nevertheless, it is a most encouraging sign that our licence conditions are becoming more liberal at a time when pressure on the radio spectrum from other services has never been greater. This is further confirmation that, as far as the UK Government is concerned, amateur radio has a vital role to play in modern society.

David Evans, G3OUF

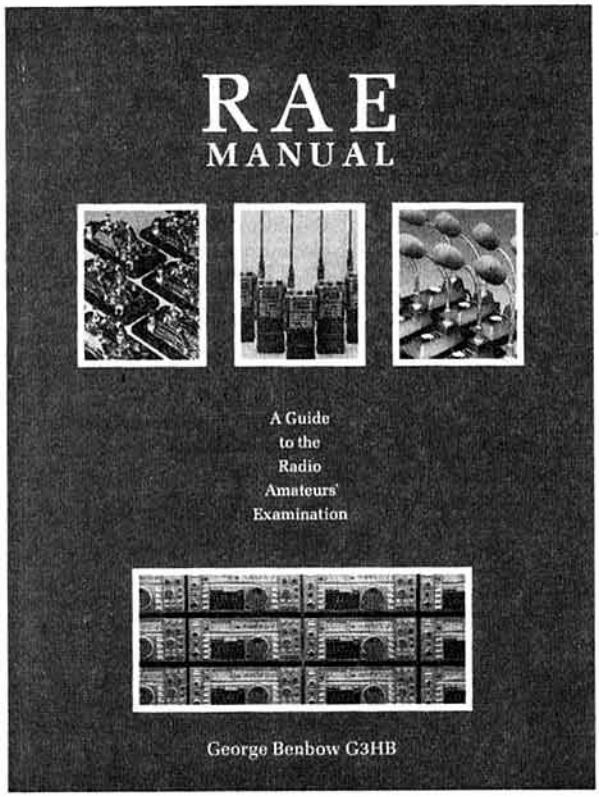
AVAILABLE NOW

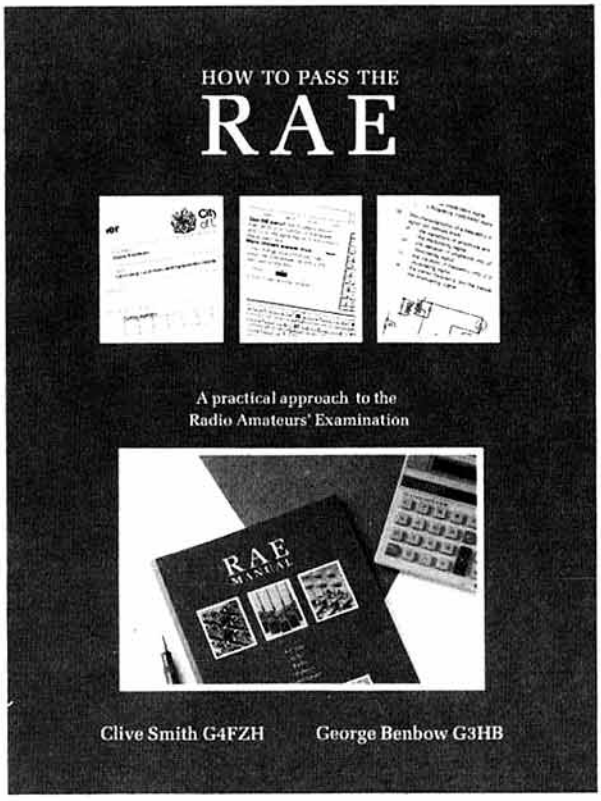
RAE Manual

by George Benbow G3HB

Recognised as the standard text book for the Radio Amateurs' Examination, the twelfth edition has been revised for the 1989-91 syllabus. The book is presented in an easily understandable format taking the candidate step-by-step through the course topics including:
Solid-state devices
Transmitters
Receivers
Power supplies
Propagation and antennas
Transmitter interference
Electromagnetic compatibility
Measurements
Operating practice and procedure

In addition to supplying the candidate with the basic requirements for the examination, this book will continue to be a valuable source of reference long after passing the examination.





How to pass the RAE

by Clive Smith G4FZH
and George Benbow G3HB

Companion volume to the RAE Manual, this book takes a practical approach to the Radio Amateurs' Examination. Chapters explain the nature and correct approach to multiple choice questions and how to prepare for the examination. The majority of the book is given to sample examination papers so that candidates can familiarise themselves with the examination and assess their ability.

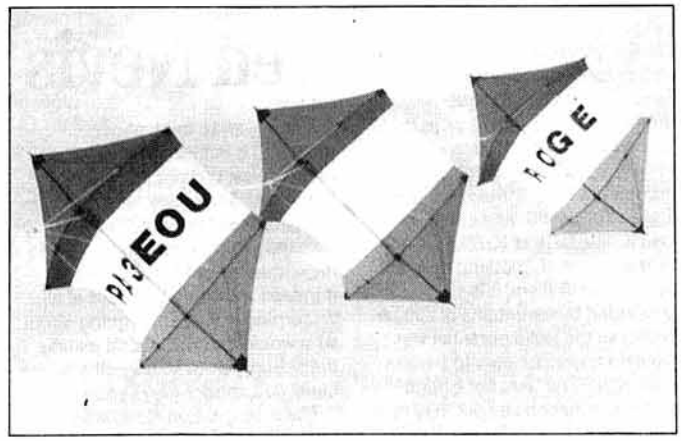
See this month's mail order list for details - pages 45-6

Flying Dutchmen

A new record for kite-borne horizontal multiband HF antennas was recently established by PI4ARA. This is the callsign of a club station in the Dutch town of Almere, which is located about 12 miles east of Amsterdam and – believe it or not – below sea level! An antenna height of 102 metres (334') AGL was achieved and contacts made in the 3·5, 14, 21 and 28MHz bands. Our reporter is Erwin David, G4LQI and ex-PA0CG.

The word 'new' describes almost everything in or about Almere. Fifty-five years ago the entire area was part of the Zuider Zee, a brackish tidal area of water covering much of the northern part of the Netherlands. After having been separated from the open sea by a dyke, the throughput of river water gradually washed out the salt; parts of what is now a lake known as the Ijsselmeer, which were selected for their agricultural potential, were surrounded by more dykes and pumped dry. In this way an entire new province called Flevoland was created, and twelve years ago the new town of Almere was built. In 1986 local amateurs formed a club, 'Amateur Radio Almere' which now has 60 members. Those who live in Almere are mostly young families who are fiercely proud of their achievements and lifestyle, and they're always eager to tell the world about both. As a contribution to a civic promotion which took place in the summer, a local group of kite-flying experts – 'Roge Vlieger Partners' – joined forces with members of the Almere club in an attempt to establish a new record for kite-borne antennas. The occasion would also mark the inauguration of the Almere club's new callsign, PI4ARA.

A 40-metre (131') long coaxial-fed horizontal multi-band 'FD4' antenna (similar to the I7SWX antenna described in the March 1988 Technical Topics on page 186) was to be lifted to an altitude of 100 metres by anything between five and seven kites depending on wind speed and connected to a 100W HF transceiver. This would be operated by Bodhi, PA3EVK, who happens to be blind and would be sitting in a 'wheelchair taxi' with suitable motive power. Bodhi would attempt to make contacts on 80, 40, 20, 15 and 10 metres if conditions permitted. In the Town Hall square adjacent to the field in which the kites would be flown, a tent containing a demonstration station capable of a variety of modes of operation on HF and VHF would enable the public to follow the HF contacts made by PI4ARA, together with the 'command and control' net used by the kite crews. Overall co-



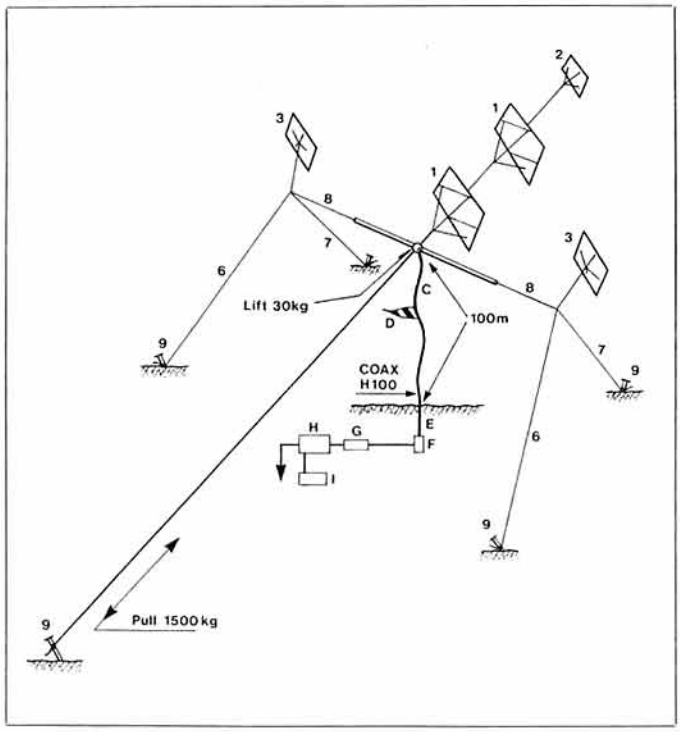
ordination was in the hands of Huub, PA3EOU, who had obtained permission from the National Aviation Authority to fly kites up to 200 metres AGL. He also had to defend his all-day reservation of the town hall square against a national political party who wanted to hold an election rally there!

Several rehearsals were held, and in the course of one of them a 144MHz ground-plane had been operated at the top of 100 metres of low-loss H100 cable. Since this is quite heavy, it had helped in stabilizing the kites and was therefore used for the HF antenna as well. The kites used were hexagonal 'Sanjo' models; those which raised the coax were 7.5 sq m (81 sq ft) in area and 5 sq m (54 sq ft) for the 'side kites' holding up each end of the antenna. A smaller 'pilot kite' was used to raise the stack of 'coax lifters' out of the lee of surrounding buildings. The tether of the main stack consisted of 6mm nylon rope.

The great day dawned, but unfortunately the omens were anything but good. When the crew arrived on site at 7am there was no wind whatsoever. However, there was plenty of rain and fog! Not even the unweighted pilot kite would stay airborne. By mid-morning a breeze was beginning to blow but a thunderstorm was then reported to be nearby; all operations had to be put on hold for obvious safety reasons. After that, the wind dropped again! In the meantime, some contacts were being made from the demonstration station to keep the public interested; an HF antenna was strung between some suitable lamp-posts.

Finally, well after noon, the wind picked up to a whopping 9 knots. This was well below the design value for the kites of 11-15 knots but it seemed worth a try. Three of the big kites were rigged in tandem; commanded by the 'pilot' they rose to 100 metres AGL on 200 metres of tether, half of which was then walked back down. The balun with coax attached was then hooked on to the tether at the half-way point. Similar operations were carried out with the ends of the antenna and their kites.

The coax was paid out slowly and the tethers were manoeuvred to stabilize the antenna at 50 metres. PI4ARA was now in business! More coax and rope was released in stages and the tethers were continuously adjusted to keep the antenna straight and level. However, the height of 100 metres which we wanted for the *Guinness Book of Records* seemed to be just out of reach in the existing wind conditions. It was decided that drastic measures were required, and an extra kite was run half-way up the main tether (which was now 350 metres long) in order to carry some of its weight. That did the trick; at 6.06 pm the balun was reported to be 102 metres AGL and we had a new record. The excellent HF performance, with strong 3·5MHz signals all over Holland and Belgium and some super DX on the higher bands (including a KH6 on 28MHz in mediocre conditions) seemed to be almost an anti-climax!



Kite-borne FD4 antenna as designed for winds of 11 — 15 knots.
KEY
1. Main "coax lifter" kites 2. Pilot kite 3. Side kites lifting antenna ends 5. Main tether 6. Tether for side kites 7. Aux. lines to keep antenna level 8. Nylon antenna extensions 9. Ground anchors.
A FD4 multiband HF Antenna B. Balun C. Coax D. Flag at 50m point E. Coax extension to transceiver F. ATU G. SWR meter H. 100W transceiver I. Car Battery

144MHz from Ben Nevis

Active mountaineer and keen amateur John Linford, G3WGV and his friend and colleague Tony Gledhill, G6MCI - both of Reading & District Amateur Radio Club - came on the air from the top of Ben Nevis on 5/6 August 1989. John sent in a short piece about their exploits, which makes interesting reading for those of us whose idea of a DXpedition is taking a handheld with them on a walk to the local...

Ben Nevis, Britain's highest mountain, was on the air over the weekend of the 5th and 6th of August. The Ben, at IO76LS, is on the west coast of Scotland near the town of Fort William; it is surrounded by mountains of similar stature, so the radio potential was unknown and suspected to be rather poor. The "Roof of Britain" station was manned by G3WGV and G6MCI, in what is believed to be the first time a full-scale 144MHz station has operated from the summit.

The basic idea was conceived after drinking too much of the local brew one evening. The task would be to get 25W of SSB/CW with a reasonable antenna, sufficient battery power and the necessary survival equipment to the top of the Ben, using the combined carrying capacity of two people. In the end this necessitated both of us carrying loads of about 60lb each. The equipment line-up included an FT290 and 25W Microwave Modules amplifier, a 9-element portable Tonna with UR67 feeder and a 20' telescopic mast. The heaviest item of all was the battery, which for 12V at 24Ah weighed-in at 18lb. In addition, a 'Force 10' tent and full camping and survival gear including some 15lb of water were carried up the 4406' mountain.

Prior to the event - which was organised literally at the last moment - some attempt was made to publicise the expedition by sending a message over the packet network to 'ALL' in the UK. We were too late even to think about including it in GB2RS news! The drive to Fort William, the nearest town, took some nine hours and we pondered the fact that it would only take the radio signals about 2ms to make the return trip to IO91-land - if indeed we would be heard at all. A morning was spent arguing about who would carry what and testing the set-up before setting off into the blue (well, murky-grey) yonder.

The route up Ben Nevis was straightforward enough. There used to be an observatory at the top, and a good path has been made from the nearest access road to the summit. However, it still took about five hours to cover the five miles to the top. You should have seen the looks and heard some of the questions we got from others on the way up! Once on the top, the next problem to overcome was how to pitch our tent - given that there is not a scrap of grass anywhere above the 2000' contour. Ben Nevis was volcanic and the summit is covered in rocks of all shapes and sizes - but no grass. A slightly less lumpy section about 50' away from the trig point on the summit plateau was chosen, and by dint of pieces of string and pieces of rock the tent was persuaded to stand up. Fortunately it wasn't too windy since otherwise we would have emulated GB2CAN/AM and taken off! After that, putting up the 9-element Tonna was very simple and we were soon on the air calling "CQ from Britain's highest radio station".

Operations began at 1745 on the Saturday, with a real DX QSO with GM7CMC/P, who turned out to be staying at our 'base camp' in the valley below! However, we were soon getting calls from further afield, helped by the (hitherto unknown to us) low-power contest going on. I think we gave a few stations a rather nice bit of DX from an unusual square. The going was fairly slow, though, and we felt decidedly out of things compared with operating in the Reading area. By 0100 we had run out of people to talk to, having worked about 20 stations down as far as Lancashire and Northern Ireland. So we decided to get some sleep and see what the morning had to offer. But almost as soon as we had settled down, the rain started! There was torrential rain all night but the tent did its job and we remained nice and dry. Believe it or not, we were woken by noises suggesting the distinct prospect of some competition. Some other mad amateur had come up to the summit (at 8am, no less) and was tuning around with a 50MHz handheld. I was so surprised that I didn't even get his callsign; I suppose it must have been a bit of a shock for him too.

The morning brought much better conditions than those of the previous day. We could now hear GB3VHF at Wrotham at a steady S2, so all we needed was some activity - and that's precisely what we got. There was a steady stream of calls from as far south as Northampton and Birmingham, and in the course of an interesting few hours we managed to work G, GW, GI and GD as well as a large number of GMs. We even got a mention at the end of one of the GB2RS broadcasts, which resulted in quite a pile-up for a while. Sadly, the lack of other publicity probably meant that we didn't get calls from the far south, where we would have been rather weak and missed by most. But we did hear some Frenchmen - too weak to work but undeniably there.

We were expecting battery power to be the limiting factor but this proved not to be the case. By 1500 we had to start dismantling the station in preparation for the long haul back down the hill, but the battery was still going strong. We could have run more power after all! The descent was somewhat quicker but no less exhausting with the heavy loads. We got down in time for a necessary shower, followed by some much-needed refreshments at the Nevis Bank Hotel.

In all, we worked about 100 stations; we would have worked many more if we had made any attempt at publicity beforehand. The location was clearly unusual, since it appears that many people take handhelds up the Ben but it is generally considered too much of an undertaking to carry a full station to the top. In this respect, it must be admitted that both of us felt after the event that we were probably carrying just about the maximum weight that either of us could safely manage - and that only because we are active mountaineers as well as radio amateurs.

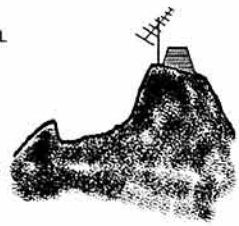
It should perhaps be stressed that it is not a trivial undertaking to climb mountains carrying such loads - nor to ensure survival in potentially wild and dangerous mountain conditions. Experience is definitely needed in general mountaineering and backpacking before considering an expedition such as ours. At least as much planning effort went into these aspects as into matters relating to radio. It would be rather embarrassing (to say the very least) to become a mountain rescue statistic whilst playing radio from some windswept hill-top.

A special QSL card has been produced and sent to all those we contacted. Now all that remains is to work out what to do for an encore!

IO76LS **GM3WGV/P** NN17

The Ben Nevis Expedition

Ben Nevis is Britain's highest mountain at 4406' ASL and is situated close to the town of Fort William in the Western Highlands. The only access is by a path built to service a now derelict observatory dating from Victorian times. The Ben carries snow all year round.



73 de _____

To _____

Confirming our QSO

On 144 MHz SSB

At _____ Z, 5/6 Aug '89

Report _____

TRX FT290+MM linear

Pwr 25 W

Aerial 9 ele Tonna @ 20'

Operated by Members of

Reading & District Amateur Radio Club

Special QSL card produced for the Expedition

Radcom Postal Survey

Please help us to conduct a survey into the delivery of *Radio Communication*! We have received a number of Complaints that *Rad Com* has been unnecessarily delayed in the postal system, and we are endeavouring to find out just how long it takes for you to receive your copy. Once we have this information, we can then go to the post office with hard evidence to back our suspicions.

To help us to gather this information, please would you write on the address label, the day and date which you received the October issue of *Rad Com*. Please mark your envelope "RADCOM POSTAL SURVEY".

GB400LIZ – QSL Cards

Due to an administrative problem some QSL cards for the operation of GB400LIZ In July 1988 were returned by the bureau as invalid. Anyone requiring cards for this operation is asked to apply directly to Mr LE Wilkes G3KJK directly, enclosing a stamped addressed envelope.

News from Waterloo Bridge House

At a meeting on 17 August, the Society and the DTI discussed the Novice Licence; the Department appear to be enthusiastic to progress matters. Initial discussions centred around the licence document. The Society is producing a first draft, which it will have sent to the DTI by the time this is read. We are also undertaking work on the Novice Licence course and examinations.

Following representations from the Society, a number of improvements are likely to be made to the amateur licence with effect from 1 January 1990. These will include the availability of 1299-1300MHz for unattended digital communications. Also of interest to packet enthusiasts will be the addition of two frequencies at 70MHz and also 432·675MHz to those available under the mailbox Notice of Variation system administered by the Society on behalf of the DTI. This should have the effect of lessening the processing times for applications for mailbox ports on these bands, and will also help reduce congestion on 144·65MHz.

WARC in 1992

A recent ITU Plenipotentiary Conference has scheduled a full World Administrative Radio Conference for the first quarter of 1992. The last full WARC took place in 1979 and led to the allocation of 10, 18 and 24MHz to the amateur service, amongst other things. A full agenda hasn't yet been set, but the American Radio Relay League (ARRL) thinks that some clues to what's on the cards are contained in the conclusions of recent WARCs dealing with the HF broadcast bands and others. The HF WARC in 1987 and the Mobile WARC in the same year referred to the possibility of extending the amount of HF spectrum allocated exclusively to the broadcasting service and revising allocations between 1 and 3GHz for mobile and space use. ARRL seems to be taking the view at this stage that the amateur spectrum in most jeopardy are the portions between 3 and 30MHz, 500MHz and 3GHz and everything above 12.7GHz.

Obviously the RSGB will be working hard on preparations for WARC 92 and we'll keep you posted in these pages.

£927 raised by Wimbledon club in appeal

On 23 April - which was of course St George's Day - Wimbledon & District Amateur Radio Society ran a special-event station, GB0SGH, at St George's Hospital, Tooting, in aid of the NMR Scanner Appeal. The station raised £927 in sponsorship, which was presented to St George's Hospital Medical School at the Club's Annual Summer Camp in Chessington.

The photograph shows (L to R) David Whiteman, G1ADW, W&DARS Chairman; Nikki Browne, the Bursar of St George's Hospital Medical School; and Jim Todd, G4XLM, the W&DARS Treasurer.

You never know where you'll meet one

Neil, G8XYN and Roy, G4XYN, were recently travelling from the Soviet Dar East city of Khabarovsk to the Siberian city of Irkutsk, near Lake Baikal. The 2,200-mile journey on what is often (and inaccurately) known as the Trans-Siberian Railway took two and a half days, and the carriage attendant for the journey turned out to be Michel, UZ3TZ. Michel comes from the city of Gorky and is a keen member of the UZ3TYA club contest station. His normal work-load is two weeks on, two weeks off, but he said that he was working solidly throughout the summer so that he could have the autumn free for the Russian contest season!

The Trans-Siberian rail journey takes seven days to travel between Moscow and Vladivostok. Michel made a request to the railway authorities to be allowed to set up an amateur radio station on the train; unfortunately this was not forthcoming, although he said that permission would be given for a special occasion. Neil and Roy were the first radio amateurs Michel has met on his train - they hope to be able to make contact with him later in the year when he returns to Gorky.

All foxed up

A silly article by a normally sensible journalist appeared in the 19 August edition of *New Scientist*. With the sensational headline 'Radio hams eavesdrop unchecked on cell phones' (wish we could write headlines like that and get away with it) the piece said '...Cellnet, controlled by British Telecom, and Vodafone, owned by Racal, started offering a cell phone service in January 1985 on the 900MHz waveband. Licensed radio enthusiasts or "hams" soon found that they could easily listen in... Hams know that the Wireless Telegraphy Acts carry heavy fines and jail sentences for misuse of the airwaves'. And so on and so forth. Written by Barry Fox, a freelance whose work we normally have a lot of time for - he's the scourge of some of the dafter claims of the hi-fi and satellite TV fraternity - this was a very good example of sloppy non-journalism.

Memo to Mr Fox. Most of those using scanning receivers to listen to various interesting things aren't 'licensed radio enthusiasts'. The proportion of 'licensed radio enthusiasts' who have receivers capable of listening to cellular radiotelephones is probably a tiny fraction of one per cent. The usual word for a 'licensed radio enthusiast' is a 'radio amateur'; the average British amateur uses the word 'ham' for something he eats in a sandwich. I don't have sales figures handy but there must be hundreds of scanning receivers sold every year in the UK. The vast majority are bought by people who like to listen to anything they can find, and you don't need a licence to own one. Oh, and as a matter of fact there are very few scanners on the UK market which will receive what you quaintly refer to as the '900MHz waveband'. The MHz is a unit of frequency, not wavelength; perhaps you should have called it the '33 centimetre waveband'.

Memo to all journalists. Next time you feel like writing a story like this, why not pick up the phone and check your facts beforehand? That way you don't risk blowing your credibility and alienating 50,000-odd radio amateurs at once. We're on 0707 59015.

(Editorial note:
Upon contacting Mr Fox and amidst a certain amount of embarrassment, we were told that the errors were due to '... heavy sub-editing...'
— a complimentary copy of RadCom *goes to Mr Fox for the quote of the month!)*

Amateur radio helps in rescue

Elsewhere in this issue you'll find a little item about how two intrepid gentlemen operated from the top of Ben Nevis. We stay in the hills for another piece, which was sent in by Michael Marsh, G4GGC; hope you're sitting comfortably...

The day started normally enough, although it must be said that the weather was fine, hot and sunny, which is perhaps not so normal for the Lake District! A group of six schoolchildren all aged 15 or 16 from Sudbury in Suffolk set off from Little Town, near Keswick, with two members of staff for a day's fell-walking in the Derwent Fells area. A similar group from the same party had started from Buttermere, and they were all planning to meet at Dale Head Tarn for lunch.

By early afternoon both groups had achieved the summit of Dale Head at 2473' ASL and were making their way down to the tarn. The temperature was high and everyone was hot and sticky, looking forward to a dip in the cooling waters of the tarn below. The ground was stony and steep and a couple of the girls had already slipped and sat down rather more firmly than anticipated. Suddenly one of the boys - perhaps moving a little too fast - also slipped and fell awkwardly, knocking his arm, shoulder and head on some rocks. As soon as help arrived at his side it was quite apparent that he had broken his arm and would need rescuing from the hillside.

One of the staff was the author, who had borrowed an FT202R handheld to take on the trip with him for just such an occasion - plus, of course, the ability to chat to local amateurs in the area. I climbed back to the top of Dale Head (since a valley in the Lake District is not particularly conducive to getting out very far with a QRP handheld) until the town of Keswick appeared in the distance and then started calling 'CQ Emergency' on S20. Unfortunately no-one came back; presumably every amateur in the area was out enjoying the lovely weather. Eventually, having got right back to the top of the hill, my calls were answered by a weak signal from G6VGH/M. Ivan had left his camera in the car and had gone back to fetch it, only to discover that he had left his rig switched on. As he leant over it to switch it off, he heard my call for help.

Map references and details were passed to G6VGH, who fortunately had a radiotelephone in his car; unfortunately it wouldn't work in the narrow confines of the valley where he was located! Instead, Ivan set out to find a telephone with which to summon help. Since both of us were running low power, communication between us was difficult as Ivan drove from his location near Buttermere up through the Honister Pass with steep overhanging cliffs on either side. To me on top of the hill awaiting developments, time seemed to be standing still. It must have been even worse for the injured lad and the group with him, who - being well down the mountain from where I was - were out of contact with what was going on. In the event Ivan came across some members of a Mountain Rescue Team working at Gatesgarth before he found a telephone, and they quickly swung into action. The Team leader was able to confirm details with myself directly by radio, thanks to the lifting of restrictions in the licence which now permit such an interchange to take place. Incidentally, the Team was quite impressed with the communications which were made possible by amateur radio, despite the simplicity and low power of the equipment being used at both ends of the contact.

As the Mountain Rescue Team assembled at Honister Hause Hostel at the top of the Pass, they were joined by another; in fact, both Keswick and Cockermouth teams were involved since the incident was on the borders of both their areas. A doctor in the team checked the details with myself before setting off up the hillside on the rescue mission with his fifteen colleagues. The need for such a large number was to become apparent later. By the time I had got back to the scene of the injury, three of the advance party of rescuers had already arrived and were comforting him and dressing some of his wounds. A few minutes later the rest arrived with the doctor and the rescue stretcher, on to which the patient was strapped. The doctor suspected a fracture of both the radius and the ulna and gave the boy a shot of morphine to ease the pain; it also did something to allay the discomfort of the rather bumpy trip which was about to start.

By now it was about 90 minutes since the accident had occurred. Shouldering the stretcher's carrying straps, the party moved off down the mountain. In the heat of the day, even the best porters would only carry the stretcher for a few minutes before changing with other members of the team - hence the reason for the large number of them. When the slope became steep enough, however, the stretcher was slid down on its runners like a sledge. Soon everyone arrived at the topmost point of Honister Pass, where the Mountain Rescue ambulance was waiting to take the patient to Keswick hospital.

From Keswick, the lad was transferred to the Cumberland Infirmary at Carlisle. X-rays showed that only the radius was fractured, although in a difficult direction, and there was some dislocation of the wrist. By midnight the bones had been reset and plaster applied; he stayed in hospital for a further two days before being taken home to Suffolk. He is continuing to make progress.

Sincere thanks are offered to the Keswick and Cockermouth Mountain Rescue Teams for their swift and efficient action in the rescue, and also to G6VGH for his help, both with communications and in finding the team in the first place.

Ohm's Law repealed?

No, you haven't picked up the April edition by mistake, but you won't believe the following story. As of 0001 UTC on 1 January 1990, the values of the standard volt and standard ohm will change. The USA's National Bureau of Standards is altering the value of the standard volt by a whopping 9.2 parts per million, whereas the standard ohm will change by a mere 1.7 parts per million.

Apparently there are two reasons why the NBS is making the changes. Believe it or not, there are actually four standard values for the ohm and the volt currently (ouch) being used in the world; after the adjustment in January, however, there will be only one. The other reason is that the last time the values were adjusted - in 1972 - someone blundered and got them wrong!

We kid you not.

Central Lancs at Leyland

3 June was a day to remember in the history of Central Lancs Amateur Radio Society. It was the day of the Leyland Festival - one of the largest annual festivals in the UK. 1989 was also its centenary, and CLARS was requested at short notice to run a special-event station. Although this coincided with the club's NFD, it was decided that both events could be managed - and the Festival turned out to be very successful.

The RSGB allocated GB0LCF and John, G0JSM; Berni, G0EHW; Shaun, G7AFH and Jeff, G7BWD handled all the organisation. Two HF stations and a VHF station were put on the air; the main antenna was carried on a 100' tower kindly loaned to the Club by the North West Water Authority. More than 300 contacts were made with over 30 countries. One of the more interesting ones was with an amateur in Kenya whose home QTH was no more than a mile and a half from the site of the special-event station. The Club also arranged to make contact with Leyland's twin town in Germany. This allowed the Mayor of South Ribble, Councillor George Woods, to exchange greetings with the Burgomeister of Schleswig-Flensburg, Kriespresident Andreas Franzen. The German operator at the other end of this contact was Johannes Hassler, DK4LU.

Sidebands

- GB3MB, one of the Manchester VHF repeaters, will be running low power until early 1990 owing to duplexer problems. MB is on channel R0. Further info from G8NSS.
- Two repeaters are back on the air - GB2SA in Swansea on R3 and GB3NX in North Sussex on RB2.
- We hear that 50MHz permits are likely to be issued in Belgium and Luxembourg - watch this space. Also, Band I television is shortly to bow out in Spain.
- A few tickets for the joint RSGB/Royal Meterological Society meeting on 20 October were still available at presstime - get yours from The Secretary at HQ, but first come, first served.
- The 1990 *Call Book* should appear in time for the 1990 Convention on 21/22 April 1990.
- The new QSL manager for the G4AAA to AZZ and G4HAA to HZZ series is Mr R Morshead (G0AEQ), 4 Osmans Close, Bracknell, Berks, RG12 6PX.
- New QSL bureau sub-manager for G0MAA-G0MZZ is Mr R Veale, G4LEA; his address is 6 Grantson Close, Brislington, Bristol BS4 4NA.
- RSGB expects to introduce direct debit facilities for members' subs early next year. If everyone paid by this method, we'd save about £5000 a year.
- Don't forget the 'EMC Hotline' on 0329 239644 if you need fast advice with EMC problems.

Cheaper South Atlantic awards

Last month we mentioned three new awards - the South Atlantic, the Ascension Island and the Air Bridge - and quoted some costs. We hear that the administrators of these awards have revised the charges slightly; applications for each award must now be accompanied by 10 IRCs, US$5 or £2.50. The address is still Awards Manager, PO Box 2, Ascension Island, South Atlantic.

WAB news

To coin a cliche, ZS6XJ has really swept the board on 50MHz. Conditions to South Africa were very good last winter and ZS6XJ has won several WAB awards at once - all of which are firsts for stations operating outside the UK on 50MHz. First of all, he gained the Overseas Introductory Award for working 25 areas and 10 counties. Then he took the Basic WAB Award for working 50 areas, followed by the WAB Bronze Award for working 100 areas. He is also the first non-UK station to gain the Counties Award for working 55 counties on 50MHz, together with the first Overseas Bookholders award for working 100 of them. In recognition of this outstanding achievement, ZS6XJ has also been awarded a Certificate of Merit.

Since conditions on 50MHz this autumn and winter are expected to be even better, WAB hopes that all British stations will give their WAB area when working the DX and also put it on their QSL cards.

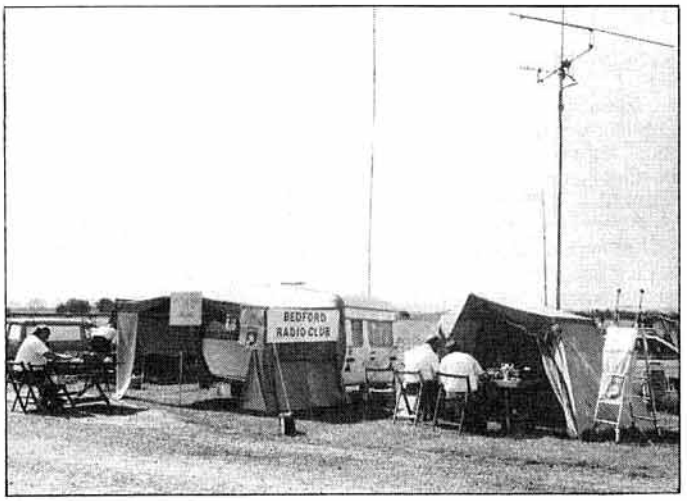
This would seem to be a good point to mention this year's remaining contests, which include a 50MHz event. Contest rules and log sheets are available from the WAB Contest Manager, who is Ian Webb, G6TNW. His address is Cornerways, Orchard Road, St Neots, Huntingdon, Cambs PE19 3AN. Please send an SASE (9" × 4") and three first-class stamps if you require log sheets. Remaining contests are 50MHz Phone on 8 October between 0900 and 1200 GMT, LF CW on 5 November from 1400 to 1800 GMT and the HF Mixed Mode on 12/13 November 1200 to 1200 GMT. Note that UK stations may operate for a maximum period of 9 hours.

Other WAB firsts this month are SWL Roger Sheppard, who received the 90 and 100 Overseas Bookholders heard; G0GQR, who has worked 10 Overseas Bookholders on 3·5MHz; and G1NRM, who has claimed the first Bookholders Award for 430MHz having worked 100. He was also the first to work 100 3rd-series bookholders on 50MHz.

Information about WAB matters may be obtained from Brian Morris, G4KSQ at 22 Burdell Avenue, Sandhills Estate, Headington, Oxford OX3 8ED. Incidentally, the new and fully-revised Fourth Series WAB Book is now available from G4KSQ at a cost of £7 including postage and packing.

Correction

On page 16 of September's *Rad Com* we gave details of the modular kits available from Jandek. Unfortunately, a couple of bugs crept in, and G3ZOM has asked us to point out that Jandek's correct telephone number is 0384 288900. Also, if you're writing for details, please enclose an SAE.



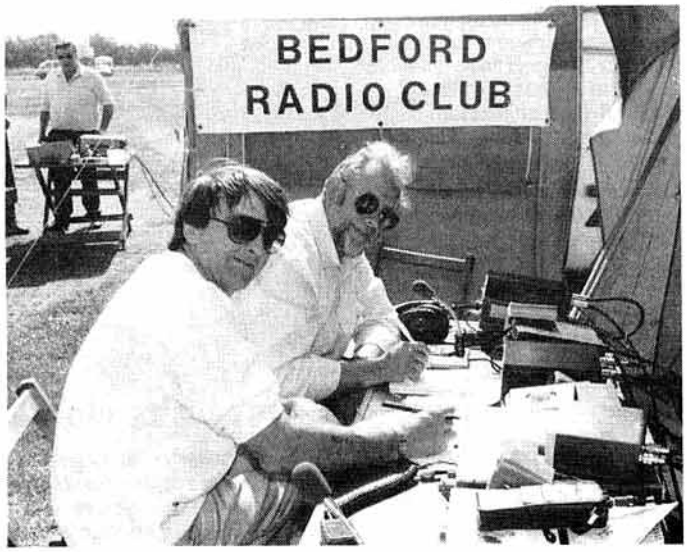
GB2ATC at RAF Cardington - caption to pic

The Royal Air Force station at Cardington, near Bedford, is famous for the large airship hangars which still dominate the local skyline. Cardington is known to countless RAF personnel who passed through its gates in the 1940s and 1950s, and on Saturday 15 July it was the venue for an 'Air Rally' to mark the fiftieth anniversary of 134 Squadron Air Training Corps which is based at Bedford.

To commemorate the anniversary, the rarely-used grass airfield was made available and more than 100 light aircraft flew in from all over the UK. Over 10,000 visitors were treated to a flying display which included a pass by the 'Red Arrows' a display by the RAF Memorial Flight with their Lancaster, Spitfire and Hurricane, a Gloster Gladiator and a parachute descent by members of the Metropolitan Police Parachute Team.

Members of Bedford & District Amateur Radio Club manned the special-event station GB2ATC, mainly on 7MHz. A number of those with whom contact was made had spent part of their RAF life on the base. In addition 50 and 144MHz were used, with demonstrations of packet and satellite communication via contacts with the USA and Japan. Club members were kept busy explaining amateur radio to a steady stream of members of the public. Amongst these the Club was delighted to discover some ex-WT Ops and Signallers whose interest was immediately re-kindled at the sight of a key!

The Club wishes to apologise to those who could not be pulled out of the pile-up and to thank those with whom their members had a few moments of nostalgia. They would like to remind readers that the Bedford club will be on the air from RAF Cardington again on 3 September with the callsign GB2WW to mark the 50th anniversary of the outbreak of the Second World War; they'll also be on again from the same site on 14/15 October with the callsign GB0IOI to commemorate the launch of the ill-fated R101 airship sixty years ago.



Operating overseas?

New legislation introduced by the Government of Greece now allows visiting radio amateurs from EEC countries to operate portable and mobile stations for up to three months. No further formalities are required for holders of licences issued in line with CEPT Recommendation T/R 61-01. The permitted transmitter power is 'not greater than the limits specified for Greek amateurs' and only frequencies allocated to the amateur service in Greece can be used. The callsign to use is of the form SV/own call/M or SV/own call/P. (Tnx G3FNJ - more info from MSD if you need it).

New Zealand has recently introduced new regulations allowing visiting UK licensees to operate on bands above 144MHz using handheld equipment only without the need for prior permission. Again, MSD has full details.

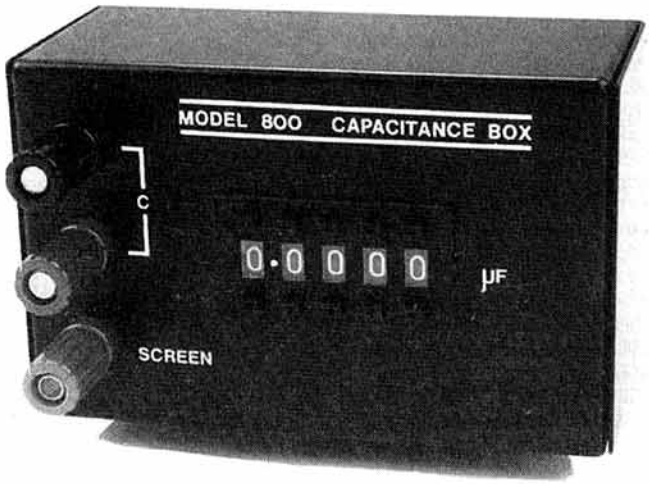
Finally, a reminder that the DTI has asked UK amateurs not to operate in Turkey under the terms of the CEPT agreement for the time being. More news soon.

Straight Key Day 1989

The third RSGB Straight Key Day will take place on Saturday 14 October 1989. Because of the poor conditions on 3·5MHz last year and the need to ensure communication between participants from both north and south of the UK, it has been decided to use the 7MHz band for this years' event.

Operation between 7010 and 7030kHz is suggested, with QRP stations staying close to the higher frequency. Start and finish times are 0900 to 2000 GMT, which should give enough time for propagation to be useful to all areas of the UK.

Remember that this is not a contest - the only requirement is to be active with a straight key and to demonstrate your skills. Information giving the other participants some details of the key you're using should be passed. Once again, the HF Committee will be interested in seeing any pictures of the keys used, and would also like to have nominations for 'Best Fist'. Please send comments and pics to G3VTT QTHR. A small prize will be awarded to the owner of the 'Best Fist'.



New products

Want a new front-end for your IC202? Well, muTek is now producing the RPCB202ub, which is a complete replacement front-end for any of the '202 series. The press release says that it "...has a signal path designed for minimum noise and high dynamic range. A low-loss nitrogen-filled relay replaces the diode antenna switching system used by the manufacturer. This is followed by a very-low-noise RF amplifier using a modern silicon dual-gate MOSFET. The noise figure of this device is of the order of 0.6dB. However, since this order of sensitivity is unnecessary for terrestrial communications where the limiting factor is external noise, the design trades some of the noise figure for extra dynamic range. Following the RF amplifier, a very high-performance three-pole Tchebyshev bandpass filter provides image rejection and feeds the mixer via a resistive pad. Considerable care has been taken to ensure that the mixer terminations are adequate, since failure to do this will result in a considerable degradation of potential mixer performance. A high dynamic range MOSFET amplifier with negative feedback follows this mixer and is also matched for low noise. The output from this stage drives the original crystal filter and noise-blanking circuitry'.

Sounds just the job for owners of the IC202, which is still admired for one of the cleanest transmitted signals on 144MHz (other manufacturers please copy). muTek quotes the following spec; noise figure 1dB, image rejection 70dB, intermod-free dynamic range better than 90dB (one tone of two to generate a third-order product at 0dB wrt noise floor) and 0.5μV for an S9 signal.

muTek are at *PO Box 24, Long Eaton, Nottingham NG10 4NQ.*

HRS Electronics sent us a colour brochure and spec of the new Ten-Tec Omni V HF transceiver, which looks exceedingly posh. They said that "In the interests of first-class receive performance, Ten-Tec has combined the advantages of the crystal mixed oscillator with the convenience of all the digital features, the result is a transceiver which is amateur bands only with superior phase-noise performance, dual VFOs, 25 memories, fast and slow tuning and many more features."

More info from Fred Rendell at HRS Electronics on 021-789 7575, or fax them your order for one on 021-789 8040.

Something we haven't seen for years is a 'resistance box'. Maplin have now got one available, and very nice it looks too - wish they'd sent us one to play with. It'll produce any resistance you like between 1Ω and 999,999Ω in 1j steps; you select it by pressing push-buttons and the value is displayed on the decade switches in ohms. In the Maplin one they've added the clever touch of providing an additional 1kΩ resistor between one of the terminals of the resistor network and a third stand-alone terminal. This means that the box can be used as a very accurate potential divider.

Get yours from Maplin for £79.95 - stock number is JL63T.

There's also a five-decade capacitance box, which will do 100pF to 9.9999μF in 100pF steps - this one costs £89.95 and the stock number is YT55K.

Mayor visits club

This photo (taken by Ray Knighton, G0GER) was taken when the Mayor and Mayoress of Wyre, Councillor & Mrs R C Williamson, and some members of their family visited Thornton Cleveleys Amateur Radio Society during its 20th anniversary celebrations. It shows the Mayor accompanied by TCARS chairman John Ward, G8YOK, listening to the HF station operated by Roy Ellison, G4WYF. Also seen listening (l to r) are Ricky Johnson, G4XNM; the Mayoress; Harry Shepard, with Mayor's daughter in front; Arthur Pilling, G0DCM; the Mayor's son; and Ian Cobbe, G3ZRZ.

New VHF records

We gather from the excellent *Westlink* newsletter that four new world VHF/UHF DX records were established last July. Between the 13th and the 15th of July, Paul Lieb, KH6HME on Mauna Loa Volcano in Hawaii and Jack Henry, XE2GXQ in Baja established new records for 144, 220 and 430MHz and 2.3GHz. The new 144MHz record of 2,659 miles was set on 13 July at 1046 by Paul at Mauna Loa and Jack at Rosario, about 640 miles south of San Diego. Reports of 5 and 2 were exchanged on SSB. KH6HME was running 80W to a pair of 7-element stacked Yagis and XE2GXQ ran 160W to a single 18-element Cushcraft 'Boomer'.

The 430MHz record was established on the following day at 1547, with a distance of 2,573 miles between the two operators. On the same day at 1754 the 2.3GHz record was broken by a contact between the two stations at the same distance. The Hawaiian station ran 10W to four vertically stacked loop Yagis. The 220MHz record was established at 0755 on 15 July. Congratulations to all involved.

Famous callsign reissued

As of 1 August 1989, the Appledore & District Amateur Radio Club's callsign became G2FKO, latterly the callsign of Mr Tom Ward. Tom was a very well-known local amateur who sadly passed away earlier this year; he was always keen to assist new clubs and amateurs in the area and was prominent in RTTY and computing circles. It was one of his last wishes that the local radio club should take over his old callsign, and the Appledore Club is very honoured to keep G2FKO on the air.

Want an American ticket?

There will be a testing session for the issue of American amateur radio licences (should that read 'licenses?') in London on 25 October. Examinations will be offered for all classes of licence, from Novice to Amateur Extra Class, and you don't have to be American; anyone can apply. A Stateside callsign would certainly be useful if you visit the USA often - it'd save having to renew your reciprocal licence every time you go - and would also give you access to reciprocal privileges which aren't currently available to UK licence-holders, such as the ability to operate in Japan. The test costs $4.75 or the sterling equivalent, and examination preparation material is available from the Membership Services Department at RSGB Headquarters. The written tests are multiple-choice and you'll need to know some CW for all American licence classes - for a USA novice licence you need a whopping 4 wpm!

Further information is available from Robert Wright, G4XDD/NV3Y, on 01-221 4399 during the evenings.

Sussex Fair

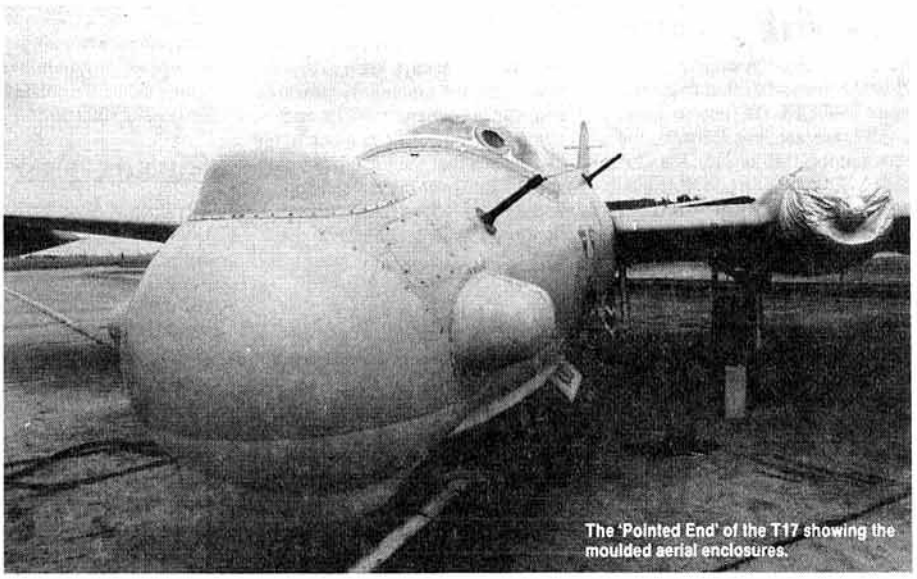
The Sussex Amateur Radio & Computer Fair took place on 16 July at Brighton Racecourse. Talk-in via GB2SMR started at 0800, and 148 mobile stations requested directions during the day; almost 2000 people attended overall.

The Rally Committee wishes to apologise to those who made the only complaints of the day, which were concerned with the catering arrangements. The Committee mentions that the catering concession is granted by the managers of Brighton Racecourse to Messrs Letheby & Christopher as sole on-site concessionaires; outside caterers are not permitted and the caterers make no donation or other payments to the Rally Committee. Discussions will be taking place to try and ensure that complaints do not arise at future rallies.

This nice pic was taken at the recent wedding of Chris Dunn, G4KVI, controller of the Mid-Thames RAYNET group.

Those standing are, from left to right: Gerry Hussey, G4PGZ; John Hughes, G4KGT; Mike Edmounds, G0DNJ; and the bridegroom, G4KVI; the bride, Fiona (an SWL); Dennis Sharley, G4XGK; and Matthew Cabban, G1WPF. Seen sitting L to R are the groom's father, Len Dunn, G6DOV; and Ray Caws, G3BRL.

When not courting the bride, Chris has been very active on the radio. He obtained his licence soon after his 16th birthday and quickly became involved with RAYNET; he has also helped John Hughes with JOTA nearly every year. We wish bride and groom health and happiness and lots of harmonics.


The 'Pointed End' of the T17 showing the moulded aerial enclosures.

ELECTRONIC COUNTER MEASURES

John Nelson, GW4FRX, goes behind the scenes to visit the RAF's 'QRM Wing'

You may remember that history was made a few months ago when - with the blessing of the DTI - an airborne special event station came on the air from a Royal Air Force Canberra aircraft whilst it was carrying out a routine training mission. GB2CAN/AM was marking the 40th anniversary of this classic aeroplane, and a great success it was too. To many radio amateurs, however, the normal task of 360 Squadron - which operates the Canberra T17s and T17As from RAF Wyton, near Huntingdon - is just as fascinating as the prospect of working an aeronautical mobile station, and a number of people asked us for more information. So to make something of a change from our normal fare, we thought we'd look a little closer at the activities of the very few groups of people in the UK whose daily job is jamming!

'RADAR' IN NATURE

Most people know that bats in flight emit a series of high-pitched squeaks. If your hearing is keen enough you can even detect them. These sounds actually have a very complex structure and without them the bat wouldn't eat; they are reflected by prospective prey such as an insect and analyzed by the bat's 'software' so as to provide information about where it has to go in order to capture the tasty morsel. It's a highly precise system. On a still summer evening in the country you can throw small pebbles into the air and watch the bats swooping towards them, twisting and turning at very high speed until they break off as returns from the pebble are swamped by reflections from the ground as it falls back to earth.

No doubt as a result of millions of years of evolution, the bat's 'sonar' or 'acoustic radar' is extremely effective. However, one Central American moth - the Melese Laodamia Druce, to be precise - doesn't care for the idea of being a bat's breakfast and has evolved a clever counter-measure to its sonar. The moth has receptors which are very sensitive to the sounds emitted by predator bats; it also has an acoustic generator operating on the same frequencies but with the added refinement that it can vary them slightly. When the moth picks up signals from an attacking bat, it switches on its generator and then gradually reduces the frequency of the 'transmissions'. Since the moth's 'transmissions' are much stronger than the reflected signals from the bat's radar, the bat's 'receiver' is 'captured' by them; the change in frequency is interpreted by the bat to mean that the moth is flying away from it at high speed. So it breaks off the attack and the moth lives to fly and fight another day. Some other moths have also evolved counter-measures to bats; they transmit acoustic signals with random repetition rates, or make such a racket that the bat temporarily doesn't know which way is up, so to speak.

ORIGINS OF RADAR

You'll no doubt be aware that radar works on a very similar principle to the bat's breakfast-detector. As early as 1900, Nicola Tesla wrote that with radio waves 'we may determine the relative position or course of a moving object, such as a vessel at sea, the distance travelled by the same, or its speed'. Three years later a gentleman called Christian Hülsemayer took out a patent on his 'Telemobiloscope' which used principles very similar to those found in modern radar. Unfortunately for him, no-one took the slightest interest in Hülsemayer's invention. By the First World War the cathode-ray tube had been invented, and the first magnetron for producing very short wavelengths appeared in 1921. In 1925, two American scientists, Breit and Tuve, used pulsed RF energy to measure the height of the ionosphere. Late in 1933 Dr Rudolph Kühnold, then head of the Communications Department of the German navy, obtained from the Philips company in Eindhoven a device capable of generating the then unheard-of power of 70W at 600MHz; by 1934 he had produced a working radar capable of detecting ships at a range of a few miles.

At about the same time in England, the Superintendent of the Radio Department of the National Physical Laboratory, Dr Robert Watson-Watt, was asked by the Air Ministry whether anything resembling a 'death-ray' - a common obsession of inventors at the time - could be produced using radio techniques, with a view to incapacitating the crews of enemy bombers. Watson-Watt replied that radio-based death-rays were not practicable but that reflected radio waves could be used to detect aircraft, if that was of any interest. He added that it was also possible to use a cathode-ray tube to display the range and bearing of a target from the transmitter.

At this period the Air Ministry was greatly exercised by the problem of how to detect enemy aeroplanes coming in Britain's direction, and Watson-Watt was invited to demonstrate the truth of his assertions. In a historic memorandum dated 12 February 1935, Watson-Watt described the basic principles of radar and how it could be used as part of a formidable air-defence system. He also supplied complete theoretical calculations to back up his case. Some experiments on 26 February 1935 with one of the BBC's short-wave transmitters used for the 'Empire Service' from Daventry and a mobile receiver in the back of a van a few fields away quickly proved that he had been correct, and the rest is well-known history. By 1936 the first Radio Direction-Finding (RDF) station - the name changed to 'radar' in 1944 and is the American acronym from '**RA**dio **D**etection **A**nd **R**anging' - was on the air, grossly overrunning valves rated at 10kW peak pulse power to produce almost 200kW pulses on about 6MHz. The RDF stations which were operational in time for the Battle of Britain in 1940 and formed the 'Chain Home' or CH, used about 150kW on frequencies between 26 and 29MHz; with their 320ft masts and four-wide collinear arrays of full-wave dipoles and reflectors, they were - to say the least - rather large. Later in the war, as it became possible to generate and control much higher frequencies, radar equipment shrank sufficiently in size to be carried on board aircraft. The turning-point was the invention of a radically new microwave generator by J T Randall and A H Boot at the University of Birmingham. Development began in November 1939, and on 21 February 1940 power was applied to the world's first 'cavity magnetron'. Whereas in previous years the available devices only permitted power levels of a few milliwatts to be generated at frequencies of several gigahertz, the new device did rather better. As one noted author put it:

"The fact that it worked was obvious. Indeed, if one brought one's hand near the output lead, that hand soon became uncomfortably hot. As power was increased, the output began to be seen and heard as a sizzling violet arc dissipated into the air

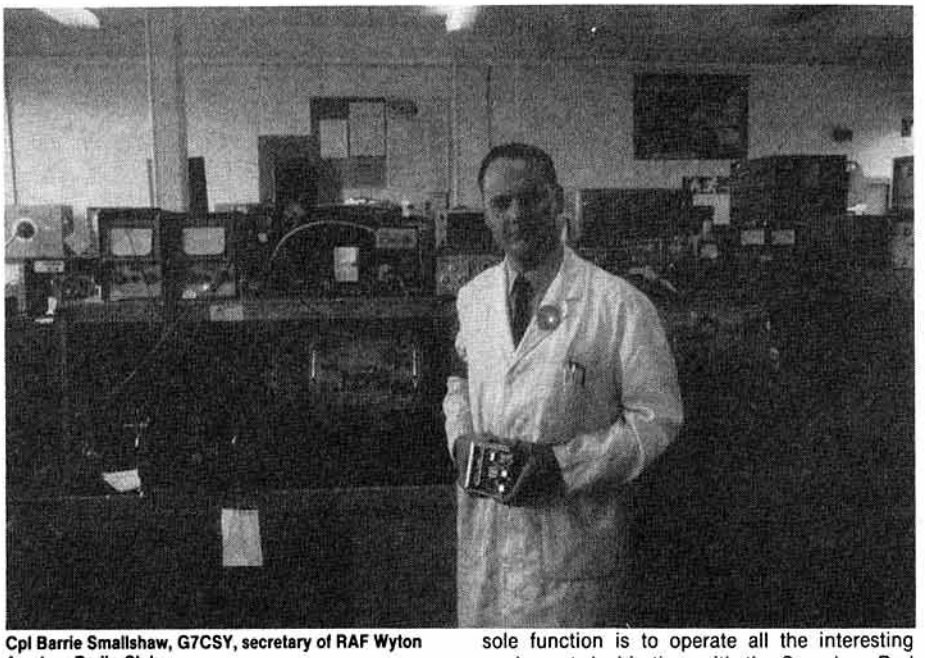
of the lab. A nearby garage supplied a succession of 6V bulbs as each in turn was burned out, and soon the output was blazing forth from large neon floodlights. This was obviously not milliwatts but hundreds of watts. On the second day a crude measuring device, hastily rigged up for a totally new task, measured about 450W at a wavelength of 9·8cm; three months later a properly designed pre-production magnetron was delivering 50kW at 9·1cm! It was a breakthrough that ranks alongside mankind's greatest technical accomplishments. It had a profound effect on the war and on man's subsequent ability to navigate the skies and oceans" (Bill Gunston, *Night Fighters*).

The so-called 'radio war' began in about 1940, when both Britain and Germany began to jam each other's radar and radio-based navigational aids; the history of this form of warfare has been well outlined in the books *Instruments of Darkness* by Alfred Price and *Most Secret War* by Dr R V Jones, amongst others. Nowadays, of course, radar is predominantly used for peaceful purposes, and as such it has become indispensable. However, it also has various military uses, largely the obvious ones of knowing where an enemy is coming from and how close they are. It can also be used to guide missiles to their targets. Given the modern emphasis on electronic systems, what is now known as the science of 'electronic warfare' is an important part of present-day military operations. In particular, radar in various forms has been a major component of air-defence systems since the Second World War, and it's obviously necessary in times of war to be able to render it ineffective; conversely, it's mandatory for military radar operators to have some idea of what happens when an enemy starts jamming and how to deal with it.

On that basis you probably won't be surprised to hear that the Druce moth which we mentioned earlier forms part of the badge of the Royal Air Force's 360 Squadron - since interfering with the function of radar in various subtle (and not so subtle) ways is its main job. The Squadron's motto, 'Confundemus' which is translatable as 'We Shall Throw Into Confusion' also gives a nice clue to the nature of its activities. 360 Squadron's formal role is to provide flying effort for trials and to give realistic training to members of NATO and all three Services in the UK; it takes part in virtually all major air and sea exercises mounted by United Kingdom and NATO forces. To carry out its mission it has six Canberra T17 aircraft, together with another six of the slightly different T17A.

360 SQUADRON

To learn a little of how 360 Squadron goes about its business and also to have a closer look at the equipment used for GB2CAN/AM, we visited RAF Wyton recently by kind permission of the Station Commander, Group Captain R McKendrick. We spent a highly enjoyable day in the company of the operator on the GB2CAN/AM trip - Flight Lieutanant Rod Angel, G4ZUP - and the first stop was the well-equipped shack of the RAF Wyton Amateur Radio Club, G3MMH. The Club has 12 members currently on the books, with about four short-wave listeners. Of the licensed members, three hold Class B licences. Despite being run on a shoestring and relying very heavily on the time-honoured military technique known as 'scrounging' the Club has a shack to be proud of. It was beautifully laid-out and extremely tidy; there was a large area set aside for working on equipment, and an FT101 and Pye UHF base station, together with an Icom 144MHz FM rig, took pride of place in



Cpl Barrie Smallshaw, G7CSY, secretary of RAF Wyton Amateur Radio Club.

the operating room. The HF antenna was most impressive; someone had obviously been 'scrounging' on a large scale, since one end of the long-wire was supported by an official-looking lattice tower painted in regulation green and giving the strong impression that it was part of an important RAF installation! The Club receives very little in the way of financial support from the Royal Air Force and relies heavily on the ingenuity and generosity of its members. I was informed that the most unlikely items had been sold at junk sales to raise money for the Club; however, 360 Squadron still seemed to have its full complement of aircraft when I counted them later...

After that it was time for a thorough briefing on their aircraft's capabilities. The 360 Squadron Canberras carry a crew of three - pilot, navigator and a specialist electronic warfare officer whose

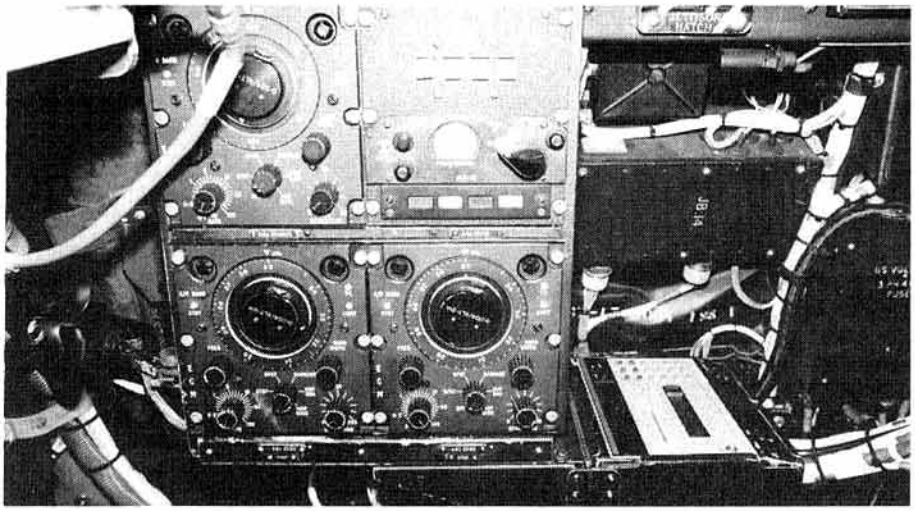
Flt Lt Rod Angel, G4ZUP.

sole function is to operate all the interesting equipment. In his time with the Squadron Rod Angel was an EWO; not only did he operate the radar jamming but it was his job to carry out various other misleading tasks which we'll come to later. As a matter of interest, 360 Squadron is the youngest in the Royal Air Force, having been formed in 1966. It is unique insofar as it is manned jointly by RAF and Royal Navy personnel in a 3:1 ratio, and the Naval element is reflected by the trident forming the other component of the Squadron badge.

JAMMING EQUIPMENT

There are several main items of jamming gear in the aircraft; collectively they are known as the ECM (Electronic Counter-measures) equipment. The first is the JS603, which deals with 'X-band' radar on wavelengths around 3cm. Another X-band jammer, the Plessey Repeater, handles a similar part of the RF spectrum. There are also jammers covering 10cm and 30cm radars; an alternative fit includes a UHF jammer. Just the thing for causing mayhem on VHF Field Day! In addition, the T17A carries something called the Sylvania Dragonfly, which is a programmable high-power communications jammer.

There are various jamming techniques which can be used. The obvious one is to generate and transmit noise; this can be done over a variable bandwidth and can also be made to 'blink' on and off in such a way as to fool some radars in a particularly nasty way by changing their receiver's AGC threshold. 'Spot' jamming is the transmission of noise on a particular frequency, whilst 'barrage' jamming covers a wider frequency range to cater for more than one radar at once. There are then some extremely devious methods which are similar in principle to those used by the Druce moth, only more so. Many modern radars use the Doppler principle for various purposes, and a technique called 'velocity gate pull-off' totally confuses them! Another tactic is to emulate the moth directly with 'range gate pull-off' thus fooling the radar into thinking that you're somewhere other than where you really are. A technique known as 'wobbulation' sounded even more evil; I was told that in the hands of a good operator, wobbulation can cause the radar dish antennas in



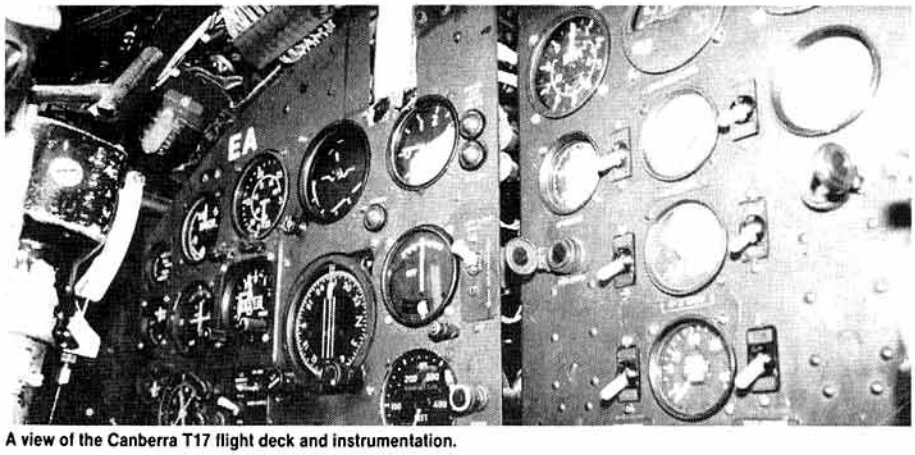
Some of the less conventional (!) radio equipment on board.

even modern air-defence fighters to perform some involuntary gyrations which are violent enough to be heard by the fighter's crew. Not surprisingly, the radar doesn't have much in the way of ability to track a target whilst it's being subjected to this treatment. Yet another trick, called 'inverse gain' makes the radar think that its target is nearer or further away than it actually is. No doubt 360 Squadron has some other tricks up their collective sleeves too. The other area of their activities, which clearly calls for a decidedly well-developed sense of humour, is 'spoofing' - i.e. giving convincing-sounding (although totally spurious) orders to other parties. Rod Angel obviously enjoyed that part of the job!

If you're going to inflict all sorts of confusion on the operators of a particular radar, you've obviously got to know what frequencies it's using. The T17 carries an intercept receiver covering all the necessary radar bands; this has a panoramic display which can show small tunable segments on its screen. The T17A has a refinement in the form of a Tektronix 492P spectrum analyser, perched precariously at eye-level just in front of the operator. It has its own antenna and can be quickly used to produce the usual picture of events taking place in the RF spectrum.

The jamming transmitters are pretty powerful; all run about 200W. The 10cm-band machine uses an oil-cooled backward-wave oscillator (BWO) to produce what was described as 'noisy RF'. This sort of power level at 3GHz is the stuff of dreams to most of us, but I gathered that the BWO is strictly a noise generator. The 3GHz-band antenna is a 'Narda' horn in the nose of the aircraft with a horizontal beamwidth of 11°. For the 3cm band, the transmitting antennas cover ±15° at the front and ±45° at the rear; the receive antenna can see over about 170°. Various lumps and bumps on the airframe house antennas for the other bands.

As far as communications go, the Canberra has an HF transceiver, the Collins 618T, one of which was used for GB2CAN/AM. The 618T runs 400W of SSB to a long-wire antenna running from the port side of the nose to the top of the fin; an automatic ATU makes it a reasonable match to the transceiver, although I gathered that the antenna worked much better at some frequencies than others! There are also two UHF transceivers covering 225-400MHz and running about 16W of AM via small 'blade' antennas at top and bottom of the fuselage, together with a VHF transceiver covering the normal civil aeronautical band. For navigation some aircraft carries the 'Omega' system, which uses VLF signals and works pretty well anywhere in the world. For shorter-range stuff there are the usual military TACAN (using a clever pulse system at about 1200MHz for finding bearing and distance from a beacon) and the rather similar VOR as used by civil aircraft, together with the decidedly steam-age 'Automatic Direction-Finder' or ADF. This works on non-directional beacons in the long and medium-wave bands, and in my experience the needle of this instrument tends to give the bearing of the nearest thunderstorm rather than the beacon it's tuned to.



A view of the Canberra T17 flight deck and instrumentation.

All this equipment obviously needs quite a lot of power to make it work. The Canberra has twin Rolls-Royce Avon gas-turbine engines and each one drives a 28V DC generator; regulation is performed by a carbon-pile system similar to the ones which disappeared from motor cars many years ago! In addition, bleed air from each engine drives a 3-phase 400Hz 115V AC alternator. These apparently trip off-line when the engines are throttled back, as on final approach, and since the HF transceiver is driven from this power source it suddenly ceases to work. This is why GB2CAN/AM went off the air rather abruptly at the end of the flight as the Canberra was preparing to land at Wyton.

SCATTERING CHAFF

One thing that doesn't need any power at all, however, is a jamming technique called 'chaff'. Chaff consists of strips of metal foil cut to half the wavelength of the radar which you wish to jam. When you're ready, you just dump some overboard and the enemy radar reacts in one of two ways. Either it interprets the result as an enormous number of hostile aircraft or it simply gives up and paints a large blob on its CRT; the chaff thus forms a sort of 'electronic screen' behind which your aircraft can manoeuvre unseen by the enemy. Even in an age of sophisticated electronic techniques, chaff is still very handy to form a screen if enough of it is used and the Canberra carries some in pods mounted at the wing tips.

Finally, it was time to make our way out to a T17 parked just outside the hangar and have a look inside. The aircraft sits low on the ground and you have to wriggle through an entrance hatch on the starboard side of the nose and then slither backwards in a rather undignified manner on your derriere in order to reach the rear crew compartment. The navigator sits on the left, with the EWO on the right; the jamming equipment is in front of him and on his right-hand side. The rear accommodation in the Vulcan bomber used to be likened to a coal mine with switches but it was rather cosy in the Canberra although you couldn't see a great deal of the outside world. Rather a nice mobile shack, I thought. Interestingly, the Collins 618T HF transceiver lives right at the front of the aircraft and is fully remote-controlled. I gather that despite the bumps and bounces it receives in normal service, the rig is very reliable and doesn't often give trouble. The modular construction makes it easy to work on, and those who work on them seem to like them very much.

At the end of the day I asked Rod Angel what he liked about his job. He said that it was technically demanding and very satisfying; Rod remarked that military activities are usually governed by very strict rules, especially in the area of rules and procedures for the operation of radio and radar but that, as far as the latter was concerned, it was his job to break them! As well as being professionally very rewarding, Rod said that it had sometimes been very good fun. It certainly sounded like fun to me, and I can think of worse things to do if you have an interest in electronics and a bent for flying. Mind you, if I'm operating on VHF Field Day in a few years' time and 1296MHz gets wiped out, I'll know who to blame... □

The Society wishes to thank Group Captain R McKendrick, Wing Commander J Donnelly, Flight Lieutenant R Angel and Flight Lieutenant M Humphrey for their help in the preparation of this article.

SPECTRUM ANALYSIS

HF

JOHN ALLAWAY G3FKM

Recently I received a copy of a book produced by DARC and written by Hans Schwarz, DK5JI. This runs to some 196 pages in A4 format and is the most complete source of information on callsigns that I've ever seen. In the first chapter the fundamentals of callsign assignment are presented. The use of callsigns, the method of assignment and their formation is described in both English and German. The allocation series by the ITU is given within the main part of the book. For each series all identifiers, prefix numbers and suffix series used are described in detail. For each prefix or prefix/suffix combination, the DXCC/WAE country is indicated if applicable - as well as the continent and the zone number for ITU and WAZ. The main list is followed by a complete DXCC/WAE countries list with notations of all callsign series in use as well as beam direction (this is from DL, however), local time, continent, ITU zone, WAZ zone, and ITU region. Callsign entries may be made for each country on all nine HF bands, together with VHF, satellite and different modes. Deleted countries are also listed. The book ends with a list of ITU allocations and index. The *Call Sign Directory* (4th edition) costs DM 16·80 from DARC Verlag, Postfach 11 55, D-3507 Baunatal, F.R.Germany - highly recommended.

AWARDS

The Peace and Friendship Games Championship

This is being organised by the Kuwait Amateur Radio Society to mark the games of the same name which are taking place there. It is open to licensed amateurs and listeners, and covers 3·5 to 30MHz and any mode. Contestants must work or hear two different Kuwaiti stations or the KARS station 9K2RA during the period of the games (between 0000 30 October and 2400 12 November). Entrants should send certified log details including date, time, station worked, and serial number received from the Kuwait station, together with six IRCs (or US$3·00) to Award Manager, 9K2MJ, Kuwait Amateur Radio Society, PO Box 5240 Safat, 13053 Safat, Kuwait.

60 years of Amateur Licences in the Netherlands

The first amateur licence to be issued in the Netherlands went to PA0BZ in 1929 - and to celebrate the fact, VERON has obtained permission for Dutch stations to use special prefixes between 1 October and 29 November 1989. During this period they may add a figure '6' before the number in their normal prefix - so PA0s will become PA60s, for example. This special certificate will be given to all, including listeners. European stations need 30 special prefixes, and DX 15. Listeners need the same on a 'heard' basis. The standard certificate is for mixed modes and covers HF, VHF, UHF and SHF. Special endorsement will be made as required and for CW, SSB and listeners. Send log extract, certified by two other licensed amateurs, to reach PA0BN 'through the normal QSL channels' by 31 March 1990. During this period the HF Traffic section of VERON will be making special efforts to promote action on the WARC bands.

DDR 40 Award

This is being issued by RSVDDR to celebrate the 40th anniversary of the foundation of the GDR on 17 October 1949. It is available to licensed amateurs and listeners and requires a minimum of 40 points gained during October by working Y stations. Each counts two points on HF and four on VHF. Europeans must work at least ten GDR 'counties' as indicated by the last letter of the callsign suffix. The special station Y40DDR may be used in place of a missing county. The award is free to blind and disabled amateurs but costs 7 IRCs to others. Send confirmed log details to Y2 Award Bureau, P.O.Box 30, Berlin 1055, GDR, by no later than 28 February 1990.

28MHz COUNTRIES TABLE

G4MUW	173
G0CKP	171(CW)
G0IHB	159
G4DXW	161
G4ZYQ	151
GM4ELV	147(QRP)
G4XAH	134(SSB)
G4OBK	115
G4NXG/M	113
G0JSM	111
G0JHC	107
G0BXQ/M	106
GD4XTT	98
G4SJG	81
G4SDK/M	54
GM4OBK	41

DXCC ON 10MHz?

It is almost certain that by the time this is being read there will have been a change of policy in Region 2 concerning the issuing of awards on 10MHz. This as a result of a paper being presented by ARRL at the Region 2 Conference in early September. It says "...after careful consideration we have concluded that the Amateur Service in Region 2 would benefit from the slight relaxation in the absolute prohibition on 10MHz awards credits. If Region 2 accepts this change in policy, it is the League's intention to accept 10MHz contacts for credits towards the Worked All States Award (basic, CW, RTTY, packet, and QRP endorsements) and DX Century Club (CW and digital contacts for the mixed, CW and RTTY awards, but not Five Band DXCC)... ARRL believes that single-band awards and endorsements for 10MHz operation should continue to be avoided."

CONTESTS

CQ WW DX SSB Contest

0000 28 October to 2400 29 October.
All bands 1·8 to 28MHz (excluding WARC). Single-operator, single and multi-band, multi-operator single and multi-transmitter and QRP categories (the last allowing up to 5W output). Exchanges are RS and CQ Zone (UK is 14). Contacts count one point with own continent and three with others. The multipliers are the CQ Zones and DXCC countries, plus WAE countries (eg Shetland). Own country may be contacted for country and zone credit only but no QSO points are allowed. Final score is total QSO points times total multipliers from each band added together. Use separate log forms for each band and give date, time, station worked, numbers out and in, and mark multipliers the first time they are worked. Logs must be checked for 'dupes' and those making more than 200 QSOs on any one band must provide a cross-check sheet for that band. QRP stations must mark the fact on their summary sheet and state the actual power output. All entries must be postmarked by 1 December 1989 and mailed to *CQ Magazine*, 76 North Broadway, Hicksville, NY, 11801, USA. Sample log and summary sheets are available from *CQ* in exchange for a large sae and some IRCs. I'm sorry that I don't have any to offer this time!

RNARS Activity Contest

0600-1800 15 November (SSB)
0600-1800 16 November (CW)
3·5 to 28MHz centred around 3·74, 7·05, 14·335, 21·34, and 28·933 MHz (on SSB) and 3·520, 7·02, 14·052, 21·052, and 29·052MHz (CW). Open to all, including listeners. Call "CQ naval" and exchange RS/T plus RNARS, INORC, MF, or MARAC number and serial QSO number (from 001). Copies of rules available from me - SASE please. In the RNARS members section of the 1988 SSB contest, GD4MNS (45,980 points), G0CBY (27,300), and LA1IE (24,160) led the field. In the CW event, GM4CXM scored 641,280 points, G3LIK 401,460 and I4TYE 381,600.

ON Contest

0700-1100 1 October (SSB)
0700-1100 8 October (CW)
Exchange RS/T and serial QSO number with Belgian and DA stations. The latter will give their club code. Each QSO counts three points and each club is a multiplier. Listeners may enter and log time, callsign of station heard, code given and callsign of other station. Send logs within three weeks of the contest to Welters Leon, ON5WL, Borgstraat 80, B2880 Beerzel, Belgium.

DARC FAX Contest

0800 28 October to 2000 29 October.
Copies of rules available from me - SASE please.

Lion City Award QSO Party

0000 - 2400 21 October
3·5 to 28MHz (no WARC bands), CW and SSB. Send RS/T plus CQ Zone. Singapore stations send RS/T and serial QSO number. Stations working five 9V stations during the QSO party may claim the award by sending full log details plus three IRCs. At other times the Lion City Award is available to amateurs and listeners who have confirmed QSOs/reports with five 9V stations. Applicants should send a certified log extract plus five IRCs to Awards Manager, SARTS, Maxwell Rd, P.O.Box 2728, Singapore 9047.

DX NEWS

Maurice French, G3ZXD, writes that after two and a half years in Saudi Arabia in the amateur radio wilderness, he has returned to Wellington, New Zealand, and is ZL2BNJ again. He noticed lack of ZL activity in contests when in HZ, and after talking to members of the N2AA CQ WW group Maurice decided to form a contest group in Wellington. The result is a dedicated band of about 12 who are

known as the 'Kiwi Contest Group' and use the callsign ZL2NX. They will operate from the coast east of Masterson and hope to be on all bands 3·5 to 28MHz with 4-element monobanders for 14, 21, and 28Mhz and loops for LF. Maurice sends his regards to all who know him as G3ZXD.

AH2BE/KH9 will be a five-man contest station on from **Wake Is** during the CQWWDX Contest at the end of this month. N8BQJ/KH9 will also be on before and after the contest, mostly on CW and on all bands 1·8 to 30MHz.

OH2s RY, BAZ, BGD, and VB are due to mount an expedition in the Pacific between 19 October and 23 November. YJ0RY will be on during the CQWW SSB Contest and there may be operation from **Fiji** or **Willis Is** at the same time. **Conway Reef** is a prime target and they should be on from there between 3 and 13 November as 3D2RY.

SM7PKK leaves Sweden on 16 October for a 4-6 month visit to the Pacific area. He hopes to be on the air from 3D2KK9 (**Fiji**), 5W1HK (**W.Samoa**), KS6/SM7PKK (**American Samoa**), and also from T30 (**W.Kiribati**), ZK3 (**Tokelau Is**), and ZK1 (**S.Cook Is**). Frequencies to look for him near are 5kHz above low band edges (CW) and the usual expedition spots on SSB. QSLs go to his home call, but please don't mix cards for different callsigns in one envelope since each will be dealt with by a different person.

CE0ZAM is said to have been given the callsign CE0XDX to use during a visit to Ambrosio Is, which may take place soon. TI8CBT and other Costa Rican amateurs may visit **Cocos Is** as TE9OM in the not too distant future. PJ5EUX will be on from **St.Eustatius** on 16 November for 24h. The PJ5 prefix has been reserved for residents on the island and there are now three amateurs settled there.

A fascinating comment in *DX News Sheet* quotes a report from a reader who heard 5R8JD on 28MHz and at the same time a group of people in a net on 21·333MHz who were also giving and acknowledging '3x3' reports with him! Weird... 5R8JD QSLs do not count for DXCC since he only has verbal permission to operate. 5H3TW now has a licence in **Djibouti** where he is J20TW. J28DN is on most days near 21·28MHz around 0300, and J28CW likes CW around 28·55Mhz from 1430. G4ZVJ is on **Ascension Is** as ZD8VJ for a six-month stay and promises all-band activity, mostly on CW. FT4ZE on **Amsterdam Is** can be found on 14·165MHz between 1000 and 1300. Peter, G3LPL, is in Maseru, **Lesotho** and is one of the two active CW operators there. He will be there for two years as 7P8EL. WA9INK, who operated recently as SU1EE, is now in **Zaire**, probably with the callsign 9Q5EE.

Also according to *DX News Sheet*, BZ4RDX said that he is the first individually licensed amateur in China and that he received his licence in August. Another individual licence holder is Kang, BZ4SAA, who often operates from BY4SZ - he was one of the operators who took part in the Mt Everest expedition last year. I have heard from Phil, VS6CT, who has

QTH CORNER

A35KB	Fr Kevin Burke, SM, Box 1, Nuku'alofa, Tonga.
A35SK	SM5CQT, Alf Thunstrom, Karlslund, S-61056 Vrena, Sweden.
BY5VZ	Box 238, Fuzhou, PR China.
C30LBS	IK1CJT, S.Tacca, Viale Parona 9, I-28024 Gozzano, Italy.
CY0DXX	VE1AL, Alan Leith, 846 George St, Sydney, NS, B1P 1L9, Canada.
S79MX	HB9MX, K.Bindschedler, Strahleggweg 28, CH-8400 Winterthur, Switzerland.
T32IO	AH6IO, 263 Kiaulani Av 10-A, Honolulu, HI 96741, USA.
VS6CT	P.J.Weaver, G.P.O.Box 12727, Hong Kong.
XT2CW	Rudi Klos, DK7PE, Kleine Untern 25, D-6501 Nieder Olm, FR Germany.
ZY0TI	PP2BNQ, PO Box 5016, 74000 Goiania, GO, Brazil.
3D2RJ	ZL1BQD, 36 Cardiff Rd, Pakuranga 1706, New Zealand.

HF F-LAYER PROPAGATION PREDICTIONS FOR OCTOBER 1989

The time is represented vertically at two-hour intervals 00(00)GMT for each band, ie 00=0000, 02=0200, 04=0400 etc.
The probability of signals being heard is given on a 0 (indicated by a dot) to a 9 scale; the higher the number the greater the probability with 1 meaning 10 to 19 per cent of days, and so on. Additionally 50MHz F-layer and 1.8MHz openings are indicated by a plus (+) sign in the 28 and 3.5MHz colums.

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	...1899982..	...3999995..	...69999982.	1..888889952	533766668997	987543346899	875211113688	+42.....3++
MALTA	...1887774..	...29998961.	...699999941	21.888889973	764876678998	998743346899	987411124788	++5.....4++
GIBRALTAR	....576553..	....7987761.	....9998984.	...298889972	442787778997	997864446899	998632113689	+++3.....3++
ICELAND	.....46652..	....178874..	....4899972.	....7888995.	32.187778985	885665456899	888632224678	+++3.....34+
** ASIA								
OSAKA	...2861.....	...3972.....	...586421..1	...475432212	...152125665	....2...3773	1551	.....22.
HONGKONG	...5++862...	...4888752..	...267677521	1....45458743	2...12126887	1.....3786	1573	.....24.
BANGKOK	...6++++83..	...4788895..	...136679831	2....15458964	4....2126898	3.....3788	1576	243
SINGAPORE	...6888983..	...5888961..	...136679831	2....14458964	4....1126898	2.....3787	1575	242
NEW DELHI	...7++++83...	...568886...	1.12226678322	311..4458654	74....1126888	73.....3789	51.....1577	2.....244
TEHERAN	...8++++83..	...86788961.	1.36346798843	425412358976	8651..126899	973.....4789	74.....1577	5.....244
COLOMBO	...7++++94..	...55788961.	2.12225679943	41...3358976	83....126899	71.....4789	4.....1577	244
BAHRAIN	...8++8+841.	..1766889621	313523679964	6353.1458987	975...126899	972.....3789	74.....1577	5.....245
CYPRUS	...7++++961.	...999999831	312987889974	645866778997	988633557999	99631.225899	8741.....2688	+5.....355
ADEN	...8++8+9621	1.1755889853	523522579986	8553..358998	985....26999	973.....3789	75.....1567	52.....234
** OCEANIA								
SUVA/S	....257731..	....478853..	...17767761.	...37545871.	..16521266..	...52...33..	...2....11..	.....
SUVA/L	32.24421.475	33.465421674	222775433852	.1387433583.	..2741.156..	...41...33..	...1.....1..	.....
WELLINGTON/S	....687521..	...1888753...	...4876761.	...67545872.	...65212672.	...32...34..	.....11..	.....
WELLINGTON/L	22..1.....22	331231...133	2335521..353	.136631.1541	..1651.1462.	...32...23..	.....1..	.....
SYDNEY/S	...6988852..	...7988874...	...68767872.	...475458951	...142126861	....1...373.	.....151.	.....2..
SYDNEY/L	....31.....32	111.531...54	12117421.274	111274222573	...252.1475.	....2...263.	.....3..	.....
PERTH	...7++8762..	...68888841.	1.1356678742	2..134358975	2....1126897	4784	1562	.....24.
HONOLULU	.....14..	....1...261.	....421.572.	.21.6321771.	.244521164..	..562...31..	..23.....1...	.....
** AFRICA								
SEYCHELLES	...777874531	2.1655876753	522322668987	8431..458999	972...126999	95.....3789	72.....1567	5.....234
MAURITIUS	1..78+899742	2..666889964	622323679997	8531..458999	961...126899	84.....3789	61.....1577	4.....244
NAIROBI	1..7+7898853	31.765689975	743522369998	9753...58999	996....26899	983.....3788	761.....1577	53.....244
HARARE	2..777789874	42.755689987	852522279999	9853...58999	996....26899	984.....3788	761.....1477	53.....244
CAPETOWN	31.58788986	53.776679998	872743358999	98561.138999	9973....5899	985.....2689	772.....477	54.....44
LAGOS	32.3+++++986	64.686569998	873862238999	99684..16999	99971...3899	8984....1689	6771.....477	444.....44
ASCENSION Is	22.198767765	541296557887	874582124899	99686...2899	99984....699	89861....389	6763.....67	354.....34
DAKAR	21..9++++985	441197657997	774485225999	997672..2899	99985....699	88862....389	7673.....157	444.....24
LAS PALMAS	....9++99961	11.199999983	342398888996	775687778999	998875445899	999742113689	88852....378	5552.....4+
** S. AMERICA								
Sth SHETLAND	21..378+8885	441158887887	774476565688	897774342368	899851.1.136	67862.....13	3553.....1	.22.....
FALKLAND Is	11..58+++884	331178876786	774386533578	99767431.268	999851....37	89862.....4	6873.....2	354.....
R DE JANEIRO	11..3+766762	331.68655785	664376211588	987575...289	999752....69	99862.....37	7773.....5	544.....2
BUENOS AIRES	11..48+77+84	221.68755686	664286522378	8875753..158	999752....27	89862.....4	7773.....2	444.....
LIMA	.....1++++72	111..2865574	443134531247	77635431..27	899652.....6	79862.....3	5773.....	244.....
BOGOTA	.....2+++772	11...3865474	343..5631157	67621531..28	9996321.....6	89862.....4	6763.....1	344.....
** N. AMERICA								
BARBADOS	.....8++++72	111..8855684	443.27621287	7762454...69	9996521...38	98862.....16	7763.....4	543.....
JAMAICA	.....1+++762	11...3875574	332.15641157	66512542..37	9985421.....6	89862.....3	6763.....1	344.....
BERMUDA	.....6+++872	7866784	332.27632487	66514541.268	9985521...38	88863.....15	7763.....3	444.....
NEW YORK	.....28+8861	4887773	321..5664576	553.25442367	89844211..37	78862.....4	5773.....2	244.....
MEXICO	298751	486552	221.2.563234	553.41441.14	79845211...2	58862.....	2773.....	.44.....
MONTREAL	2888851	4887872	221..5665686	553.25443477	88834211.147	88862.....15	5673.....2	244.....
DENVER	.....5874.	68751	22.....166544	442.1.254224	687341121..3	47862.....	1573.....	.24.....
LOS ANGELES	.....1873.	38741	22.....57432	442.2..46212	576341.23...	26852.....	.463.....	..4.....
VANCOUVER	.....362.	5731	11.....27742	441.1..37533	575341.25212	36852...2...	.363.....	..3.....
FAIRBANKS	.....2..	.....1241.	1...11125641	32.132237753	554452126655	34652...3322	.143....1...	.....

The provisional mean sunspot number for August 1989, issued by the Sunspot Index Data Centre, Brussels, was 166.8. The maximum daily sunspot number was 227 on 5 August, and the minimum was 50 on 28 August. The predicted smoothed sunspot numbers for October, November, December and January are respectively: (classical method) 178, 176, 173, and 169; (SIDC adjusted values) 186, 184, 180 and 175.

now moved into a new flat but is off the air because he has no antennas. His mail box is very small and he asks those writing to use his PO Box address (see QTH Corner).

The 18MHz band was expected to be released to Class 1 and Class 2 licence holders in Japan on 1 July, and 24MHz was made available to all. JARL is planning to prepare special awards to celebrate the release of the new bands.

1989 is the 20th anniversary of the foundation of the Singapore Amateur Radio Transmitting Society, and this year the SEANET Convention will be held there from 17 to 19 November. To celebrate the two events, Singapore Telecoms has given permission for the optional use of the special prefix 9V0 from 1 July until 30 November. During the SEANET weekend an official station - 9V0SEA - will be on the HF bands and special 50MHz tests will be carried out by 9V0ES - closet VHF readers of this column please note!

DL2GBT is in **Malta** until 19 October as 9H3EH and will be on HF as well as 50MHz, mostly using SSB. UA0BAZ/UA1O will be on the air from Alexandria Is in **Franz Josef Land** for a couple of years and should be on all bands and modes. According to the *Long Island DX Bulletin* there is now a USSR QRQ Club which meets at 0700 on 14·070MHz; they have applied for the permanent use of the special callsign 4L1QRQ, which had been issued to them on a temporary basis. Worldwide membership is said to be open to those with the ability to work at at least 34wpm. Details are available from UW3AA.

PROPAGATION

This month's contribution from G8KG reads as follows: "The lull in solar activity during July ended in the first days of August and indices then climbed steeply. On 12 August the daily solar flux peaked at 286 SFU and it was still above 200 at the end of the third week, while the 27-day average had risen from a July low of 182 to 220 SFU and was still rising.

"It seems probable that the average solar flux for August will be in the vicinity of 225 SFU - perhaps a monthly sunspot number around 180 - in which case Cycle 22 will again be very close to the position of Cycle 19 at the same age, and 28% above the corresponding value for Cycle 21. It is hoped to be able to review this in more detail next month.

"There is always uncertainty as to exactly when a solar cycle will reach its peak, which means that it could have been reached by the time this appears in print though it could equally well be some months away. Whichever the case, we can expect HF band conditions this winter to be at least comparable with those of the 1979/80 season and possibly approaching if not exceeding those of 1957/58."

BAND REPORTS

This month's reports came from G2s AKK, HKU, GM3CSM, G3s GVV, KSH, VRU, YRM, G4EHQ, GW4KGR, G4MUW, G4NXG/M, GM4OBK, G4ZYQ, G0s BXQ/M and CKP. CW stations are in italics.

3·5MHz
0300 CY0DXX

7MHz
0000 ZD8PJ
0200 *CY0DXX, TA1E/2*
2300 *XT2CW*

14MHz
0000 TG0FRACAP, TR8CJ, ZF2AZ
0100 CE0MTY, FO5LZ(Marquesas), V31BB
0600 *TJ/IK1JLL*
0700 A35SA, C21RK, *FK8FG*, P29CG, S01A, T30AC, T32IO, ZL7TZ, 9V1GY
1700 *HS0YDY*
1800 ZS8MI, 9M6HF
1900 V85AM
2000 A71BK, T77T, 9N1MM
2100 CY9SPI, CY0DXX, *HL5BD*, T5YD
2200 ZY0TX, *4L1FS*

18MHz
0600 *TA7/KU0J*
1400 9M2RI

21MHz
0700 BY5HZ, KL7XD, T32IO, UA1OY
0800 BY5RY, FO5LU, JT1BC, T32PO, 3D2AG, 3D2XV, 5W1FV
0900 A35SK, *PY0FF*, V85AM
1000 A35KB, TA7/KU0J, *3D2SI*
1100 3D2RJ
1200 T5MF
1400 HS0AIT, UA1OT
1500 KL7XD, ZS3/DK2WH, 9V0RH
1600 BV5VZ, T32AB, 5R8JD, 9M6JR
1700 *XT2CW*
1800 *HL5BDS*, KH6/WB6PZF, 3X1SG
1900 CY0DXX, *6V1A*, 8Q7AC
2000 HS0AIT, ZL4JO
2100 HL5BAJ, *PA0GAM/ST2*, V29AO
2200 FJ5AB, W6-W7
2300 JA, *ZL3GQ*

28MHz
0700 S79MX
0900 BY5RA
1100 FY4FM, PY0FF, *7P8EL*
1300 J52US, T5YD, *YI1BGD*
1400 ZD7VC, *9Q5UN*
1500 *TZ0MAR*
1600 ZD9JR, 3X1SG
1700 *XT2CW*
1800 VP8BFH, 9V0RH
1900 V44KI
2100 0T6C, *9Y4VU*
2200 *FG89/FD1DMP*, ZL4OD(I.p)

Thanks go to the following information sources — *DX'press* (PA3CXC), *CQ Magazine* (W1WY), the *DX Bulletin* (VP2ML), *DXNL* (DL3RK), the *Long Island DX Bulletin* (W2IYX), *DX News Sheet* (G4DYO), the *Ex-G Radio Club Magazine* (WA8GTA), *DX Report* (VK9NS), and the *Lynx DX Group Bulletin* (EA2JGO).

Closing date for items for the **December** issue is **24 October.**

VHF/UHF

NORMAN FITCH G3FPK

As we approach the peak of Cycle 22, the sun has become increasingly active. Things were fairly quiet during the last week of July, the solar flux averaging 174 units and the geomagnetic A index 11. During the first week of August Old Sol was quite active, with 210 units average and 233 peak being recorded; the A index averaged 6. There was a surge in activity the following week with many proton flares and ionospheric disturbances, polar-cap absorption, magnetic storm alerts and auroras. The solar flux averaged 240, with a peak of 288, while the A index averaged 16, peaking to 37 on 10 August.

The third week of August saw a massive increase in solar activity, with some mind-boggling figures. On the 15th a ten flare of 19000 flux units triggered off a magnetic storm, which peaked with a huge proton flare at 0154 on the 16th. This event produced particle energies of more than 100 Mega-electron-volts and the neutron monitor on the island of Kerguelen (ME field) recorded a very rare ground-level event between 0100 and 0800 on the 16th. The SF averaged 258, peaking to 278 and the A index averaged 33, peaking to 63 on the 15th.

The more northerly stations, such as Andy Steven, GM4IPK (SLD), have observed many auroras resulting from this hyper-activity. In more southerly latitudes a few have been rewarding, if not spectacular. Anyway, auroras in August are a bit of a bonus and helped to offset the generally mediocre tropospheric conditions on the VHF/UHF bands.

BEACON NOTE

Calum MacPherson, GM0EWX (HLD), passed on the news from OY9JD that the OY6VHF beacon is now QRV again from the Faroes on 144·885MHz, running 25W. Around mid-July, weather permitting, it was planned to erect two 4-element yagis, one pointing south east, the other north east for auroral studies. I assume it is still at IP62NA.

DX NEWS

Dave Court, G3SDL (KNT) has received permission from the Turkish authorities to operate in the 28 and 50MHz bands from Antalya (KM56) on the south coast of Turkey. Operation was due to start on 30 September and end in the week beginning 8 October, using the call TA4/G3SDL. This is a business trip so activity will be limited to 1000-1100GMT and evening periods but with more intense operation during the 7/8 October weekend. QRGs 50·11 and 50·13MHz, with the possibility of a beacon on 50·095MHz. Paul Turner, G4IJE (ESX) will be 'anchorman' over here, monitoring 50·11MHz and the 80m information net on 3718kHz.

Dave Gascoigne, G4OSY (YSW) hopes to be QRV on 50MHz from Bermuda (FM72) between 15 and 29 October using the call G4OSY/VP9. When he wrote on 8 August he was "looking out to buy/borrow a TS-680, HF/50MHz transverter, 50MHz amplifier and lightweight 3-element antenna." He will be QRV on the HF bands too.

Ian Stewart, G1IMS (HFD) will be on Lanzarote over the Christmas period. He has an apartment there, so he's applying for a special licence to operate from EA8. Local amateur EA8VI, who works in the Air Traffic Control department at Arecife airport, doesn't think Ian will have any trouble. The local amateur radio club's callsign is EA8RCL, but its members weren't aware that many European countries now have a 50MHz allocation. So if Ian gets a temporary licence, hopefully the other EA8s on the island will apply.

DXPEDITIONS

Keith Tatnall, G4ODA (LCN) has sent the results of the Five Bells Contest Group's operation from North Rona (IO79) in July, using the callsign GB4XT. This DXpedition was no less than nine months in the planning stage. They boarded their small chartered

fishing boat on the 9th, the journey taking over eight hours in gale-force winds. Landing on the north east of the island the next morning went better than planned, but they had a two-thirds of a mile walk up a 300ft escarpment to reach the site!

Operation started at 2121 on the 11th on 144·215MHz. At 2350 they QSYed to 144·028MHz, their MS frequency, and worked two PAs on random to check out the station. After some sleep, they recommenced activity at 0600 on the 12th and were on continuously till 1130 on the 19th, via tropo in the day-time and on MS at night. Tropo conditions were not spectacular; there were no usable auroras and only a couple of brief Es openings to F and EA4.

116 of the 158 MS tests (mainly CW) were completed, many around the 2000km distance. Countries worked on all modes in 575 QSOs included D, EA, F, G, HB, HG, I, LA, OE, OH, OK, OZ, PA, SM, SP, Y and YU. Notable contacts were ON5FF on tropo, DF8VU, probably via tropo-scattter and F6DKW, mode unknown. The station comprised an FT-225RD with muTek RF stage, a home built 3CX800 PA and four 9-element Yagis.

50MHz operation commenced at 1340 on the 12th using an FT-736, 25W PA and 4-element Yagi. A few Gs were worked on MS but the bulk of the 94 QSOs were via Es to CT, F, GJ, PA and SV. They closed down at 2131 on the 18th. 430MHz operation was limited to four days from the 14th and resulted in only 22 contacts, best being with G3LQR (SFK). The gear was an FT-736, home built 3CX800 PA and four 17-element Yagis.

The departure from the island took place in two stages and resulted in some publicity in the local press and on the local radio - but that's another story! The operators were John, G4NPH; Julian, G4YHF; Dave, G4YTL; Chris, G1IJC; and G4ODA, to whom we are all indebted for putting on a fine show from an uninhabited and inhospitable island.

David Johnson, G4DHF (LCN) was unable to join the XT team due to work commitments but did manage a one-man, two-site DXpedition to Scotland. Between 11 and 18 August he operated from a 600ft hill at XS40g (IO78WN) on the Sutherland coast, and endured four-and-a-half days of 50-60mph gales.

He caught the tail-end of the Perseids and completed with 13 stations between the 11th and 13th, all but one on the random SSB frequency of 144·200MHz. Countries worked were D, G, I, OE, OK, UR and YU. The main highlight was three auroral sessions. The OY6VHF beacon was copied at 1200 on the 14th and OZ, SM and OYs were worked on CW between 1525 and 1538. The next event was from 2248 on the 15th to close-down at 0302 on the 16th, and the final affair was from 1411 on the 17th to close-down at 0028 on the 18th. Countries worked were D, EI, G, GI, GM, LA, OH, OK, OY, OZ, PA, SM, SP, UR, Y and GW0KZG/MM (JO05). Most QSOs were on CW. On the way home, David stopped off at XQ80d on the 20th for about five-and-a-half hours of tropo operation.

Allan Duncan, GM4ZUK, operating the 144MHz station on the Foula DXpedition.

About 200 auroral QSOs were made, the final tally for the trip being 18 countries and 78-plus squares worked. At XS40g the station comprised of a modified IC-202S with digital display, BF988 front end with SRA-1 mixer, home-built 200W solid-state PA and four 9-element Yagis at 20ft on a trailer-mounted mast. 80W and two 9-element Yagis were used at XQ80d. He used a 1·2kW propane-powered generator.

Stewart Cooper, GM4AFF (GRN) E-mailed the account of his group's activity in August from the small island of Foula (IP80XD or YU70d), 44km west of the Shetland mainland. Operation was between the 9th and 15th to include the Perseids shower. For various reasons they had to move their operating site three times, so missed some earlier MS skeds.

The 144MHz station comprised a TS-780, 40W driver, Tempo amplifier and 19-element MET antenna. For 50 and 70MHz they used a TS-430 with Microwave Modules transverters, 100W solid state amplifiers and a Jaybeam 4-element dual-band Yagi. All antennas were mounted on a 22ft mast.

(l to r) Roger, G30HH, Allan, GM4ZUK and local resident Frank getting the gear from the pier on Foula.

MS contacts on SSB and CW were completed with stations in D, G, HG, HB9, OH and OK on 144MHz. Ten MS QSOs were completed on 70MHz SSB and many on 50MHz with F, G and PA stations. Bursts were so long that it resembled tropo working. The final location was a town called Ham, with such a poor take-off to the south that only three stations on the Scottish mainland were worked.

The equipment was packed up on the 15th, but they couldn't get off the island for three days due to gales, so they missed a huge aurora and, on the boat trip back, some Es. Stewart concluded, "This divine intervention means that YU square is as rare as ever it was - which is probably not a bad thing."

The other members of the team were Allan, GM4ZUK, and Roger, G3OHH. They would like to thank Frank, one of the 42 residents of Foula - who helped them move equipment - and regular visitor Terry Robinson, G3WUX, who lent them a hand on 50MHz.

REPEATER NEWS

Most of the Summer Newsletter from the Kent Repeater Group is devoted to the minutes and report of the AGM held on 26 May. It was the first effort by its new editor Tony Young, G1AJY, who managed to squeeze in a half-page of news of the group's repeaters. The seven relays mentioned all seem to be working satisfactorily, even though the very hot weather did cause GB3EK to drift a bit. The secretary is Kelvin Fay, G0AMZ, who is QTHR.

The Summer issue of *Talkthrough*, the newsletter of the UK FM Group (Western) runs to 32 pages of diverse material, including the odd 'Heard on the Repeater' anecdote, viz; One G7 to another: "There must have been a lot of passes in the last exam, George. I worked a G8 the other night. Have you heard one yet?". There is plenty of information about the group's repeaters and a list of the 483 paid-up members at 10 July. PO Box 73, Crewe is no longer available, so if you want details write to either G3LEQ or G4WSS, both QTHR.

WORKED ALL BRITAIN

In its September press release, the WAB Group mentions the award of a Certificate of Merit to Leroy Dale, ZS6XJ (KG33) for his outstanding 50MHz achievements. He has won numerous awards for the band and has probably worked most of the European DX-chasers on 50MHz. The new and fully revised Fourth

Series WAB Book is now available from G4KSQ for £7·00, including postage.

CONTEST NOTE

The forthcoming RSGB contests are listed elsewhere, but the WAB Group is holding its 50MHz Phone event on 8 October from 0900 to 1200GMT. Copies of the rules are available from G6TNW, Cornerways, Orchard Road, St Neots, Huntingdon, Cambs., PE19 3AN. Send a 9x4 inch SASE, plus three first class stamps if you also want logsheets.

METEOR SCATTER

The next significant meteor shower is the Orionids, which - like the Eta Aquarids in May - are associated with comet Halley. The Right Ascension is 95°, the Declination 16° and at its peak, which should be on 21 October, the ZHR is 30-40. The radiant is above the mid-UK horizon between 2100 and 1200.

Prime times for the usual directions are; NE/SW around 0230, E/W around 0430, NW/SE around 0700 and N/S, two equal peaks around 0100 and 0800. If the prime time coincides with the actual peak, results should be quite good. There are several other minor showers in this period which could provide additional reflections. Incidentally, the worst times for any particular direction coincide with the prime times for the direction at right angles. For example, the worst N/S time is 0430, which is the prime time for the E/W path.

50MHz

Ray Cracknell, G2AHU (HWR), has forwarded his comprehensive July report and remarks on the very short solstice 'closed season' for TEP which only lasted from mid-June to mid-July. Beacon and amateur signal reception in Britain shows that ZB2VHF was heard for 90% of the month; CT0WW and CT/EA amateurs 61%; 9H1SIX and 9H amateurs 55%; LA, OH, SM 29%; F, I, T77 65%; DL, HB9, OE, OZ, PA 23% and 5B4CY 29%.

From Greece, SV1DH records 18 and 19 July as the only poor days. The new TEP season started on the 21st, but there was TEP propagation on 48MHz from Z2 on 48% of the days. Once again France fared best in the Es stakes at 68%, followed by PA 52%, 9H 42%, ZB2 39% and G 35%.

Mike Gotch, G0IMG (ESX), added GD, SV and TK to his score since his last report. Dick Hyde, G0LFF (SXW), lists some choice DX including LA and OH on 22 July; Z23JO (KH52), CX4HS (GF17), FM5CW and PA3DYY/MM on the 23rd; LUs 8MBL (FF57), 2EIO and 9AEA (GF05) and CX4HS on the 27th; 9Hs on the 29th with ZS3VHF at S8 at 2035 on the 30th on an otherwise empty band. August brought ZS6, Z2, 9H and EA7 cross-band on the 2nd; ZB, TK and F on the 6th; SV1OE (KM17) on the 10th, while OH9NLO and LA9BM were contacted via auroral Es on the 21st.

Bob Nixon, G1KDF (LNH) heard Z2 and ZS3 on the 27th with CX, LU and TK worked. GM0FRT/P (IP80/Foula) was worked on 12 August using MS procedure and GMs were contacted in the aurora on the 17th. 9H4W on Gozo (JM76) was an interesting QSO on the 18th. LA, OH and SM were worked on the 21st and many GMs heard in the aurora on the 23rd. He caught the South America opening the next day, working three LUs in GF05 and CX4HS between 2010 and 2100. From 2115 to 2150 he copied PY2SB, PY2DM (GG66) and PY2GWH who was S3 for 30 minutes; Bob didn't hear him work anyone, though.

Andy, GM4IPK (SLD) worked ZS3KC (JG77) on the 9th and heard ZS3VHF between 1715 and 1805. He said that there were also some Es to the south coast of France at the same time. On the 21st there was an Auroral Es opening to PA, G and SM6 and Andy also heard an OZ on 50MHz, together with a baffled-sounding Russian non-amateur station on 50·200! The band opened from him to CX4 on the 23rd but no QSOs took place.

Darryl Green, G1PBU (SRY), was away in the second half of July. 6 August brought SV1OE at 1710, then TK/PA0ERA and some Fs. 9H5s BN and BW were contacted in his lunch break on the 8th. MS on the morning of the 12th saw completions with EI8EF (IO54) and GM3WOJ (IO77) and in the evening GM0FRT/P, GM0HSC and GM4WJA were further SSB MS QSOs.

Gerry Schoof, G1SWH (LNH), caught the South America opening on 23 July working CX4HS, LU6DLB and LU1DMA (GF05) and CX8BE (GF15). John Hunter, G3IMV (BKS) worked much of the DX that was around, such as CX, LU, Z2, ZD8, ZS3, ZS6, etc. He remarks that it is not too easy to get through the monumental pile-ups from G and PA.

G4IJE reports many openings to CT, F, OH and 9H. On 23 July Paul heard CXs and LUs but couldn't crack the huge pile-ups. At 1841 on the 27th he contacted his second ever Argentine station, LU2EIO; then patience was rewarded at 1855 when he worked CX4HS for country number 47. On the 31st, Z23JO was no48 at 1745. ZS6s were worked on 2 August. Paul thought activity in the Perseids shower was fair but no F, LA, OH or SM stations were heard on 50·350MHz, which is the designated random MS frequency. The shower produced bursts up to three minutes duration from GM0FRT/P and the GM3RMK beacon.

Ted Collins, G4UPS (DVN), sent in the usual comprehensive report covering the period to 14 August, and he worked and heard all the European and African DX reported above. In his information sheet, Ted records: that LX1SI promised to telephone him as soon as the LXs received their permits; that the Belgian PTT has agreed to 50MHz operation; that with the ending of Channel E1 TV in Spain, several EAs have applied for permits; that GM4DGT has moved to IO86DC in Clackmannanshire and that ZC4MK "is hopeful of receiving a permit, according to Hal Lund, ZS6WB."

Byron Fletcher, G6HCV (SFD), used MS to work the Foula expedition, GM0FRT/P, on 12 August, completing in a single two-minute burst. He enters the table with 143 'legal' squares. Ian Harwood, G8LHT (YSS), found PA3DYY/MM in JN01 on 27 July. On 8 August he worked 9H5AB and TK/PA0ERA, and the next day, F5NS and FC1GHX, neither of whom are on the list of French permit holders.

Ela Martyr, G6HKM (ESX), has made the magic 'ton' thanks to FC1JBA (JN15) on 6 August. Prior to that she worked LUs 9AEA and 2EIO and CX4HS on 27 July; Z23JO on 2 August, followed by ZS6WB, 9H5s BN, AB and O. She caught the aurora on the 17th but only worked GM0GEI (IO77). LU6DLB (GF05) was contacted on the 19th, while auroral Es brought QSOs with OH6RJ (KP22) and SM2CEW (KP15) later that evening.

Steve Damon, G8PYP (DOR) worked a rare 'local' on 23 July, G/PA3AUC/P (IN79). F2LQ/P (IN88) was contacted on the 28th but is another apparently self-licensed station. Es accounted for PA3DYY/MM (JN01) on 2 August, 9H5BN on the 8th and CT1XY (IN51) on the 14th. John Fitzgerald, G8XTJ (BKS) logged GMs 4DGT and 3YOR on CW in the 17 August aurora and confesses, "Wish I had the guts to use the key." Well, why not have a go? We all had to start sometime!

It was a pleasure to hear from George Ripley, GD3AHV, who I first worked 30 years ago when he was VQ2WR in Northern Rhodesia. He worked CX4HS on 7 July for the first GD/CX contact and Z23JO for the first GD/Z2 QSO on the 27th. Other notable QSOs were EA8/G3JVL on 8 July, SV1DH on the 14th and three LUs on the 23rd. He also mentions assorted CT, F, LA and OH activity.

Geoff Brown, GJ4ICD, claims the first GJ/Z2 QSO at 1646 on 23 July. LAs were around at 1740, followed by CXs and LUs from 1800 until 1928 when he went QRT. Z23JO was up to 40dB over S9 from 1700 on the 28th. Many ZSs were on from 1600 on 2 August, plus several LUs from about 1900 to 1930. On the 12th, he had tropo QSOs with GB2XR and GM0EWX.

Like many others, Geoff is getting fed up with those who use the inter-continental DX calling frequency, 50·110MHz, for working locals and rag-chewing. He cites GM6RGN working Gs and Fs via Es. French stations have no authority to be there anyway, since their permits are for 50·200-51·200MHz only! PLEASE stick to the band plan

ANNUAL VHF/UHF TABLE
January to December 1989

Callsign	50MHz Cty	50MHz Ctr	70MHz Cty	70MHz Ctr	144MHz Cty	144MHz Ctr	430MHz Cty	430MHz Ctr	1.3GHz Cty	1.3GHz Ctr	Total Points
G1SWH	68	26	64	6	90	19	51	6	—	—	330
G8LHT	58	16	19	4	89	26	45	14	7	4	282
G6HKM	59	29	—	—	73	27	39	14	23	7	271
G0IMG	66	24	39	5	51	10	27	5	—	—	227
G4XEN	24	9	23	4	76	31	39	11	—	—	217
G4PIQ	—	—	—	—	81	34	41	20	—	—	176
G1DOX	26	3	33	6	57	13	20	3	2	1	164
G8PYP	33	21	—	—	50	25	23	10	—	—	162
GM1SZF	41	11	—	—	71	16	7	6	—	—	152
GM4CXP	28	11	4	1	60	19	4	3	—	—	129
G8XTJ	40	14	—	—	54	13	—	—	—	—	121
G0EVT	24	19	—	—	39	26	6	6	—	—	120
G3FPK	—	—	—	—	74	24	—	—	—	—	98
GW4FRX	—	—	—	—	65	32	—	—	—	—	97
G4OUT	—	—	27	5	41	18	—	—	—	—	91
GJ6TMM	28	12	—	—	23	9	1	4	—	—	77
G7CLY	—	—	—	—	54	14	4	1	—	—	73
G4TCK	—	—	—	—	44	44	—	—	—	—	58
GM0JOL	—	—	—	—	43	11	—	—	—	—	54
G0HDZ	—	—	—	—	38	7	—	—	—	—	45
GM1ZVJ	4	3	—	—	22	11	—	—	—	—	40

Do not include EI countries. British countries are the 79 listed in the January RadCom. Up to three different stations allowed in all 12 GM regions. Countries are the usual DXCC ones.

which can be found in the *RSGB Call Book*. G4UPS and I have it on disk, so if anyone wants a copy printed off an SASE to either of us will get it to you.

At a recent meeting of the VHF Committee, we discussed the band plan and endorsed the idea that 50·200MHz be designated a 'dead band calling frequency'. This was proposed to try to prevent the problems caused by the 'call and QSY' technique when the band is busy.

Michael Thomson, GM4JEJ (TYS), has heard quite a lot of DX from F, OH, CX, ZS, ZB, etc. but wrote in his letter of 27 July, "Still no auroras or openings to the USA. Perhaps you could explain why, with so much solar activity, there is a lack of auroral activity?" The general trend is for there to be fewer auroras in the summer months and for auroral activity to peak 12 to 18 months after the sunspot peak. GM4IPK has reported numerous events from Shetland since Michael's letter, so I hope that GM4JEJ has now made some auroral QSOs, perhaps during the 14-18 August period.

70MHz

Ray Parrish, G0DMV (CHS), reports that there are about eleven stations QRV on FM in the Macclesfield area. Most use Pye Westminsters on 70·45MHz, though some have 70·26MHz as well. There is usually some nightly activity on 70·45MHz. The only other reader to mention 70MHz is G1SWH who worked EI9FK/P (IO51) on 9 August and again in IO54 on the 24th. On the 21st he found GM4ZAP/P (IO64) for a welcome Western Isles QSO.

144MHz

Andrzej Kaleta, SP6GVU (JO81LC), worked some fine DX in the Es opening on 21 July, using an IC-202S, 30W amplifier and 17-element Tonna Yagi. Between 1356 and 1628 he lists 20 QSOs with Russian stations, seven of them over 1900km. Best DX were UV4HN (LO43), UA4CFV and UA4CAJ (LO32), UA4API (LO20), UW6HN (LN04), UA4FFD (LO33) and RA6AX/UA6YP (LN03). Most signals were S9 plus 20dB. At 1342, SP6ASD and SP6AZT (JO81) worked UG6AD (LN20FE).

Colin Morris, G0CUZ (WMD), used four modes to bring his squares tally to 327. Es on 22 July brought Italians between 0716 and 0826, a gotaway being IA5PLB (JN52) on Elba. Tropo on 31 July provided GW0KZG/MM in JO15 and JO05, and on 10 August at 2330 EA1TA and EA1ACD (IN53) who were S9. The only activity in an aurora on 10 August was GM4IPK (IO99) but the one on the 16th was better, yielding SM5CBN (JO78), GM4DHF/P and GM0JOL (IO78) and SM4KYN (JO79) between 0040 and 0108. The event faded away by 0140.

LOCATOR SQUARES TABLE
Starting date: 1-1-1979

Callsign	50MHz	144MHz	430MHz	1.3GHz	Total
G6DER	43	183	114	82	422
GJ4ICD	215	263	119	59	656
G8ATK	—	143	94	52	289
G4RGK	—	284	126	51	461
G3IMV	91	427	124	48	690
G6HKM	102	215	107	45	469
G1KDF	139	180	102	37	458
G4MUT	82	153	93	31	359
G8LHT	72	175	88	10	345
G4VXE	147	162	42	4	355
G1DOX	33	61	11	3	108
G4IJE	225	338	5	2	570
G4KUX	—	384	120	—	504
G4XEN	66	290	111	—	467
G6HCV	143	229	—	—	372
G4RRA	—	277	80	—	357
G4SSO	—	251	95	—	346
G4PIQ	—	256	86	—	342
GM4YXI	—	340	—	—	340
G4SWX	—	333	—	—	333
G0CUZ	—	327	—	—	327
G4DHF	—	325	—	—	325
G0EVT	58	197	57	—	312
G1SWH	97	123	53	—	273
GJ6TMM	62	151	47	—	260
G3FPK	—	240	—	—	240
G0LFF	83	153	—	—	236
GM4CXP	—	198	31	—	229
GW4FRX	—	226	—	—	226
G4DOL	—	213	—	—	213
G8PYP	68	98	21	—	187
G8XTJ	38	116	—	—	154
G4XBF	—	150	—	—	150
G4TGK	—	136	—	—	136
G0JHC	117	—	—	—	117
GM0GDL	—	81	22	—	103
G1WPF	—	101	—	—	101
GM0GEI	94	—	—	—	94
G0HDZ	—	64	—	—	64
G6MEN	48	—	—	—	48
G7CLY	—	38	1	—	39
GM1ZVJ	5	33	—	—	38

No satellite, repeater or packet radio QSOs. 'Band of the month' 1.3GHz.

Best in the Perseids were LA6HL/TF (IP14) on 6 August and in IP25 on the 10th, TK4MS (JN42) on the 10th, and on the 12th CT/F1DDA (IM59) on SSB, EA3BEW/7 (IM77) and OH2AUK (KO19). Colin completed seven other QSOs, but thought the shower not as good as in 1988. The peak was 0600-0800 on the 12th, as he had calculated by adding six hours to the previous year's peak time.

G0LFF worked two IW0s via Es on July 22, while MS brought IW1AZJ (JN35) and GM4CAN/P (IP80) on 12 August. G1KDF claims random SSB MS QSOs with OE3JPC (JN88), IK3CBU, DJ7KL and I0UZF (JN63) on 12 August. Auroral QSOs on the 17th were with GB2XS and GM4DHF/P and on the 23rd with GM6RGN (SLD). Bob operated portable from IO83PO in the Low Power Contest on 5 August, his 182 QSOs and 65 multipliers bringing 82940 points.

G3IMV thought the Perseids quite good. The longest burst was from HG1S in the early evening of the 12th; although 150 seconds long, they didn't complete. Four new squares were TK4MS, SP6ASD/8 (KO10), SP6AZT/8 (KN19) and OH1AYQ (KP12). John has worked GW0KZG/MM in several wet squares and thinks Andy is to be congratulated for his efforts. His 1990 provisional schedule has been published showing more North Sea operation from the Challenger, plus some from the Atlantic, west of Scotland.

Peter Atkins, G4DOL (DOR) worked three I0s via Es on 6 August from 1756 and a couple of EA7s around 2005 on the 11th. He thoroughly enjoyed random SSB operation in the Perseids on 12 August, completing with YU3AN, FC1JG, I8KPV twice, OE3OBC, IW5AVM, EA6FB (completed in a 30-second burst at 1155), EA6VQ, EA3ADW and OE3NFC. At 0712 on the 13th he worked I2FHW (JN44) on tropo. At 1752 on the 21st, GM0EWX (IO67UL) was the only station worked in an aurora.

It took John Palfrey, G4XEN (NHM) 37 minutes to work GB4XT on MS on 18 July and he wonders what region North Rona is in? My guess would be Orkney but don't take that as gospel *(Our Bartholomew* Gazetteer of Britain *puts it in the Western Isles - Ed).*

John caught the early morning Es to Italy on 22 July but best DX came later, to UO5OIW (KN46KX). Shift work resulted in his missing the best of the Perseids, but when he did listen the bursts didn't seem very long.

Mark Holloway, G4YRY (DOR), runs an FT-290, 80W amplifier and two 14-element Yagis. He worked Italians in the 0 and 2-5 call areas in the 22 July Es between 0723 and 0737 and heard I4XCC at 0830. G6HKM worked GW0KZG/MM in JO14, 15, 24, 25 and 35 for five new North Sea squares. Ela monitored the random SSB MS frequency on 12 August and found it most interesting, so she might be tempted to have a go sometime. In the 17 August aurora she worked GB4XS and GM4DHF/P, and worked David again on the 20th when he was in IO76.

Perseids successes on SSB for G6HCV were GM4CAN/P on 11 August, Y22IC (JO63) on the 12th and LA9ZV (JO59) on the 13th - all completed within four minutes. IW5BML (JN52) was the only station heard in the Es opening on 22 July at G8LHT. Between the 24th and 31st, Ian had QSOs with GW0KZG/MM in JO05, 12, 13 and 15 for four more squares. Other QSOs of note were with GM3POI/P (OKE) on the 29th, GM3ZME/P (SCD) on 3 August and GM4ZAP/P (WIL) on the 7th.

GJ4ICD missed the peak of the Perseids. Geoff sat on 144·200MHz from 1300 on 12 August to 0600 the following morning and claims QSOs with OK3BIL, YU3ZV, YU3ZW (who was S9 plus for three minutes), YU2KK, YU3DDC, IK5EHN, IK5EHW, IW5AVM, I3FDX, OE3AP, I5JUX, I4XCC, IN3TWX, YU2EZA and IK3EVN.

John Lincoln, GM0JOL (HLD), operated in the auroras on 15, 17 and 21 August, working the usual Europeans and UK countries. Notable contacts on the 15/16th were GW0KZG/MM (JO05), G4CVI (IO90) and DJ9UX (JO41); on the 17th OY6FRA and on the 21st OZ6OL (JO65). One gotaway was GB2XS, all of 60km away yet never worked on tropo.

Keith Kerr, GM4YXI (DGL) has been one of the most reliable signals from north of the Border for years. He has been busy moving his goods and chattels to Aberdeen and hopes to be fully QRV from there before the end of the year. He managed to catch the Perseids as his swan-song from Gretna, and generally found reflections quite good, particularly on 12 August. New squares included LA6HL/TF (IP25), TK4MS, LA/DF9PY/P (JP78), SM6CMU/2 (JP96), SM6CMU/3 (JP62), UR1RWE

TROPO AND AURORAS: A CONNECTION?

In the June VHF/UHF column I included some observations on VHF propagation by John Eden, GM0EXN (HLD), who wondered whether there could be a connection between solar activity and tropo propagation. He has since written to say that "all the repeaters in the Borders region and northeast of England are detectable again on a regular basis." He also feels there is a "connection between certain particle input from the sun, or magnetic or electrical field effect influence, on what we call tropospheric propagation."

Geoff Grayer, G3NAQ (BRK), is a member of the Society's Propagation Studies Committee and has sent a two page mini-treatise on tropo matters. He begins by stating that normal long distance contacts (several hundred kilometres) on 144MHz, which we attribute to 'tropo' are not the result of smoothly refracted rays such as illustrated in all the text books with the caption, 'Super refraction'. For that to happen, the refractive index would have to be just the right value over the whole path to follow the curvature of Earth. He suggests "this would be an astonishing coincidence if it ever happened. Under these conditions signals would suffer only free space attenuation, i.e. they would be very strong."

Long distance, high level signals result from ducting when the waves are guided between layers which follow Earth's curvature. So what of these regular, middle distance contacts we regularly make? Geoff says, "Beyond the relatively short refraction zone (the line-of-sight plus one-third hypothesis) signals proceed by a combination of diffraction over ground-based obstacles and by forward tropospheric scatter. The refractive index of the atmosphere changes continuously from point-to-point due to differences in the temperature, density and - most important - humidity. So the wavefront is continuously undergoing small changes in direction, and hence spreads out.

"For this reason, I believe the model of tropospheric scatter normally adopted - of relatively large angle scatters arising from a small common volume (Ref. J N Gannaway: 'Tropospheric scatter propagation' *RadCom*, August 1981, pp 710-714) - does not represent the true situation except, perhaps, where there is a massive obstacle in the path. Most important, each deviation of direction is very, very small, so the wavefront proceeds coherently (with the same phase) and hence the many scatters reinforce each other. This is not true for large angle scatters, where phase incoherence produces the frequency warble heard on tropo backscatter signals. Remember that phase modulation is equivalent to frequency modulation.

"The amount of forward scatter obviously depends critically on the size and frequency of the irregularities in the atmosphere, and it is this which gives the day-to-day variations of conditions when there are no abnormal openings. It is the size of these irregularities which gives the differences between the bands; after all, the refractive index of air is not frequency-dependent at VHF/UHF wavelengths. Rain is very effective at equalizing the conditions throughout the lower atmosphere, which explains why it generally depresses tropo-scattter propagation.

"So where is the connection with aurora? Well, tropospheric irregularities are not the only source of forward scatter. Ionospheric irregularities can also perform the same function. Normally, these are far too small to be effective for any but extremely high-ERP stations. However, auroral particles precipitated before a full aurora develops cause enhanced ionization on the HF bands, prior to the adverse effects of D-layer absorption and magnetic disruption of the layers."

Geoff concludes, "This auroral precipitation and magnetic disturbance could well create sufficient irregularities in the lower ionosphere (D and E-layers) for ionospheric scattering to become an effective propagation mode. This - rather than tropospheric scattering - may be the mechanism noted by your correspondents." He mentions that support for this conclusion comes from a paper, *Simultaneous VHF Riometer and Forward Scatter Observations* by L A Maynard.

Geoff corrects a statement by Charlie Newton, G2FKZ, in the July VHF/UHF that noctilucent clouds are around 40km high, which would be within the D-layer. Their altitude is around 82km and as Geoff says, "The amount of energy carried by auroral particles is very great indeed; an estimated one million Amps flowing along the auroral curtain at E-layer height. Hence it is hardly surprising that enough heating results to evaporate these very tenuous clouds formed of ice-coated meteoric debris."

(KO38) and YU1ADN (KN03) all on CW, and CT/F1DDA (IM59) and OH1AYQ (KP12) on SSB.

Andy, GM4IPK, now has his LDF-5 feeder and is working on getting the 4 X 15-element Cue Dees up on the tower. With a single antenna he worked EA2s LY (IN80), CW (IN83), LU (IN92) and AGZ (IN91), and at 1821 Andy had a QSO with EB1ARV in IN70. The Spanish station was working into East Germany at the time and Andy had to beam at Y22 to make the contact. Andy commented that he saw his best-ever display of noctilucent cloud on the same evening. He listed auroras on the 10th, 15th, 16th, 17th, 18th, 19th and 21st of August. On the 22nd Andy worked SM2CEW (KP15) via EME with his single Yagi and 350 watts at the feed point. Signals were good enough for rebroadcasting on the 14MHz VHF Net!

430MHz

G0CUZ reports the "only interesting thing worked for a long time was GM3ZME/P on Tiree on 4 August." (How about a squares entry for this band, Colin?) G1KDF took part in the Low Power Contest on 6 August and made 50 contacts with 39 multipliers for a score of 13104 points from the home QTH. Apart from that, activity seems to have been nil. G1SWH lists GB4XT (OKE) on 15 July and G8DDY/P (IOW) on 6 August as recent new ones for the table.

Highlight of the month for G6HKM was working GU3EJL (ALD). Both Ela and G8LHT commented adversely on the RSGB's choice of the day of the Woburn Rally for the Low Power Contest; "A fine piece of planning" as Ian commented. Did any readers submit an entry for the August Activity Contest? If not, just what can we do to generate more activity on the band?

THE MICROWAVES

No microwave activity news this month apart from G6HKM, who reports only one 1·3GHz QSO in August, "and that was a struggle with PE1EWR on the 8th." Perhaps the September Activity Contest and the forthcoming Cumulatives might persuade people to actually operate!

DEADLINES

Some contributors are still sending in reports too late. We all work to a very tight schedule to make Spectrum Analysis as topical as possible, so please make sure you get your input to me by **21 October** for the **December** issue and by the early date of **11 November** for the **January** 1990 *RadCom* - Christmas and all that.

SWL

BOB TREACHER BRS32525

October traditionally marks the start of the HF DX season, where we move away from short-skip summer conditions into the expeditions and contests which herald the beginning of the 'New Season'. This year, as we head for the peak of the current sunspot cycle, we can expect some very good conditions - especially on 21 and 28MHz. The experts are also predicting great things for 50MHz, with a good deal of F2 propagation to look forward to. Will we hear any activity from the Pacific? Only time will tell, although there should be plenty of 50MHz DX on offer from the Caribbean.

With all the increased activity which winter conditions should bring about, I look forward to lots more reports from readers which can be used to form this portion of my monthly offering. However, let's look back now over what happened in August.

HF REPORT

We start with a report from Malcolm Harrington, BRS20249. Malcolm's radio activity has to fit in with his shift pattern, and when he wrote he was finding that his 'late shift' allowed him an hour at the rig between 0630 and 0730. Nice results, too, judging by the information provided in his letter. Some good loggings included J79T on 28MHz CW and FO5JR on 21MHz CW, and JT9C was noted on 14 and 21MHz SSB. Malcolm also accounted for KH6IJ, V31BB, P29CG and HH2Z on 14MHz SSB, all in the space of 15 minutes.

Brad Bradbury, BRS1066, apologized for missing a couple of months. He hasn't been too active but did come across two new Oblasts - 02 and 174 - making a total of 180 heard so far; 161 have been confirmed. Also in the log during August were XU1SS on 14MHz CW (for country number 302), CY0DXX (Sable Is) on 21MHz CW, LU1ZA (South Orkney) on 28MHz CW and ST0SA. Brad notes that the Russians are now mounting many internal DXpeditions to rarer parts of the USSR.

On the question of rare Oblasts, Stan Williams, G3LQI, wrote on the subject of Arthur Miller's comments concerning lack of activity from UA8T. Stan has been licensed since 1955 and had never heard one until 0803 on 21 July this year, when RZ8T/UA4FDS appeared; he was

599 and had a mega-monster pile-up. Stan hoped that Arthur was listening at the time and crossed him off the 'wanted' list with a flourish. If anyone needs it, the QSL route is Box 555, Penza 44061, USSR.

Next, a report from Robert Small, BRS8841. Robert felt that midsummer conditions had been quite good, especially on 21MHz where there were many openings to the Pacific. 28MHz was disappointing, however. As usual for Robert, most DX was on 14MHz during early-morning or late-evening hours; nothing much was heard during the middle of the day. Highlights were CE0NKY (Easter Is), FP/KU2W, ZF2BD, YN3RD, FP89DX, BY4AY, T5YD, ZY0TI, ZD8XX and JT1BR. Here's the best of Robert's list of 21MHz DX - KH6LW/KH7, 3D2AK, T32PO, JH1MAO/JD1 (Ogasawara Is), FO5MC, KH6IMB, 3D2XV (Rotuma Is) and FW/N7HAT, all in the Pacific, together with CM2AW/4 (Isle of Pines), YB9ZDA (first YB active from East Timor), DL1SCQ/TF7 (Westman Is) and 3D2SI (Conway Reef). On 28MHz Robert logged ZY0TX and CY0DXX for new ones. On an otherwise dead band one morning, KH6JJK put in an appearance. Other highlights included VP8BWT, ZD7VC, ZD8PJ, 5H3TW and 6Z2E (Liberia).

Pick of the HF news from David Whitaker, BRS25429, was that he had heard 9M6HF and 9M8STA on 14MHz. Like Robert Small, David found 28MHz poor, with only TJ1MW, A92BE, BY4AY and 8Q7AC heard during the entire month.

Finally, a quick look at 18 and 24MHz. David Whitaker sent a detailed report of his findings on 18MHz. As of 15 August he had heard 87 countries including 9M2RI, YN3CB, VP9LP, J6LPS (QSL via W2GBX), HP3FL, YB6LD, CE0ICD, VP2VM, C6ARC, HH2MC, FR5EL, HC5K, T32IO, 8P9FU and ZD8JW. On 24MHz Robert Small mentioned AL7I, HC1HC, HK7/SM5HV, HZ1AB and VP2EHF (direct QSLs only).

QSL cards reported from a number of sources included BY5NC, KC6VW, DK1CE/KH8, VP8BUB, ZX0F, 3C0A, 3B1DB, 3D2CR, 3W0A, 3W8DX, 5V7WD and 9X5AA.

VHF REPORT

Martin Parry, BRS52543, sent in a brief update before leaving for a holiday in the sun. 22 July was a good day, with SM6PU (JO67) heard at 0608 on 50MHz. Between 1246 and 1423 Martin logged a variety of OH stations in KP01, 11, 20, 24 and 26. On the 23rd he caught CX4HS (GF17), CX8BE (GF15), LU2EIO, LU1DMA and LU6DLB (all GF05). On 144MHz Martin noted six Italians between 0717 and 0726 on an unspecified date.

Up in Harrogate, David Whitaker had no success with the Perseids - he says he doesn't have the patience! On 50MHz he mentioned 23 July as being a good day, hearing LU8YYO, LU4DMX, LU9AEA, LU1DMA, LU3DMA, LU6DLB, CX4HS and CX8BE. David heard ZS3E on the 27th, ZS6LN (KG46) on 2 August and Z23JO on 5 August. On the European scene David logged some Frenchmen, PA3DYY/MM in JN00 and TK/PA0ERA in JN41.

Mick Toms, BRS31976, actually mentioned some tropo on both 144 and 430MHz - a rare event these days - although he added that he hadn't been at the rig at the right time. Mick had more success at finding GW0KZG/MM than your scribe did and heard him in JO12, 13, 25, 34 and 35. On 430MHz some Scandinavians were logged on 19 June. In the Perseids Mick copied good bursts from UR1RWX (KO29), EA6FB (JM19), OH2AUK, EA7AJ/P, SP6AZT/8 and HB0/HB9QQ in JN47.

Here in London, VHF has been quite poor. On 50MHz, CX4HS was logged on 23 and 27 July. PA3DYY was /MM in JN12 on 23 July and in JN00 on 2 August. Some LUs were heard around 1900 on 27 July. ZS6WB and LU7DZ were heard on 2 August, whilst Z23JO, ZS3E and the tail-end of a CQ from '...B' at 1726 were heard on 5 August. I thought at first that it might have been 7X5AB but it seems that ZD8MB was on the band that night, so it may have been him. SV1OE (KM17) and SV1AB (KM18) were logged about 1720 on 6 August.

In the Perseids, two new ones were heard on 70MHz - GM3WOJ (IO77) and EI9FK/P (IO43). On 144 MHz, OH5LK (KP30) and OY6FRA (IP61) were new. Elsewhere, there were plenty of bursts from the 'regulars' in the course of the year's best MS event. Stations identified included IC8CQF, IW5BML, YU1WP, YU2CAU, I5JUX, HG5PT, YU1AFS, IK4DCO, SK3LH, YU3C, HG8CE, YU3AN and YU1LR.

That's it for this month - keep those reports coming!

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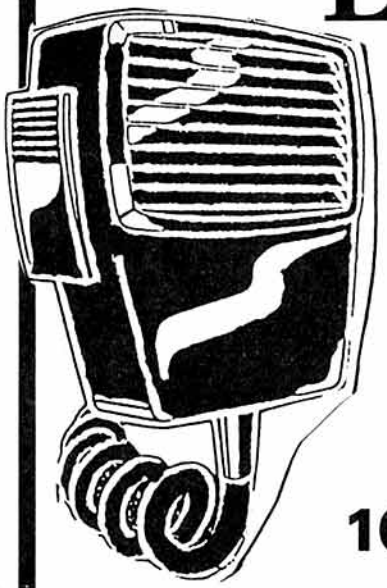

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For more information on the TS-950S and its likely delivery schedule, contact your approved Kenwood dealer soon.

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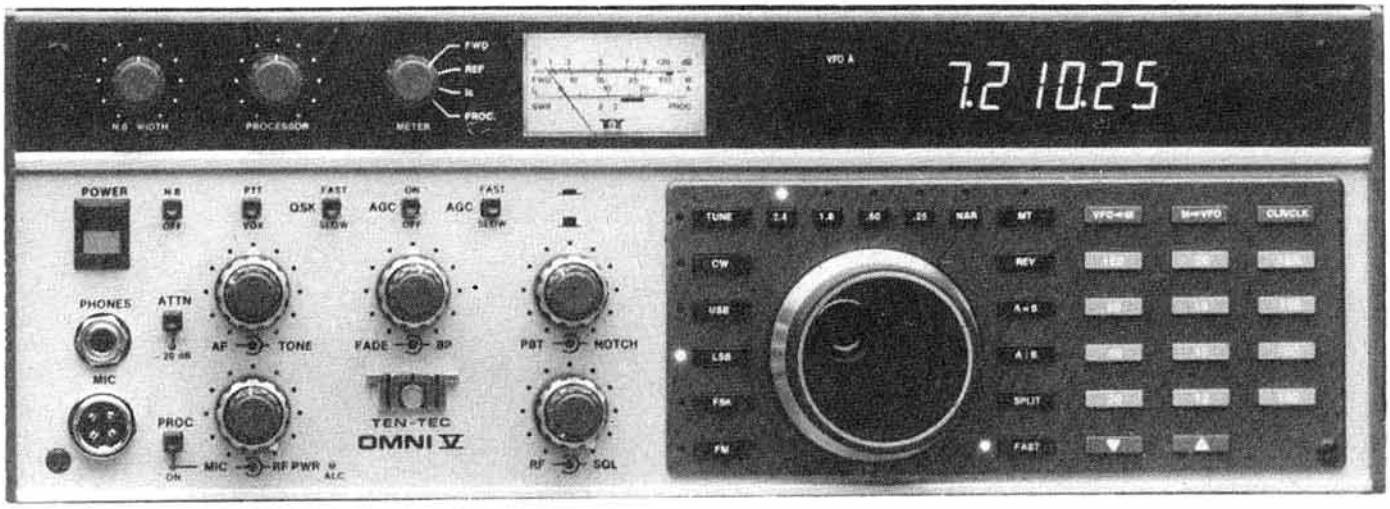


The NEW OMNI V:

The OMNI V is a Paragon with a 12 band crystal mixed local oscillator in place of the general coverage synthesized oscillator. The result is receiver cleanliness like the legendary Corsair and Omni series. The OMNI V local oscillator is a new ultra low noise 5.0 to 5.5 MHz PLL design. Phase noise is simply eliminated as a significant variable. Dynamic range is maintained right up to the edges of the crystal filters, even under the most adverse conditions.

Many of the nifty features made possible by digital technology are included. Dual VFO's with A-B-split select, the frequency stability of a PLL, 25 tuneable memories, VFO to MEM, MEM to VFO and the SCRATCHPAD feature. RS-232 interface is standard and includes remote band switching for the HERCULES II amplifier. The memories are nonvolatile RAM and are retained until you change them. The status registers and clock are backed with a lithium battery (2 year life) so that when the rig is powered up, the status is the same as when you turned it off.

The OMNI V operates USB, LSB, fast or slow QSK CW and real FSK. FM is optional. All bands from 160 through 10 meters are push button selectable. Each band position covers 500 kHz plus 30 kHz over-shoot at the band edges. The four 500 kHz segments of the 10 meter band are switched automatically as you tune through the segment limits. Tuning is in your choice of 10 Hz or 50 Hz increments on SSB, CW and FSK. With the FM option, tuning is in 100 Hz or 500 Hz increments. Up/Down buttons tune in 10 kHz or 50 kHz increments.

An auxiliary frequency tuning system is available and plugs into the rear panel. This allows you to remotely tune the frequency from the most convenient and comfortable position. It takes about 10 ms to fall in love with this option.

A noise blanker and audio speech processor are standard equipment as is the cw sidetone and speech monitor. The rear panel has a full complement of inputs, outputs and controls for the convenience of the all-mode operator, including an auxiliary RX antenna input. High speed key lines are provided for QSK control of a fast switching amplifier, such as the TITAN or HERCULES II. Changeover in fast QSK is less than 30 ms, great for CW and the digital modes.

The front panel is spacious and friendly. The vacuum fluorescent display uses large, bright, easy to read elements. The frequency display doubles as the 24 hour clock display when the CLOCK button is pressed. Other elements indicate VFO status and warn when the memories are full.

All four of the 6.3 MHz I-F crystal filter positions are push-button selectable, independent of mode. A second filter socket is also provided, in series, behind the standard 2.4 kHz filter in the 9 MHz I-F. This may be used for an optional 2.4 kHz, 1.8 kHz, 500 Hz or 250 Hz filter which is selected with the "NARROW" button. This adds six or eight poles into the crystal filter network and even further reduces the impact of adjacent strong signals. Most impressive!

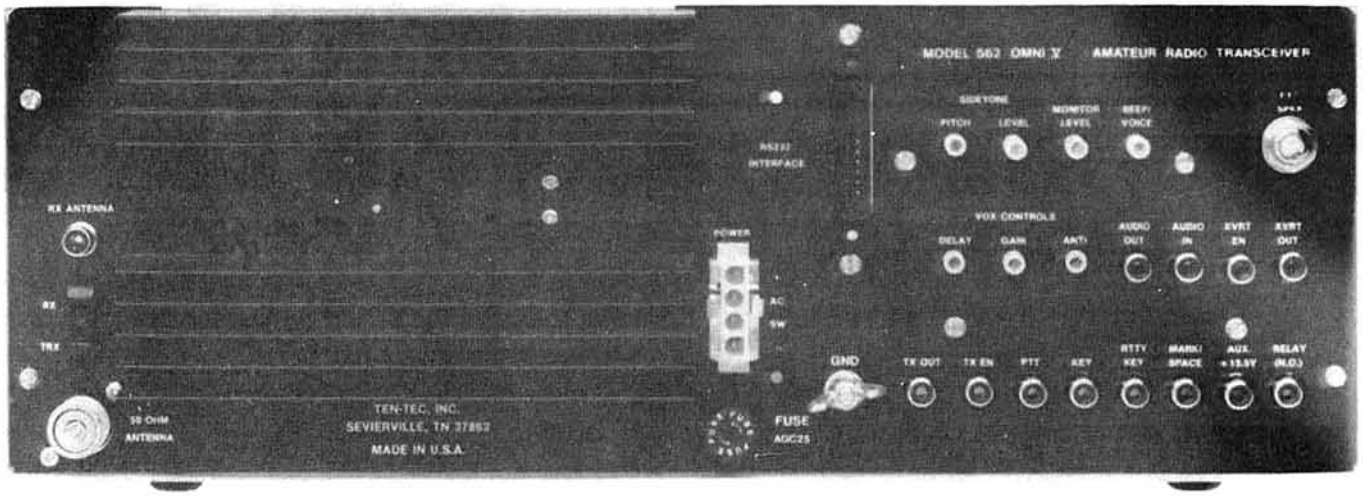
If you do not need a general coverage receiver in your HF rig, the elegant OMNI V is a great choice. If you are also a serious DX-er and/or contester, the OMNI V is the best choice.

GENERAL SPECIFICATIONS

Frequency Range: Transmit and receive on all ham bands from 160 through 10 meters in their entirety. Twelve 500 kHz segments plus 30 kHz over-shoot at the upper and lower edges of the segments.
Frequency Control: LO generated from a crystal oscillator mixed with a low noise 5.0 - 5.5 MHz phase locked loop.
Frequency Stability: Worst case, 1 PPM per degree C at 29.999 MHz.
Frequency Accuracy: +-100 Hz @ 25 degrees C.
Antenna Impedance: 50 Ohms, unbalanced.
Printed Circuit Boards: G-10 epoxy glass.
Power Required: Receive = 1.5 A. Transmit = 20 A. 12-14 Vdc.
Dimensions: HWD 5¾" x 14¾" x 17". 14.6 x 27.3 x 43.2 cm.
Net Weight: 16 lbs. 7.25 kg.

TRANSMITTER

Modes: USB and LSB (J3E), CW (A1A), FSK (F1A). Optional FM (F3E).
DC Power Input: 200 watts maximum.
RF Power Output: ALC stabilized, adjustable from 20 watts to 100 watts (50 Ohm load) with front panel RF OUT control.
Microphone Impedance: 200 Ohms to 50k Ohms. Bias voltage for electret mic is provided in front panel connector.
CW Sidetone: Internally generated with rear panel level and tone adjustments, independent of front panel audio level control.
SSB Generation: 9 MHz, 8 pole crystal ladder filter, balanced modulator.
Carrier Suppression: Greater than 60 dB.



Impressive from either end... but it's how we make ends meet that really delivers the difference.

SEE OMNI V AT LEICESTER — STAND 11 — EXHIBITION HALL

Unwanted Sideband Suppression: Greater than 60 dB at 1.5 kHz AF input.
Harmonic Emissions: Greater than 45 dB below peak power output.
Third Order Intermod Products: -30 dB from two tone at 100 watts PEP.
Metering: Switchable forward power, SWR, collector current or audio processing level on SSB.
CW Offset: 600 Hz.
FSK Shift: 170 Hz.

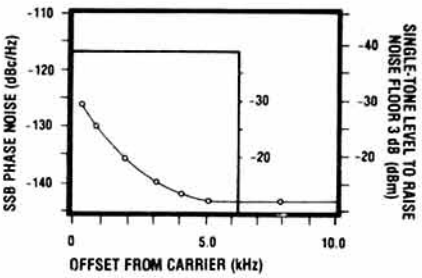
RECEIVER
Modes: LSB, USB, CW and FSK. FM with optional board.
Sensitivity: .15 uV for 10 dB signal to noise ratio at 1.8 kHz bandwidth. With FM option, .3 uV for 12 dB SINAD at 15 kHz bandwidth.
Selectivity:

	-6 dB BW	-60 dB	Shape Factor
Standard 2.4 kHz	2.4 kHz	3.36 kHz	1.87:1
Opt. 1.8 kHz	1.8 kHz	2.90 kHz	1.60:1
Opt. 500 Hz	500 Hz	1.40 kHz	2.80:1
Opt. 250 Hz	250 Hz	.85 kHz	3.40:1
Opt. FM	15 kHz	30.00 kHz	2.00:1

Attenuator: -20 dB.
I-F Frequencies: 1st I-F 9 MHz, passband tuning I-F 6.3 MHz.
Image Rejection: ►100 dB.
I-F Rejection: ►60 dB average.
Noise Blanker: Switchable on/off with width adjustment.
Dynamic Range: 97 dB, measured with standard 2.4 kHz filter at 20 kHz spacing. 100 dB + with cw filters.
Third Order Intercept: + 10 dBm.
Noise Floor: -133 dBm @ 2.4 kHz bandwidth.
Squelch Sensitivity: Less than .6 uV.
Receiver Recovery Time: Less than 30 ms.
Pass Band Tuning I-F Shift: + -2.3 kHz.
Audio Output: Speaker, 1.5 watts @ 8 Ohms. Fixed level 1 mw @ 600 Ohms.
Notch Filter: 250 Hz to 2.2 kHz, greater than 50 dB notch depth.

Audio Bandpass Filter: 4 pole, variable center frequency 220 Hz to 1.7 kHz, 35% band width @ -6 dB.
Tone Control: Variable 15 dB roll-off @ 5 kHz.

PHASE NOISE PERFORMANCE OF THE OMNI V
-127 dBc/Hz @ 250 Hz offset from carrier.
-146 dBc/Hz @ 5 kHz offset from carrier.



Here is a graph of the phase noise performance of the OMNI V receiver. These measurements can only be made under laboratory conditions and, even then, our test equipment is at the limit of its ability to measure the noise at the narrow offsets. The significant measurements are those close-in. Note that this graph does not even go out to 25 kHz offset where many of the published measurements are made. Certainly, we invite comparison.

Contact your local Ten-Tec dealer for further details of this truly remarkable high performance transceiver. Also ask about the rest of the amazing range of Ten-Tec 'professional' amateur equipment now available throughout the U.K. Call Fred Rendell on 021-789 7171 for details of your nearest stockist.

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G4AOG

A MESSAGE FROM THE GUVNOR

(The one on the right)

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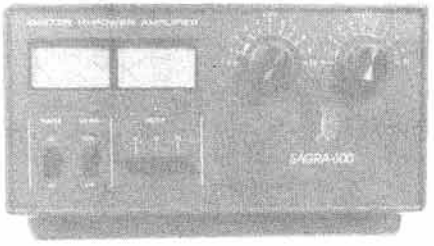

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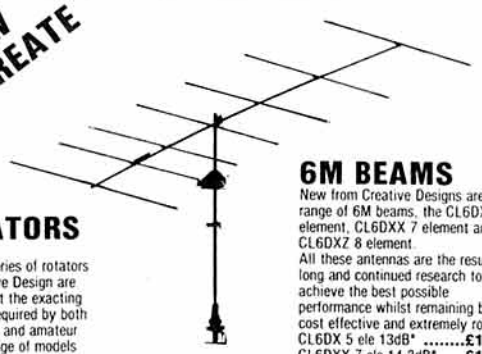

6M BEAMS

New from Creative Designs are a range of 6M beams, the CL6DX 6 element, CL6DXX 7 element and CL6DXZ 8 element.
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*Manufacturers figures

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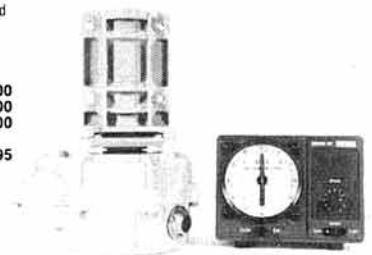

COMET & HOKUSHIN ANTENNAS

New from Hokushin, an exciting range of high performance antennas, the WX1 has been a best seller for some time now, available are its bigger brothers the WX2 and WX4. Both are multi section 2m/70cm colinears and the mechanical construction the best we have seen yet. On the mobile front a new mini dual bond mobile, the HS-727SS, very similar to the Comet CHL21J, and tests with our network analyser confirm its compatibility with our existing range of gutter and mag mounts. Also available a low profile hatchback mount and cable, the SS-B1, two new dual band antennas, the very slim VM-720SKR and the compact HS-727VMS. Both are suitable replacements for the 70N2M. For the HF enthusiasts a compact 10m HB9CV dual driven element antenna that is extremely light and very cleverly constructed.

WX2	WX4	HS-727SS	28HS-2HB
VHF/UHF Base	VHF/UHF Base	VHF/UHF Mobile	10m 2 ele HB9CV
144/432MHz	144/432MHz	144/432 mini	Dual driven element
6/8db gain	7.8/10.8db gain	1/4 / 5/8 wave	6dbi gain
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258	70cm 2 x 5/8	£29.37
358	70cm 3 x 5/8	£33.73
268E	70cm 2 section colinear	£32.80

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CHL21J	Mini dual band mobile	£14.95
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CA2X4KG	2m 2 x 5/8 70cm 4 x 5/8	£39.95
70N2DX	2m 6/8 70cm 3 x 5/8	£37.75
HS-727SS	Dual band mini antenna NEW	£16.95
HS-727VMS	2m 1/2 70cm 2 x 5/8 NEW	£25.95
VM-7020SKR	2m 1/2 70cm 2 x 5/8 NEW	£24.95

DUAL BAND BASE ANTENNAS

WX1	2m/70cm colinear	£54.99
WX2	2m/70cm colinear	£75.00
WX4	2m/70cm colinear, high gain	£99.00
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TECHNICAL TOPICS

PAT HAWKER G3VA

POWER SUPPLY COMPROMISES

Power supply units remain an area where home design and construction continues to interest many amateurs even in this era of black boxes. But it is an area where care is needed, particularly if the PSU is to be used to drive an expensive transceiver or linear amplifier without inducing a gnawing fear that one day it may inflict costly damage on itself or its load. Protection against excessive voltage output (transient or sustained), over-current and short-circuit protection, switch-on transients and current surges, including safeguards against all likely fault conditions are important, while always paramount should be the safety of users, their family, pets etc. The degree of voltage regulation and ripple filtering may vary widely according to the intended load (transceivers intended for mobile operation will include in-built voltage regulation). Then again, for some applications questions of size and weight and the desire to counter the rising cost of what we used to call the 'ironmongery' — mains transformers, smoothing chokes, metal cabinets etc — will need to be taken into account. In many areas of electronics, the 50Hz PSU is being superseded by switched-mode units and inverters with the tendency for these to function at ever higher switching frequencies and involving the need to counter radio-frequency-interference (RFI) problems by the use of good EMC practices. For 50Hz and higher frequency units the toroidal transformer has become established (see *TT* March 1986, pp 186-7 for a summary of the advantages of toroids based on information stemming from John Brown, G3EUR) as an alternative to conventional laminated-core transformers.

To meet *all* the requirements outlined above with a high-voltage or high-current transmitter/transceiver PSU is neither easy nor cheap, and in practice many of the designs published in *TT* and elsewhere tend to include compromises that reflect the designer's belief that, despite Murphy's Law, particular fault conditions are unlikely to befall him. A PSU designed to function perfectly under all fault conditions may in fact be over-designed and not truly cost-effective. Most of us only partly believe in the validity of Murphy's Law and comfort ourselves with the thought that sustains all those who live dangerously: 'It won't happen to me.' Thus most of the PSUs published in the amateur press tend to be based on units that have worked satisfactorily over a reasonable period of time rather than designs that would fully satisfy a top professional designer (though the same could be said for some factory-built PSUs). However, if compromises are to be made, it is highly desirable for those concerned to know and recognise what they are. For that reason it is my practice to publish constructive comments on *TT* designs, without this implying that the original design would not prove satisfactory in practice. Perhaps the main problem for the amateur designer is analysing what may happen in the event of a sequence of component failures and deciding what are the chances of particular components failing.

The components count of high-current PSUs can be significantly reduced by the use of specialised and over-rated components; unfortunately these may not be readily available in the UK to those not working in the electronics field. An interesting example of such a design is the 13.8V (adjustable), 20A maximum PSU described by Jean-Luc Barraud, FC1JEK (*Radio-REF*, No7/1989) using SGS and Thomson devices: **Fig 1.** The BUX21 series regulator is rated at 40A, 250W (alternatives BUX20, BUX22) is mounted on a heat sink at least 150-200mm (0.5°/W) and forced air ventilation of the unit by means of a fan is strongly recommended. The diode bridge can be mounted on the side of the metal cabinet or on another heat sink. Capacitors should be mounted very close to the SGS L200 regulator (alternative Thomson TDB200) which also requires heat sinking, for example by mounting on the side of the cabinet. The use of a 6A miniature circuit breaker as switch and 'fuse' is another feature. The design is included here primarily for interest rather than duplication.

John Brown, G3EUR, with much professional experience, offers some useful comments on several recent PSUs that have been shown in *TT*, including the two in the July issue: Fig 2 (p35) G4WAS's 13.5V high-current supply with crowbar over-voltage protection; and Fig 4 (p36) G4IDE's 600V/400V unit for the 50MHz valve amplifier. Both raise questions of the protection arrangements.

G3EUR writes: "In the event of a catastrophic failure of the series regulator in G4WAS's unit, due to collector/base-emitter short, the voltage across C2 (39,000 μF) will rise until THY1 fires, turning on THY4 to blow the fuse F2. But the coil of RL1 in series with C2 will present high impedance to the current surge. Feeding the network R1, RV1 etc from the junction of the regulator and RL1 would give much faster turn-off and could permit a smaller value for C2. This is advisable since a large-value C2 could deliver a lot of destructive energy to a short-circuit in the transceiver etc, although not as much energy as from a hefty 12-volt battery. I consider that *several* fuses are desirable at strategic points in the rig. For example, I found the scale lamps on the VSWR meter and the 12V outlet for 'accessories' on my rig were fed from the same 20A fuse that 'protected' the PA. For my peace of mind, I have added 20mm by 5mm holders and 500mA fuses.

"I have never experienced a breakdown in a series pass transistor, perhaps because I always use conservative ratings and like to keep devices cool. Many years ago, in a professional capacity, I found that different makes of 2N3055 transistors when opened up revealed a more than 2:1 variation in chip area, often with poor thermal coupling between chip and header. I decided that cheap chips are poor insurance. The firm I was with encapsulates many type of regulators using 2N3055 devices and has had almost zero fault records for a decade.

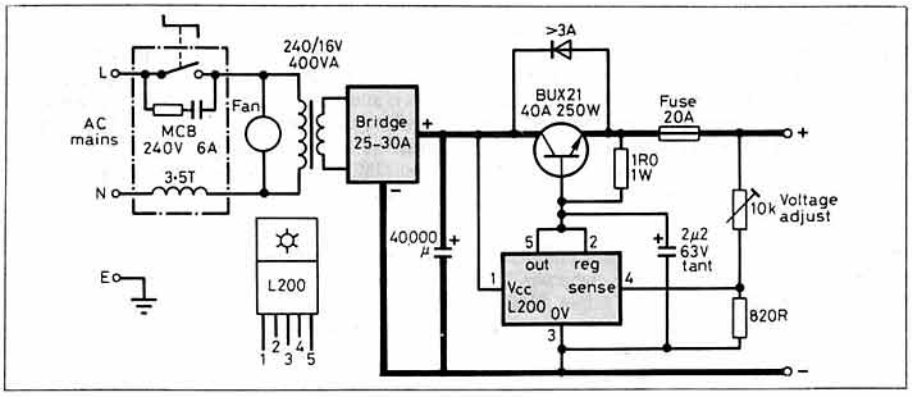


Fig 1. FC1JEK's 20A PSU based on relatively high-power components. Shown for interest rather than duplication as some components may not be readily available in the UK. MCB is a miniature contact breaker combined switch and 'fuse'. *(Radio-REF)*

COOKING THE VISION

Gina Moda, I7SWX draws attention to an article 'A microwave oven to amateur TV transmitter conversion' by David Pacholok (Creative Electronics Consultants) in *RF Design*, March 1989. This describes how he used a domestic 400-500 watt microwave oven as the basis for a 2.3GHz amateur television transmitter with an FM vision output of more than 200 watts, at a cost of under $200, and capable of being received on the low-cost 2.3GHz down-converters sold widely in the USA for the 'pirating' of MDS (microwave subsciption-television distribution systems). One must have doubts about the advisability of attempting to squirt out amateur TV signals from a 2M189A or 2M226A magnetron used as a self-contained, crossed-field power oscillator, with an HT supply of about 3.5kV even by those with a good knowledge of microwave engineering (the frequency can shift by up to about 6MHz if the load is varied). It opens up a new way of cooking the books. David Pacholok points out that the basic transmitter scheme should be adaptable to other emission modes, such as narrow-band FM, with additional phase-lock circuitry. The *RF Design* article describes the characteristics of microwave oven magnetrons and shows how the built-in cavities can be modified to couple RF to a transmission line instead of the oven compartment; it is also emphasised that safety must be considered paramount: "4kV DC and high power microwave energy are present in the transmitter. An inexpensive microwave leakage detector should be used to check the integrity of the modified unit, and door interlocks should be retained (the modulator was installed in the now-unused cooking cavity). Antennas can easily have high gain at this frequency, so avoid pointing them at people, buildings, etc." The author concludes: "Although this is not a 'high performance' television transmitter, it represents a low-cost effort to achieve significant power output at microwave frequencies." Some of the shortcomings are discussed, along with possible improvements.

"But it has been my experience, more than once, that if RF gets into the control circuits of a regulated PSU, it can raise the output voltage sufficiently to turn on crowbar protection. This happened recently at a Duxford (part of the Imperial War Museum) demonstration when another transmitter was being tuned up.

"In connection with the above notes, an average linear regulator has a source impedance of the order of 10 milliohms from DC to about 1kHz and this is usually less than the impedance of the cable connecting the PSU to the load. The impedance rises with frequency to tens of ohms at say 10kHz, hence the need for a bypass capacitor, but *not* 39,000μF. More important is low equivalent series resistance (ESR). A 1000μF capacitor has a reactance of 0.16 ohms at 1kHz, adequate for bypassing audio, but the series-resistance may be higher, especially in old 'surplus' types. A new radial type, for SMPS use, will have an ESR of around 0.1 ohm at 1kHz and stay low up to tens of kHz. A mica or ceramic bypass for RF should then keep the PSU source impedance lower than the cable impedance, so that large values of C in this position represent only excess energy storage.

"PSU design should be related to need: the load variations in an SSB transmitter are relatively slow, modulation envelope sized; in CW there are fast square waves with a change in mean current related to keying speed (wpm). If the circuits prior to the final amplifier are voltage sensitive, it is better that they should be stabilised or decoupled at their own low-current level, which also gives some protection and time for the main-PSU protection circuits to work. This also applies to a receiver. Over-kill is not good design; costs money and space, and adds problems.

"Questions of protection also arise in the G4IDE PSU (July Fig 4). C9, C10, C11 together store about 16 joules of energy and in the event of a short-circuit in the power amplifier (and there are at least five points in the PA circuit which could break down to chassis) the destructive energy would probably explode the 500mA fuse (F1) unless this was of the specially-designed, high-voltage, sand-filled type. 16 watt-seconds in 1mS is 16kW! Hence the bang on arc-over.

"Then a common failing in such designs: most resistors of 1W or less are rated at 350V DC maximum regardless of their value and I would not recommend a single 10 megohm resistor (R16) for the 100μA voltmeter unless it was of the 50mm spiral track type rated at 1kV continuous working.

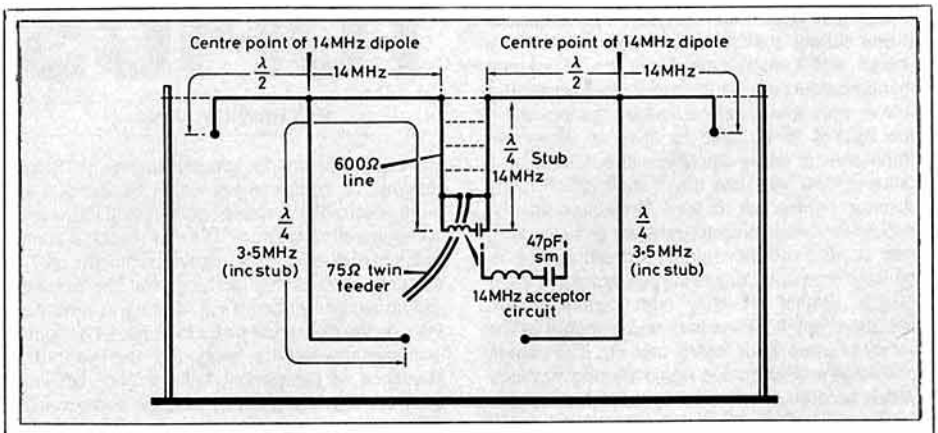
"Then one must question the use of half-wave rectification for the bias supply. Admittedly, the resulting small amount of DC in a big mains transformer will not saturate the core but a bridge-type rectifier is cheap (38p) and could save one of the 100μF capacitors (36p) yet providing less ripple. I frequently see designs using toroids with half-wave rectification; clearly it is not always recognised that the gapless core of a toroid means that it can be easily biassed by DC, and then blamed for core noise and excessive switch-on spikes."

SSB LINEARITY: THE MOVING GOAL-POSTS

The recent series of references in *TT* to the question of the linearity of amateur transceivers and linear amplifiers continues to attract comment. It was noted in the June *TT* that for many years the specification for most professional SSB/ISB transmitters has called for a third-order IMD performance of at least -42dB relative to PEP output (equivalent to -36dB relative to one tone), whereas few factory-built amateur rigs come within 10dB of this figure, and some are appreciably worse than this.

It is worth recalling that many years ago, Les Moxon, G6XN pointed out in *TT* that the design and operation of high-power linear amplifiers requires a high level of good engineering practice, particularly where any degree of speech-compression is used. Apart from the actual amplifier stages, including the exciter, the PSU must be able to handle the current peaks without drooping, including the increased duty-cycle found with compressed speech and with frequency shift keying (FSK) as used for RTTY, AMTOR and digital data.

Paul Essery, GW3KFE writes: "May I pick up on



ANTENNA TOPICS

From a number of antenna ideas recently received from readers, this month's selection includes an ingenious 3.5/1.4MHz wire antenna from C W Farrell, G8GS and a method of ensuring resonance of narrow bandwith HF mobile antennas from Charles Wilkie, G0CBM.

G8GS writes: "After improving signals to VK/ZL on the long path by using a four-element wire beam comprising two colinear horizontal dipoles, each with a director, it was desired to incorporate a 3.5MHz facility into the system. This has been done and the arrangement works successfully on both bands. The method is shown in simple outline in **Fig 2,** utilising the voltage node points, switching being achieved with a 14MHz acceptor circuit fitted into the bottom of the quarter-wave stub. The array is compact, measuring approximately 52ft in length, the mast height being 30ft. No deterioration of the out-going 14MHz signals has been detected." The illustration does not show the 14MHz director wires.

G0CBM required an efficient mobile antenna for 3.5MHz and recognised that the key to efficiency with electrically-short (high Q) antennas is achieving accurate resonance when changing frequency. He writes: "The usual way of achieving resonance of mobile antennas is by means of a tapped loading coil, thus resonance occurs as a series of steps through the band with maximum efficiency only when the operating frequency coincides with the resonance of a tapping point. On the lower HF bands, bandwidth is often only about 10kHz or less, and would entail the use of some 30 taps on the loading coil. I found that by placing a variable capacitor at the base of the antenna, resonance could be achieved at any point in the band. Matching the antenna to a 50-ohm output of a transmitter is achieved by inserting a 4.5μH inductor between the variable capacitor and ground. In practice, I have found that the twin requirements of resonance and unity VSWR can be achieved with only three taps and a 365pF variable capacitor. In operation I simply peak the variable capacitor for maximum signal on a field strength meter. Dimensions shown in **Fig 3** are for guidance only."

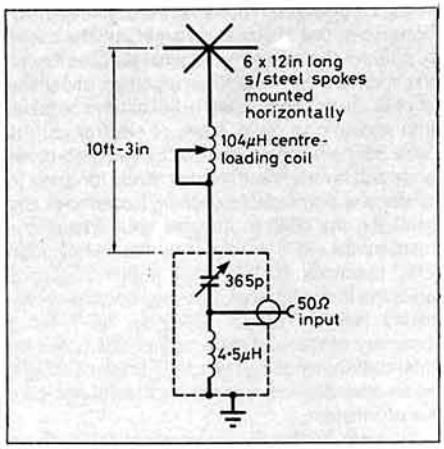


Fig 2. (top) G8GS's dual-band (3.5 and 14MHz) antenna.

Fig 3; G0CBM reduces the need for multiple loading-coil taps by adding a variable capacitor to peak for resonance while maintaining near-unity VSWR. Dimensions of his 3.5MHz mobile antenna for guidance only.

John Heys, G3BDQ reports some very successful DX operation using a three-band (14, 21 and 28MHz) and a two-band (3.5 and 7MHz) inverted ground-plane antennas (see *TT*, May 1989 and many earlier references) based on the standard multi-band dipole principle of parallel wires of suitable resonant lengths. His triband unit (fed at the top of the three vertical radiators by means of tuned 300 ohm BOFA ribbon feeder) has the 14MHz wire inductively loaded 3.5MHz radiator with the bottom ends of both 3.5 and 7MHz radiators folded back so that the total support height is only 34ft (lower part 2ft above ground). This is end-fed to a single wire radiation feeder to an ATU which then also allows the antenna to be tuned up as form of long-wire antenna for any band. G3BDQ hopes to publish an article on them before long.

your point recently about non-linear linears? Whilst I agree that many people overdrive linears, some points need to be stressed; firstly that by-and-large valve linears perform satisfactorily given reasonable design and subject to not being overdriven. However, in my humble opinion by far the biggest cause of problems is the fact that designers have moved the goalposts. In the early days of SSB — vide ARRL's *SSB for the Radio Amateur* for instance — it was accepted that a *minimum* of -30dB represented the figure for spurious output products. Nowadays, if you look at manufacturers' literature covering equipment with solidstate output stages — let alone solid-state 'big boot' amplifiers — you find specification figures for their IMDs of around -25dB at rated output.

"So where in 1989 is the problem with linears? Overdriving is a running problem of course, although ALC can at least reduce this tolerably. But with the present design specifications, a linear to perform adequately at 400W PEP output needs to be rated at much higher output so that they cannot be overdriven accidentally. It is surely better to be momentarily 'over the limit' cleanly than to be plastering the band with splatter at legal limit!

"Secondly, and so few people seem to realise this, whatever the type of linear, as soon as the input impedance changes the driver stage senses this and distorts. Thus to obtain adequate linearity one needs a low-pass filter (to provide a constant impedance) between a blackbox transceiver and a factory-built linear more, possibly, than at the output of the linear if this is feeding an ATU. I had handsome proof of this at my former QTH. Woe betide me if I did not have an LPF between linear and rig; the second LPF merely cleaned up the slight increase in spurious output due to the linear itself. For more than two decades, I have had a TV set built into the shack and switched on whenever the rig is in use. The problem was noted with Class AB2 and Class B linears, but nobody realised, it seems, that AB1 linears with ALC had the same problem. The point is that if the transceiver output stage is forced into distortion the linear faithfully reproduces that distortion!

"With solidstate, designers seem to have compounded the problem by selling what in effect is a PA tank circuit as an optional extra called 'automatic ATU'. In my opinion, the right way to go, in the long term, is to use FETs as transmitter amplifiers. But I still believe that many problems arise because the market demands 'modern solid-state technology' regardless of its suitability for a particular application. Leaving things to the marketplace means in practice that 'fashion' rather than 'technical merit' is everything. It is fashion that puts all those confusing buttons and knobs on current transceivers. So many, that even after several months of use, it can be a problem to 'drive' the rig. A few old-style controls would be infinitely easier to operate. Similarly the handhelds are virtually impossible to use with gloved hands, as might be necessary in an emergency."

ECONOMICAL DUAL-VOLTAGE AND VOLTAGE-MULTIPLIER PSUs

John Brown, G3EUR, was stirred to take a long look back to the 1942 era, when he designed the Type 3 Mk II (otherwise known as the B-2) transmitter-receiver for SOE, when he saw F8CV's

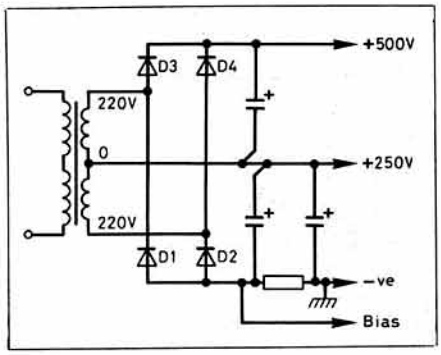


Fig 4. Dual voltage (plus negative bias) power supply as used by G3EUR in the 1942 B-2 transmitter-receiver still represents an economical arrangement.

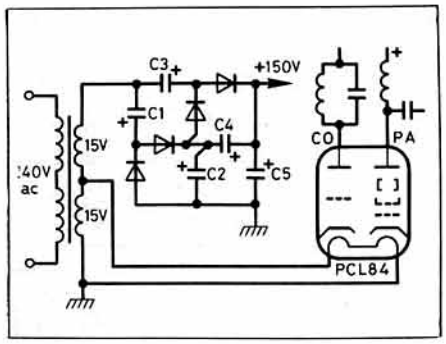


Fig 5. How a 15V + 15V toroid or laminated core transformer can be used to power a valve QRP (2-3W) transmitter. 15-20VA toroid transformer. D1-D4 1N4003. C1-C4 50μF (100V). C5 25μF (200V).

dual-voltage (anode/screen) PSU for use with a typical medium-power valve transmitter or power amplifier (*TT*, July, Fig 8, p38). His Scottish instincts lead him to point out a cost saving can be made. He writes:

"The B-2 used a similar arrangement but with the negative of the bridge arrangement forming the negative HT connection as in **Fig 4.** I used selenium rectifier-stacks, big and heavy compared with modern silicon diodes, although nevertheless semiconductors. With this arrangement there is no need for the resistors across the capacitors since the centre-tap to the 250V line keeps the voltage across the capacitors to a maximum of 1.4 times 250V, though it may be advisable to retain two resistors to bleed away the charge when the unit is switched off. In either case, the current in the 250V line is supplied by diodes D1, D2 in the bridge and the transformer rating is unchanged at the total wattage of the 250V and 500V loads. Note that 220-0-220V rms gives an off-load voltage of 600V DC."

The basic diode rectifying circuits of the July *TT*, Fig 9 were all familiar to G3EUR but he considers it worth adding a voltage-quadrupler arrangement which can provide a useful means of powering a QRP value transmitter from a low-voltage toroidal transformer: **Fig 5.** He included this arrangement in his article 'Using toroidal transformers' (*Mercury*, November 1985) to which reference was made in *TT*, March 1986. The usefulness of this approach is underlined by the fact that the current 'economy' ranges of power transformers, both toroidal and stacked-lamination types, have twin identical-winding secondaries: eg 12V + 12V which can be used separately, in parallel or in series, for full-wave or bridge rectification, thus providing very flexible components. A 15V + 15V transformer in a quadrupler arrangement can provide 150V HT for a 2-3 watt transmitter from a 15/20V toroid. Basic voltage-multiplier circuits are shown in **Fig 6** and a triple output PSU is shown in **Fig 7.**

G3EUR adds: "Less obvious is the use of PSU circuits which give HT and LT from low-voltage. For example, using a TV-type valve, still cheap and plentiful, such as a PCL84 (triode-pentode with 15V heater) one winding of a 15V + 15V transformer can be used for the heater and the whole with a quadrupler to give 150V HT for the valve as a CO-PA as in Fig 5. Add a PCF80 (triode-pentode with 9V heater) as a simple receiver to the 15V heater of the PCL84, then use a 25V + 25V transformer and a tripler arrangement and you have power for a modest transceiver, using the triode of the PCL84 as an audio output valve on receive and as a crystal oscillator on transmit (a device used in the A MkIII of 1943). Even better, use DC for the heaters with an IC regulator such as the LM317 to provide stable DC for the receiver LT and so reduce the drift associated with valves. The possibilities are almost endless."

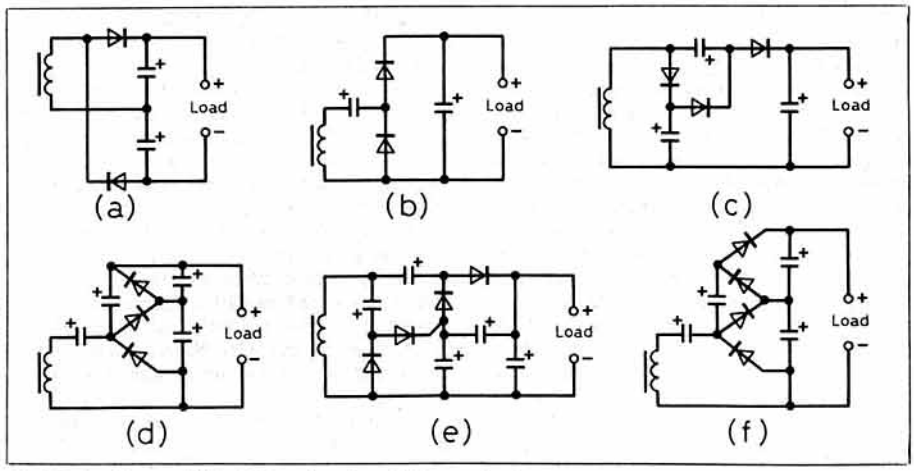


Fig 6. Basic voltage-multiplier PSU configurations. (a) Conventional voltage-doubler. (b) Cascade-type voltage doubler. (c) Voltage tripler. (d) Cascade-type voltage tripler. (e) Voltage quadrupler. (f) Cascade-type voltage-quadrupler (extendable to an n-times voltage multiplier). Note that voltage regulation between load and non-load conditions is very dependent on the value of the capacitors and that such circuits are more suitable for relatively low-current loads.

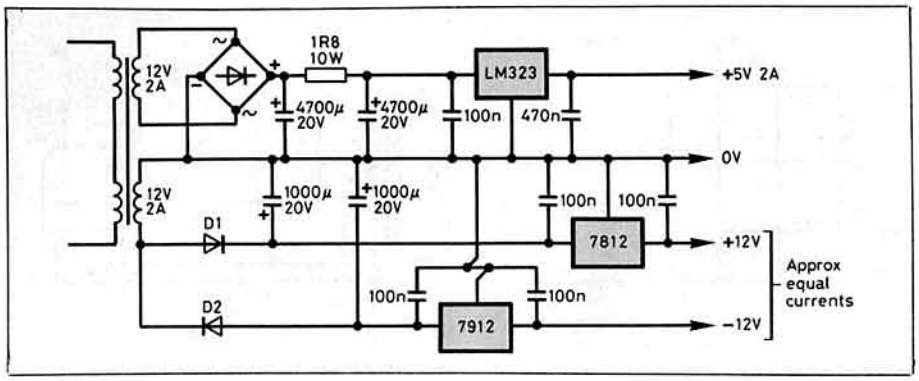


Fig 7. A triple-voltage, regulated supply using the twin-windings usually found in modern toroidal and laminated core transformers. With the back-to-back half-wave rectification of the two 12V outputs it is advisable to ensure that the loads are balanced to avoid a DC component in the gapless core of a toroid, if necessary by adding loading resistor(s). The top section uses a bridge and provides about 15V DC across the 4700μF capacitor. This is rather high for a 5V IC regulator and the heat dissipation can be reduced and smoothing improved by adding a low-value resistor as shown (1.8 ohms in this example) which drops about 3.6V at the full load of 2A with the second 4700μ capacitor giving extra smoothing. (G3EUR, *Mercury*, November 1985).

HF PACKET RE-THINK?

Without, this month, pursuing the CW/AMTOR debate, which arouses strong feelings on both sides, it seems worth drawing attention to an article by Paul Rinaldo, W4RI, the Editor of *QST*, 'The Great 1989 HF Packet Design Quest' (*QST*, May 1989) in which the 'dragons' of HF packet operation — multipath, intersymbol distortion, group delay, QRM, QRN, busty errors, contention and retries — are given an airing. W4RI believes that the time has come for amateurs as well as the increasing number of professional users to rethink the AX.25 protocol for HF operation, for which it is clearly far less satisfactory than AMTOR. He introduces his appeal for a quest to find a less vulnerable protocol as follows:

"Medieval mariners *knew* that the earth was flat. As they sailed near the edge of the earth, it was commonly accepted that 'beyond this place there be dragons.' Hams now *know* that amateur packet radio works well on VHF/UHF, but not too well on HF. Sure many of the HF bands are buzzing with packet activity... The problem is efficiency; ie, too many retries to get past the monsters. Because the AX.25 protocol includes an error-checking feature, packets with even itty-bitty errors are shunned by the receiving station. Then, the automatic repeat request (ARQ) feature of AX.25 takes over and keeps on retrying until a packet runs the ionospheric gauntlet of monsters completely unscratched... Why not just use AMTOR? Of course, it is a partial solution that's here today. There are even packet-to-AMTOR gateways. However AMTOR has its problems. AMTOR is based on the older Baudot charater set rather than the newer ASCII character set which is replete with upper and lower case, more symbols and computer control characters. At best, even when band conditions are perfect, AMTOR has a *maximum* efficiency of 50 per cent, as only three characters are sent at a time, then the sending station must get an acknowledgement (ACK) before proceeding with new characters. While the symbol rate is 100 bauds, the throughput is between 0 and 50 bauds depending on band conditions. When the concept on which AMTOR is based was first conceived some years ago, designers didn't have the luxury of today's microprocessors and other digital integrated circuits. Whether or not AMTOR is used as a point of departure for a new HF packet protocol, it nevertheless sets a standard for comparison."

If I were an AMTOR operator, which I am not, I would not be entirely convinced by W4RI's strictures on its efficiency. There is little doubt that in reasonable (and not so reasonable) conditions the throughout of anything between say 30 and 50 baud can shift a lot of words, at least in upper case letters! Even on VHF, AX.25 packet can involve a large number of retries which can bring its throughput tumbling down. Meanwhile I intend to keep plodding along with hand Morse!

BATTERY CHARGER CONTROLLERS

Recent items in *TT* have stressed that lead-acid and nicad rechargeable batteries can have their active lives shortened by subjecting them to frequent overcharging, sometimes when attempting to keep them fully charged by continuous trickle charging. The August *TT* included some suggestions on the use of timers designed to reduce greatly the charging rate after a fixed period of time. This approach is well suited to nicad batteries which have a fairly 'flat' voltage charge/discharge curve that makes it difficult to use a voltage-sensitive controller. However, for lead-acid batteries, where the voltage increases significantly as the battery approaches the fully-charged state, it is easier to use a voltage-sensitive controller which can be either an add-on unit or built into the charger.

Ron Wilson, G3DSV draws attention to a charger-controller of this type that was described by J P Bell, G4LSA and E J Barker in *Practical Wireless* (June 1985, pp20-21, 53). He writes: "I use a 12-volt vehicle battery for running my HF rig and have been following the notes in *TT* with some interest. You mention chargers taking batteries up to 13.8V. In practice, most of the chargers I have come across will take a battery up to 14.4V and indeed this is the voltage found on many cars, my Volvo for one. This voltage is a bit too close to the 15V maximum of some older rigs (although most newer rigs are now rated at 16V maximum). The policy of watching a voltmeter is sound but it is so easy to forget to adhere to, as I well know. I would like to draw readers' attention to the controller described by G4LSA. This cuts the charger almost out, in practice down to about 100mA, when the voltage reaches 13.5 to 13.8V (this can be adjusted and mine is set to 13.6V). The controller is simple and inexpensive to build, and can often be built within the charger enclosure."

The G4LSA controller was intended for use with lead-acid vehicle batteries (charging rate about 4-5A) used to power SSB transmitters with an output of up to about 100W requiring 13V DC at up to about 25A peak. When set to 13.5V it cuts out, reducing the charging current to a very low value, when the battery is roughly 85% fully charged and greatly reduces any tendency for the battery to 'gas'.

In the *PW* article, G4LSA pointed out that modern vehicle batteries of the 'low maintenance' type can be topped up with distilled water in the traditional manner. Plates now contain less antimony than before; this reduces the amount of gassing and the batteries require less topping up. With modern 'sealed for life' batteries, the plates have very little antimony or may replace this altogether, by the use of calcium. The sealed batteries cannot be topped up (without drilling into them) but since a small vent is provided to prevent the pressure

AIRCRAFT-ENHANCED PROPAGATION: A CONTRAIL HYPOTHESIS

Arising out of the item 'Aircraft-enhanced propagation debate' (*TT*, August 1989, pp36-37), Brian Measures, G0HKR puts forward an interesting hypothesis; he believes that an explanation of the mode discovered in the south of Australia may be found in the visible aircraft exhaust trails called condensation trails or 'contrails'. He writes:

"Water, a by-product of combustion, is ejected through the aircraft exhaust gases and tends to raise the relative humidity of the air whilst heat generated by the engines tends to lower the relative humidity by raising the temperature in the aircraft wake. The net result sometimes is a contrail.

"A contrail occurs when the air temperature is in the range -24°C at sea level to -45°C at 50,000 feet. It can also occur exceptionally when operating at full throttle. If the surrounding air is at, or near, saturation the contrail is long and persistent, whereas if the relative humidity is low the contrail is only a short plume behind the aircraft.

"In the tropical stratosphere, where the lowest temperatures are to be found, persistent contrails are formed by the aircraft exhaust gases. These gases contain sublimation nuclei so causing supersaturation with respect to ice with radio signals possibly bouncing off the resultant ice particles formed in the contrail.

"Therefore, it appears that the forward scatter propagation researches of VK2ZAB and VK3UM which found that the signals from VK1BG at Canberra (roughly mid-way between Sydney and Melbourne) 'lasted from just a few minutes to tens of minutes,' clearly point to the creation of contrails in low-level or high-level saturation conditions where contrails were either a short plume or of a long, persistant nature. It appears to me that the disciplines of meterology, flight and Amateur Radio need to come together in this debate and research."

Sydney/Canberra/Melbourne are roughly at latitudes that correspond in the northern hemisphere to the Mediterranean area (eg Spain/Morocco)

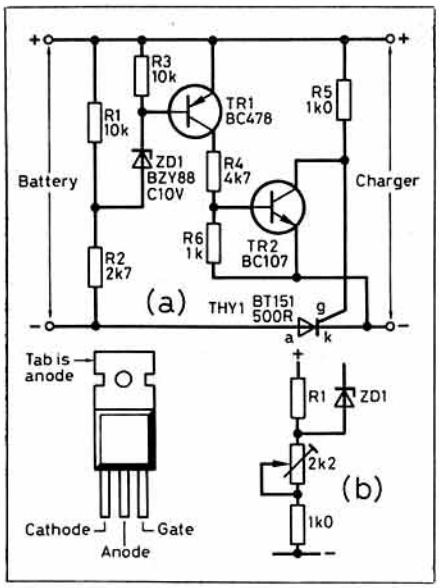


Fig 6. (a) G4LSA battery-charger controller (b) Modification for adjustable voltage replacing R2. (*Practical Wireless*)

building up if the battery is overcharged, frequent venting will make the battery unusable. Since most cars are now fitted with alternators rather than dynamos, the primary task of a car battery is to provide the initial heavy surge of current (hundreds of amps) and are not designed to be deeply discharged.

The G4LSA controller (**Fig 6**) is designed to charge the battery when this discharges to about 12V. Initially a partly charged battery should be connected since a fully discharged battery will not enable the controller to function. With a battery voltage of about 12V but less than 13.5V, ZD1 conducts and TR1 and TR2 are 'off'. The thyristor THY1, with its gate voltage derived through R5, will be 'on', effectively passing the charging current. When the voltage increases to about 13.5V (or as set), ZD1 conducts, turning both TR1 and TR2 'on', thus clamping the gate of THY1 to its cathode, switching the thyristor 'off'. Where a substantial load is being drawn from the battery, the effect will be to switch the charging current quite rapidly on and off.

THY1 requires heat sinking and this could be the metal lid of a small diecast aluminium box (114 x 54 x 30mm) with the thyristor mounted on the underside of the lid. With the specified device an insulating washer is not needed and the anode is bonded via the mounting tab to the box. Note however that the DC output terminals of the charger must be independent of the mains earth, otherwise the controller may be bypassed.

A full-size overlay and PCB track pattern is given in the *PW* article together with notes on setting up and testing, but construction should not be critical and operation is quite straightforward. Perhaps the most important point to note is that if the battery is fully discharged ZD1 may not conduct and the battery will not be charging unless a switch or shorting jumper is added across THY1 (anode to cathode).

The July *TT* included a warning on the importance of using battery clamps that cannot result in the full voltage from a charger reaching the equipment. G3DSV points out that "available from caravan shops are snap on/snap off clamps suitable for batteries with round posts. Inside each clamp are two fixing screws, one for the charger and one for the rig. The clamps are rated at around 100A and make a very positive connection." Personally, I feel one would need to be fully convinced that the clamp could not under any circumstances become detached from the battery lug, since this would create just the situation that must be avoided. G3DSV also reminds us that a breakers yard can be a useful source of low-cost car batteries: "My son and I have purchased batteries for £8-£10. The main point is to look at the date on the battery. We have managed to purchase batteries less than a year old, from crashed cars."

Vincent Evans, G4AVT is another *TT* reader who uses a lead-acid car battery and charger for his 144MHz and HF transceivers. To avoid continual checking of voltages, he, like G3DSV, uses a voltage-sensitive controller but intead of a thyristor he uses an electro-magnetic relay: **Fig 7.** Full details of his 'Automatic Battery Charger' appeared in *Ham Radio Today* (September 1988, pp42-44). The action of his system is basically similar to that of the G4LSA unit in that the charger is left on continuously but is switched through to the battery only when the battery voltage is between about 11.5 and 13.5V after setting the cut-out adjustment RV1 with the aid of an accurate voltmeter. The relay must have heavy-current contacts, the specified unit being a 12V SPDT 320R, 10A at 240V contacts, PCB mounting, Maplin type YX97F. Full constructional details are given in the *Ham Radio Today* article. G4AVT adds: "The device is self-contained so that no alteration has to be made to the charger, and it is a reasonable DIY project. The charger is always on but current consumption is negligible. The more experienced amateur could very well build the device into a simple charger, and perhaps experiment by putting the relay contacts in the mains lead, although caution would be necessary since switching the transformer in the mains lead would cause a current surge, giving a momentary high output voltage and misleading the voltage-dependent switch. A resistor in the line to SW1 might provide an anti-surge device but this has not been tried.

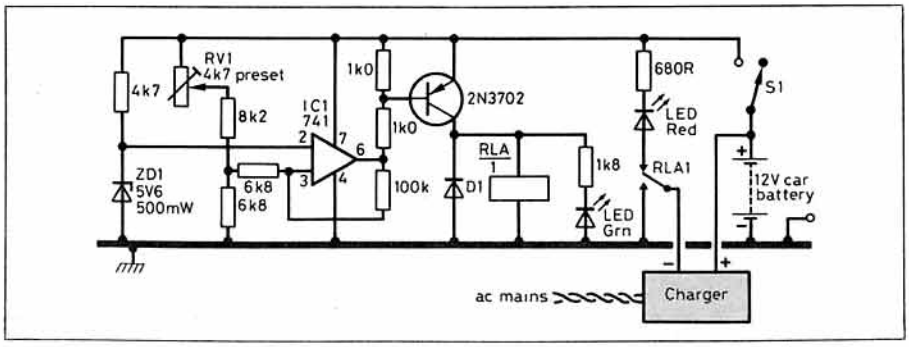


Fig 7. G4AVT's battery-charger controller using a relay rather than a thyristor. (*Ham Radio Today*)

HERE AND THERE

The August *TT* included a list of solvents used in the electronics industry that can cause health and environmental problems. As became clear several years ago (see, for example, *Electronics Week*, March 18, 1985 'Toxic chemicals jar industry') the semiconductor industry and the fabrication of printed circuit boards involve a large number of potentially harmful substances. Some experts have claimed: "no other industry on earth uses nastier chemicals than the semiconductor industry." The *Electronics Week* article noted that "the chemicals in question are those acids, gases and solvents used in every phase of semiconductor manufacture, from the silicon ingot to the finished chip. They are: (1) sulphuric and hydrochloric acids used in cleaning chips and hydrofluoric acids in etching them. They are all irritating to skin, eyes and the respiratory tract. Hydrofluoric acid also attacks bones. (2) Silane, arsine and phophine gases are used for doping and fluorinated hydrocarbons for plasma etching. Silane is pyrophoric, that, it can ignite spontaneously. And (3) organic solvents, which are used in vapour degreasing, pose one of the toughest problems because they can't be neutralised. They are blamed for cancer and birth defects as well as for systemic illnesses."

Clearly the risks are to those involved in manufacture or living in areas where effective waste disposal has not been employed, and not to users of semiconductor equipment. But it could be argued that it is the responsibility of us all to be aware of the potential hazards and to do what we can to see that the necessary steps are taken to prevent environmental pollution or the creation of fire or explosive hazards.

Peter O'Keele, VK3YF, in *Amateur Radio (VK)*, April 1989, discusses the various types of lead-acid batteries now on the market, including various forms of 'Deep Cycle' batteries intended for non-vehicle use but imposing various charging constraints and often carrying only a six-months guarantee. He also notes that the sealed gel-type batteries sold for automobile use are intended strictly for engine-starting purposes and have a very limited stationary capacity. For conventional wet lead-acid batteries, he advises: (1) Keep the electrolyte up to the required level. (2) Check the specific gravity of the cells periodically using a hydrometer — cells should have a gravity of at least 1230 when the battery has been left overnight. (3) Charge at about 14.4V, 4A for nine plate batteries, 5A for eleven plate batteries, for about 12 hours. Four hours after gassing begins you can assume the battery is fully charged. The specific gravity will then depend on the condition of the battery.

Those who recall such books as the classic *Admiralty Handbook of Wireless Telegraphy* of the 1930s, with its stress on the care of batteries, may feel wryly that it all goes to show that technology often moves in circles. But then, it has long been evident that it is often easier to generate RF power than the necessary DC! □

Switched Mode Power Supplies

Clive Smith, G4FZH, lays to rest some of the mysteries of the SMPS and shows that they aren't so complicated after all.

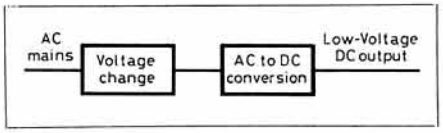
Switched Mode Power Supplies (SMPS) can often be picked up cheaply at rallies, but what *is* a switched mode power supply; how does it work, how does it differ from a linear PSU and what are the advantages and disadvantages of such types of power supply? The aim of this article is not to advocate one or the other, but to describe how linear and switched mode power supplies work and lay out the various design criteria together with the pros and cons of each.

A power supply is a unit that accepts power from a one source and converts it into a form which is suitable for a particular application. Throughout the sphere of electronics there are many such applications and typical inputs are the mains at 240V AC or DC supplies at unsuitable voltages. Typical DC outputs from such power supplies are 5V, 12·5V, ±12V and 24V. In the majority of cases the radio amateur is interested in the conversion of the AC mains into a low voltage DC output suitable for running 13·8V equipment. It should be noted that, with either type of PSU, two processes are carried out - the AC to DC conversion and the change to a different voltage level.

LINEAR SUPPLIES

In the conventional linear power supply the changes will occur in the order shown in **Fig. 1**, ie a voltage level change followed by AC to DC conversion. The level change is usually accomplished using a transformer and the AC to DC conversion by means of rectifier diodes, smoothing capacitors and regulators. For a heavy duty DC power supply such as 13·8V at 25A (345watt DC output) the transformer must capable of handling the total power loading including losses. When the supply is provided at a frequency of 50Hz this requires a sizeable unit due to the materials and laminated structure of a suitable transformer. Also, because of the low mains frequency, the number of turns required on the primary winding is quite high and this in turn necessitates the use of thick, heavy-duty enamelled copper wire in the secondary winding. Whilst the rectification process causes little problem (rectifiers are cheap and readily available), smoothing and regulation are inter-related and these factors usually require a fair amount of space and cooling. As a rule of thumb, the regulator typically requires a 3V drop across it in order to function correctly - hence the lowest input voltage allowable must be at least 3V above the desired output when the unit is on FULL load.

Fig. 2 shows a typical arrangement for the DC side of a linear power supply. Smoothing is accomplished by electrolytic capacitors and the ripple depends on the value of capacitance and the current being drawn. With low current supplies, eg less than 2A, the value and physical dimensions of the capacitor are not too formidable, but these increase drastically when currents of more than 10A are required. One approach for keeping the minimum 3V differential between input and output of the regulator is to use a transformer which has an increased secondary voltage output but the power handling capabilities of the transformer must also be increased in order for the regulated DC output current to still meet the desired specification. This would allow use of a smaller smoothing capacitor but the transformer bulk increases. The excess voltage is removed by the regulator but, since power = volts × amps (P = V.A), it follows that as the excess voltage is increased so the regulator must dissipate more power. This then requires a larger heat sink which leads to the general trend for heavy duty linear supplies being large and cumbersome. They also require adequate cooling arrangements which sometimes requires the use of fans in order to provide adequate cooling. Some manufacturers minimise the heat dissipation requirements (and hence costs) by designing units for intermittent use, relying on a low continuous current demand combined with an ability to provide current peaks for short periods, such as is found with SSB transmitters.



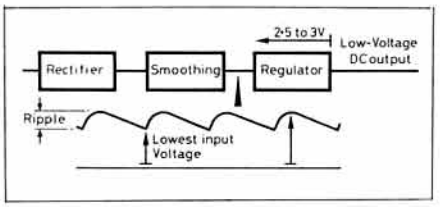
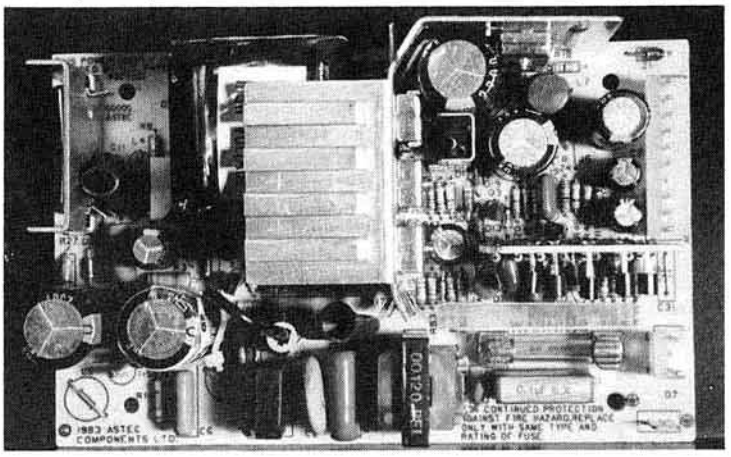


Fig. 1 (above) Linear PSU configuration showing voltage conversion sequence and Fig. 2 smoothing process.



SWITCHED MODE POWER SUPPLIES

A different approach is the switched mode power supply. The SMPS is generally smaller than its linear counterpart but introduces other problems. As in most engineering solutions the final choice is made by weighing up the pros and cons so as to determine which is the best option.

The switched mode power supply exists in various forms but the isolation between input and output is still provided by a transformer. The size of the transformer is dramatically reduced by operating at a high frequency (eg 50kHz) and carrying out part of the smoothing at high voltage where the current requirement is smaller. High frequency transformers are not made from laminations (such as for 50Hz) but are made from ferrite materials. The reason why laminations are used at 50Hz is to keep the eddy current losses in the transformer core low - with ferrite the losses are much lower and so the size of the transformer core is considerably reduced. All of this reduces the size of the overall power supply but at the expense of complex control circuitry and the possible production of radio interference (RFI). Typical efficiency of these units is around 75% whereas a linear supply is closer to 60%.

A typical block diagram of part of a switched mode power supply is shown in **Fig. 3**. The unregulated DC input is converted to a high frequency AC supply (eg 50kHz) and a transformer provides the voltage translation and isolation. The AC is then rectified and the resulting DC is then smoothed (filtered). A sample of the smoothed output voltage is fed back to control the high frequency switch so that the output voltage is well regulated. The unregulated DC input can come from a battery, generator supplies or rectified mains with some smoothing (as in **Fig. 4**).

HIGH FREQUENCY SWITCH

The high frequency switch is in essence a power oscillator with rectangular output pulses. **Fig. 5** shows a simplified view of the high frequency switch and transformer arrangement. Control circuits drive the switch with rectangular pulses (Waveform A) which cause Waveform B to appear across the transformer primary. This induces a voltage in the secondary of similar shape but of an amplitude which is dependent upon the turns ratio N1:N2 — Waveform C. The electronic switch may be either a bipolar transistor or a power FET which must be capable of withstanding high voltages. The power FET has advantages in that it is voltage driven and not current driven as for the bipolar transistor. As the devices switch on the high voltage side of the transformer the current switched is low, normally a few amps in a 500W supply.

The electronic switch can take various forms and **Fig. 6** shows two more arrangements. Note that in **Fig. 6b** the capacitors *must* be of a

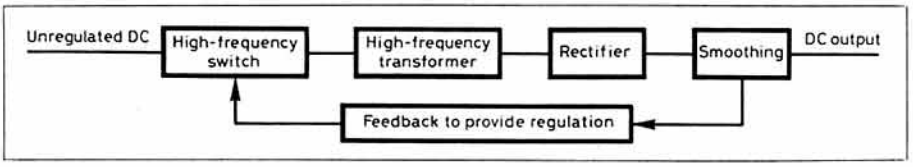


Fig. 3 Switched Mode PSU block diagram.

type which are suitable for handling current at the switch operating frequency (low equivalent series resistance and inductance). In both these cases the drive waveforms 1 and 2 are in anti-phase and are generated by control circuits which are now available as dedicated integrated circuits (ICs). To provide a regulated DC output voltage, a sample is fed back from the DC output and compared with a reference voltage to produce an error signal. A common way of providing the regulation is to allow this error signal to alter the mark:space ratio of the drive waveforms whilst keeping the frequency constant. This produces waveforms as shown in **Fig. 7** and is known as Pulse Width Modulation (PWM). This is not the only form of control but is the most commonly used at present.

In systems using two electronic switches (Fig. 6) the drive waveforms must be in anti-phase and *never* capable of switching both devices ON simultaneously - if they do an explosion usually results! Typical waveforms generated are shown in **Fig. 8** and these introduce the concept of 'dead time' a period during which it is guaranteed that both drives are zero thus allowing the electronic switches to turn OFF. The actual drive waveform across the transformer primary is shown in **Fig. 9** and this is reflected, of course, in the waveform of the transformer secondary.

In the dual switch circuits, since there is current flowing in opposite directions on different half cycles, the magnetic flux reverses and prevents magnetisation of the core. With a single switch, the current only flows in one direction and so steps are required to de-magnetize the transformer core. In the circuits of Figs 5 and 6a, the back EMF produced by inductive action dictates that the switches are rated for at least twice the maximum DC supply voltage, whereas in Fig. 6b the devices need only be rated at the maximum input DC voltage. This means that for a 240V RMS input (peak value 340V) the devices should be rated at 680V and 340V respectively. It is always good practice to be conservative with the voltage ratings and devices with minimum ratings of 800V and 400V respectively are commonly used. For example an IR740 has a voltage rating of 400V, a maximum continuous current of 10A and maximum drain to source resistance of 0.55Ω when ON. This means that even at 10A, the maximum continuous power dissipation would only be 55W - and in practice the mark:space ratio is less than 50%, being spread between two devices. For a power supply with a 2kW output the heatsink requirements are quite moderate. For a typical 500W output supply driven from the 240V AC mains, the drain current is about 2.5A on average; thus for a maximum 50% duty cycle, the power dissipation per device is about 3.5W maximum.

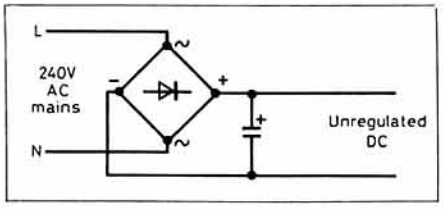


Fig. 4 Typical SMPS power source.

OUTPUT TRANSFORMER

The transformer is quite small - typically 70 × 68 × 17mm for a 500W output. It is made from ferrite for the reasons stated earlier and takes the form shown in **Fig. 10**. The transformer would weigh about 1 kilo, as compared to an equivalent transformer for a linear supply which would not only weigh between 7 and 10 times more but also be considerably more bulky. The number of turns required for the primary winding is significantly reduced from that required by a 50Hz transformer, and this also applies to the secondary which is advantageous in that the secondary winding requires quite thick wire because of the current requirements.

OUTPUT RECTIFIER

The output rectifier used (see Fig. 3) must be of a type which will switch ON and OFF very fast - ie at 50kHz or more. The type of rectifier used at 50Hz is wholly unsuitable as it cannot switch fast enough. The output rectifier will be of a type described as a 'fast-recovery rectifier diode' which may be packaged as discrete units or often as two diodes in a single power encapsulation such as TO3 or SOT-93. The rectifier does get quite warm during operation and therefore *must* be mounted on an adequate heatsink.

OUTPUT FILTER

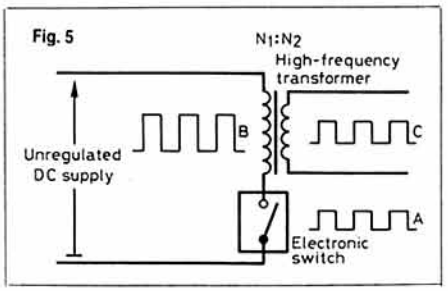
The output filter acts as an averaging device and usually consists of an inductor and a capacitor, the former being about the same size and weight as the transformer but with a gap in it, a typical arrangement is shown in **Fig. 11.** This includes a bleed resistor to allow the capacitor to discharge when the power supply is switched off and also to provide a small minimum load.

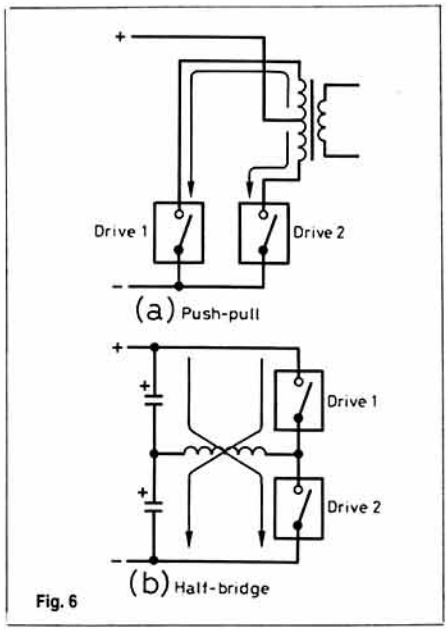
CONTROL IC

As mentioned earlier, the control circuit is now generally in the form of a dedicated IC, such as the SG3526 by Motorola and Silicon General. A representative block diagram of a typical control IC is shown on **Fig. 12** and will serve to describe some of the functions offered.

The IC incorporates an internal oscillator circuit, the frequency of which is set by an external R-C network. In association with the oscillator there is an external resistor which allows various dead-time values to be set. In order to minimise the in-rush currents when the switched mode circuit starts up, there is a soft-start arrangement. The period for which this is operative is determined by an external capacitor and is typically for the first few seconds.

For the voltage comparison the IC produces a reference voltage (eg 5V) and this is fed to one input terminal of the comparison amplifier, a sample of the power unit's DC output being fed to the other input. The resulting output error signal from the amplifier is then used to control the





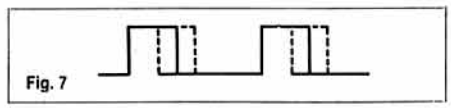


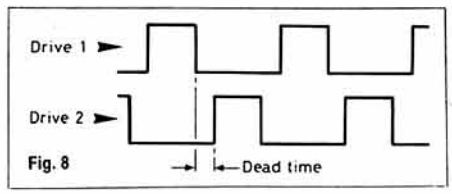
Fig. 5 High frequency switch and transformer section of an SMPS

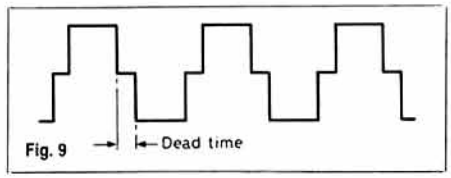
Fig. 6a-b Alternative switching arrangements.

Fig. 7 Error signal wave-form.

Fig. 8 Dead time wave-form in dual switch systems.

Fig. 9 Drive wave-form across transformer primary.





amount of the generated pulse signals which are used to drive the output circuitry. The output circuitry consists of two drive circuits which are fed with anti-phase signals so as to allow either single-ended (Fig. 5) or double-ended (Fig. 6) switching arrangements.

Most of the controller integrated circuits contain some form of protection. Typical of these are dynamic current limiting and shut-down. Dynamic current limiting is achieved by monitoring the current supplied to each of the electronic switches. Circuit components can be arranged so that the control circuit tries to shut down if a preset value of current is exceeded on each supply pulse, thus protecting the power switch. Remote shut-down is explained in the next section.

REFINEMENTS

Refinements consist mainly of additional monitoring circuits which will try to shut down the control circuit when excess output voltage is detected or if the safe output current is exceeded. The shut-down signal required by the IC is a logic signal which indicates if the above parameters have been exceeded. A typical block diagram of the arrangement is given in **Fig. 13.**

PRACTICAL SMPS

Fig. 14 gives a typical circuit diagram of a switched mode power supply but without over-voltage and over-current protection. The diagram splits horizontally, with the power circuits being in the upper half and the control circuits in the lower.

The mains is supplied, via a fuse F1 for protection purposes, and is then full-wave rectified by BR1. This feeds smoothing capacitors C1 and C2 via resistor R1 which limits the inrush current to C1 and C2 on switch-on. Note that the only reason why the smoothing capacitor is in two sections (C1 and C2) is that the circuit can easily be modified to allow 110V operation. Because C1 and C2 are in series, resistors R2 and R3 are necessary to equalize the voltage across them. The unregulated DC appears across the combination C1, C2, R2 and R4 as shown in Fig. 4.

The basic power switch is of the half bridge type and is essentially C3, C4, T3, TR1 and TR2. There are additional components in this area and their function is as follows: R4 and R5 ensure that the centre point of C3 and C4 is at half the supply voltage and networks R6/C5 and R7/C6 are

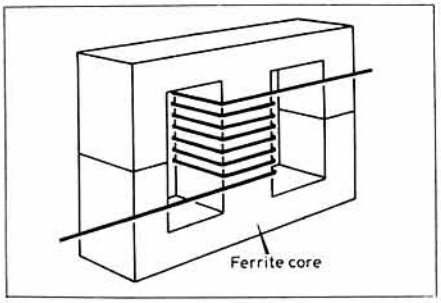


Fig. 10 SMPS output transformer.

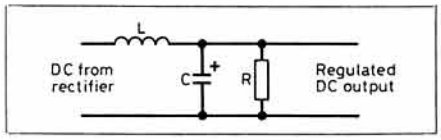


Fig. 11 SMPS output filter.

'snubber networks'. With fast switching waveforms in inductive circuits there is always the risk of voltage spikes occurring at the switching edges, especially if the magnetic circuit is not perfect. The 'snubber networks' together with the inherent drain-source diode of the power FETs, are used to reduce these spikes to within acceptable limits. Transformer T5 is part of the dynamic current limiting as explained earlier and is fed to R16 et al (see later).

The power transformer T3 uses a centre tapped secondary and D1a and D1b are the fast rectifier diodes, R8/C7 and R9/C8 being snubber networks. The output filter is formed by components L1 and C9, with a bleed resistor R11 whilst D2/R10 merely form an output indication and C10 provides decoupling at radio frequencies.

The control circuits are built around an SG3526 integrated circuit and as isolation is required between the mains input and the DC output of the power supply, steps must be taken to ensure this. There are two basic choices, a) have the control circuits connected to the mains side and isolate the feedback voltage or b) have the control circuits directly connected to the output and drive the power switches via isolating transformers. In this circuit the latter course is chosen on safety grounds as there is no problem posed when using an oscilloscope to examine waveforms on the control circuits.

T4 is a small mains transformer and with C11, BR2 and REG1 this forms a regulated DC power supply for the SG3526 IC (typically 12V). A feedback voltage is taken from the main power supply output via a resistive potential divider R13, RV1 and R14 with C20 removing unwanted disturbances from the feedback voltage. It is necessary to use the divider chain since the internal reference of the SG3526 is 5.00V and the feedback voltage should equal this. Potentiometer RV1 allows slight adjustment for component and output tolerances, R15 feeds back the reference voltage to the comparison amplifier and C19 is for decoupling.

The soft start capacitor is C13, whilst R22 and C15 are the main oscillator timing components, with R18 defining the dead time. Dynamic current feedback is from current transformer T3 loaded by R16. The dynamic current feedback is rectified by diodes D3 and D4, slightly smoothed by C14 to remove some spikes and applied to the voltage divider RV2/R17, with RV2 being used to set the level at which dynamic current limiting occurs.

Output drive to the power switches TR1 and TR2 is via C17 and C16. These anti-phase outputs drive the power switches via isolating transformers T1 and T2 which are small ferrite cores wound with bifilar wire giving a 1:1 turns ratio. Resistors R20 and R21 ensure that the gates of the power FETs are biased to ground to prevent them accidentally switching ON. Back to back zener diode combinations D5/6 and D7/8 are to clip any dangerous voltage spikes and limit the voltage applied to the gates. R12 and C12 are compensation to ensure that the internal comparison amplifier does not oscillate and R19/C18 provide decoupling on the output drive circuits of the control IC.

RFI

Switched mode power supplies can be prone to causing RFI on nearby receivers. This is because of the frequency at which they operate (eg 50 - 200kHz) and the sharp switching waveforms which generate harmonics well into the RF spectrum.

When building a switched mode power supply one should ensure that it is in an earthed metal case, which not only affords good screening but also prevents interference via the mains wiring when the necessary RF input filter is used. When using an RF filter take note of the advice given as some of these need to be earthed.

SAFETY

When making, repairing, modifying or using

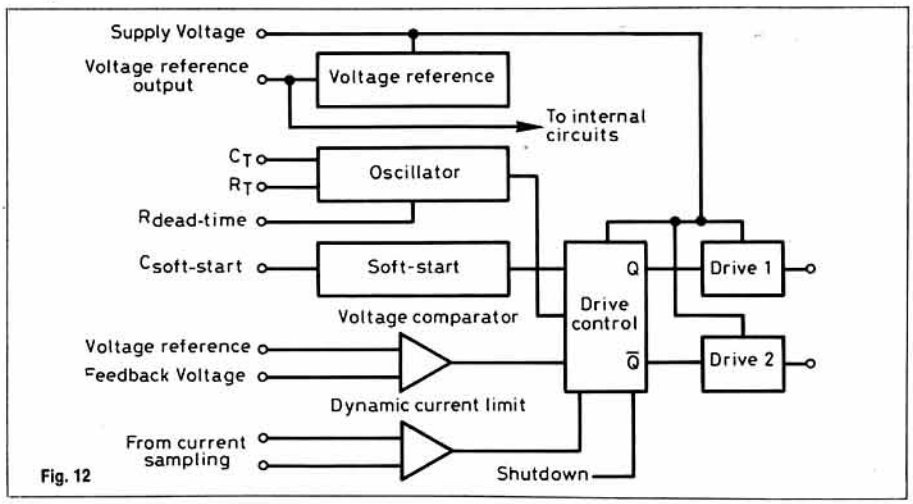


Fig. 12

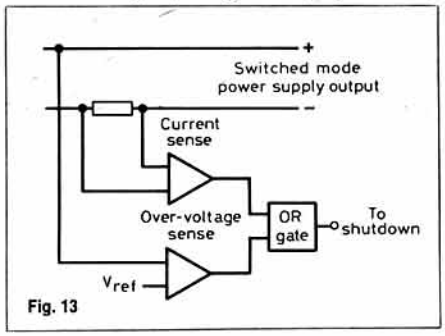


Fig. 13

Fig. 12 Block diagram of a typical SMPS IC circuit.

Fig. 13 Auto shut-down circuit

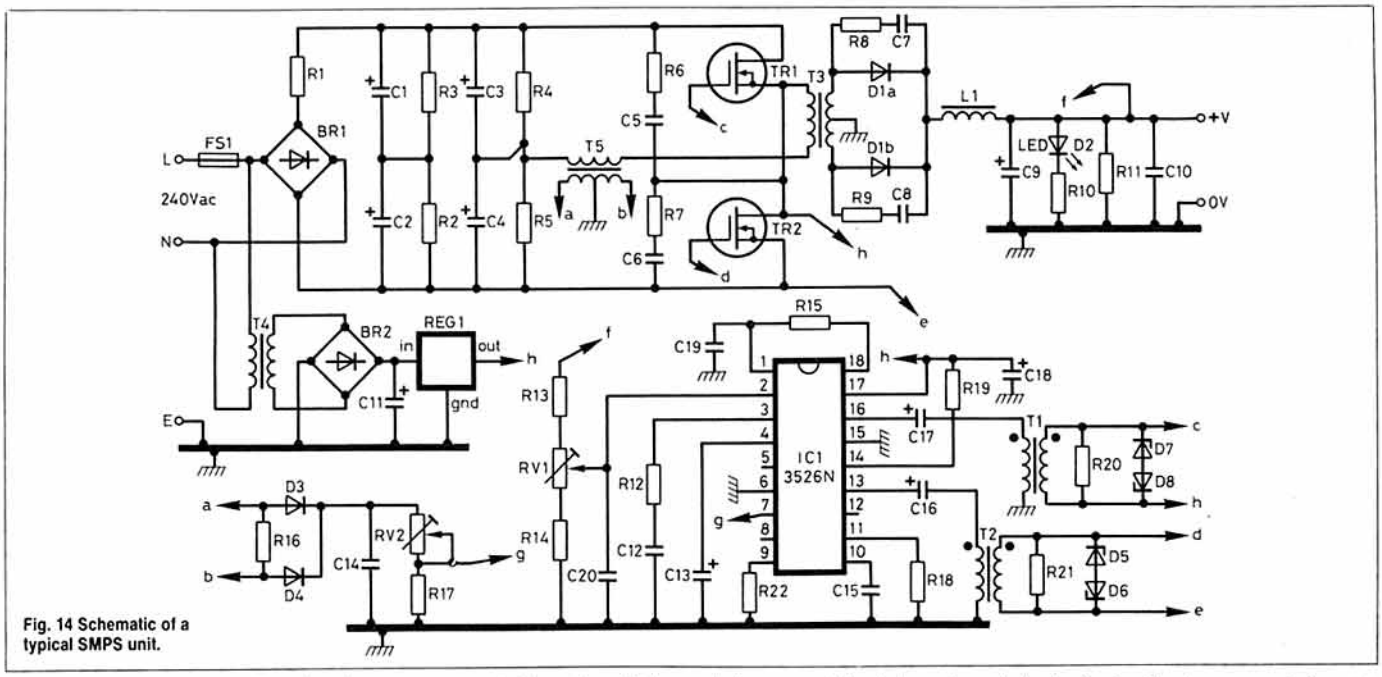


Fig. 14 Schematic of a typical SMPS unit.

switched mode power supplies, do take care as dangerous mains voltages are present in some of the circuits. In many instances an oscilloscope cannot be connected directly to the unit as it will be earthed. If the mains input side needs to be examined then feed the SMPS via a 1:1 mains isolating transformer (*not* an auto-transformer) of suitable rating. If the earth becomes detached from the metalwork, this may float up to half supply voltage.

IN CONCLUSION

This article has tried to describe the operation of switched mode power supplies in simple terms. As in most electronic circuitry there are variations on a theme and so it is not possible to cover them all in an article such as this.

Readers may be interested to know that we hope to publish a constructional article in the near future for a 12.5V, 20A supply based on the circuit in **Fig. 14.** □

BEAN TIN antenna

S Sutherland, GM4BKV, shows us how to re-cycle our rubbish and produce a cheap and effective 15m antenna into the bargain

Aerial projects have, from time to time, been initiated by some rather strange events and this project is no exception — in fact this particular design arose as a consequence of updating our bathroom! One of the items left over from this epic event was the shower curtain rail, comprising two aluminium rods which fitted inside one another à la telescopic aerial.

RAW MATERIALS

One of the two rods had a spring and disc assembly which locked it into place, the combination being designed so that it could be fixed horizontally between two walls by means of spring tension. Having decided that a spare length of aluminium tubing must be useful for *something* I had kept it, never imagining that it would one day take to the air!

The project was prompted by hearing the numerous Soviet radio amateurs who operate on the 15m band with nothing more than a simple ground plane aerial - probably because they are cheap and easy to build - so it was decided to home-brew my own version.

CONSTRUCTION

The components needed are simple, inexpensive and easy to obtain, consisting of:

3 Jubilee clips
2 Exhaust system 'hangers' for Ford cars
3 Lengths of aluminium tubing, each piece of different diameter
1 70cm length of copper tube
1 Baked-bean tin
1 Co-axial chassis socket
2 Metal L-brackets
1 Piece of wood 160 × 15 × 6cm
Wire for radials
Pegs to hold the radials

Taking the widest of the aluminium tubes first, cut six to eight equally spaced slots down into one end and then do likewise with the second widest tube. Insert one tube inside the other and place the jubilee clip over the slotted area as shown in **Fig 1** and attach the remaining aluminium tube in the same way. Next, adjust the overall length of the assembly so that it measures exactly 3.3 metres in total, then lock the tubes together by means of the jubilee clips.

Take one of the car exhaust system hangers, place it on the base of the empty baked-bean tin and draw around the outside. Now cut a hole in the tin which is slightly *smaller* than the circle you have just drawn, then ensure that all the ragged edges are rubbed down using a suitable file. Push the hangers over the end of the copper tube and then push the bean-tin over the hangers. When completed, this assembly serves to electrically isolate the vertical element from the rest of the aerial and provides a degree of weather protection for the feeder termination.

The next job is to connect the centre pin of a co-axial chassis socket onto the bottom end of the copper tube. This can be achieved in a number of ways - such as using a (very!)large soldering iron to connect the two together, or alternatively by attaching a piece of stout copper wire to a suitable solder tag (the other being soldered to the co-ax socket centre pin) and then bolting the solder tag firmly on to the tube. In either case the metal should be cleaned thoroughly before operations begin, in order to make a satisfactory join. Regardless of the fixing method, it is also advisable to fit a static bleed resistor across the inner and outer of the co-axial socket - a 100k, 2W component being perfectly adequate.

The next step is to attach the six wire radials to the bean tin, so first cut the wire into 3.3m lengths. Make six equally spaced marks around the outside of the can, as near to the bottom as possible, tin the can at these points to aid attachment and then solder each radial wire into position (see **Fig 2**).

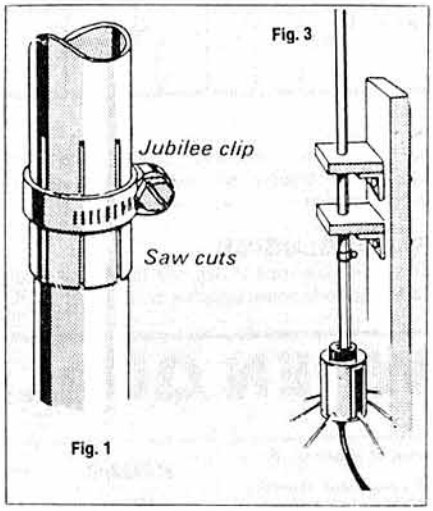
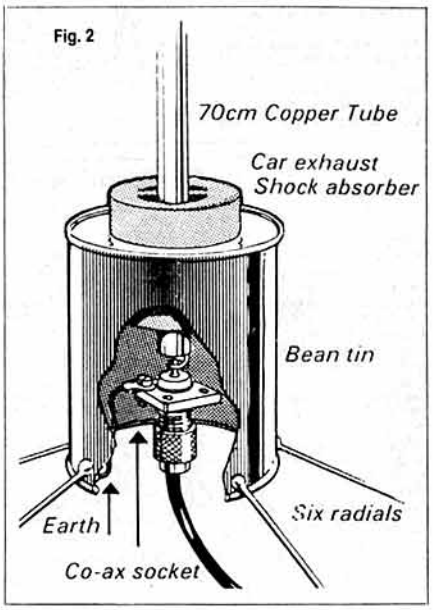


Fig. 1 (above, left) Tube clamping technique

Fig. 2 (below) Aerial base and radial attachment detail

Fig. 3 (above, right) Aerial support method



MOUNTING

Cut two 10cm pieces from the length of wood for use as stand-off brackets, then measure the width of the lowest aluminium tube and cut two slightly under-size holes in each of the stand-offs - the fit should be tight enough to support the aerial. Screw a metal bracket to each of the wood stand-offs and then secure these to the large piece of wood. Push the copper tube through the bracket holes (**Fig 3**) and then attach the rest of the aerial to the tube using a jubilee clip.

Dig a hole about 20cm deep, place the mount in it and refill the hole, pressing the earth down with your foot. Then, using suitable pegs, spread out the radial wires and secure them firmly as these not only fulfill an electrical function but also serve as supports for the antenna structure. When correctly installed, the base of the antenna should be about a metre above ground so that the radials are at an angle of 20° to the horizontal.

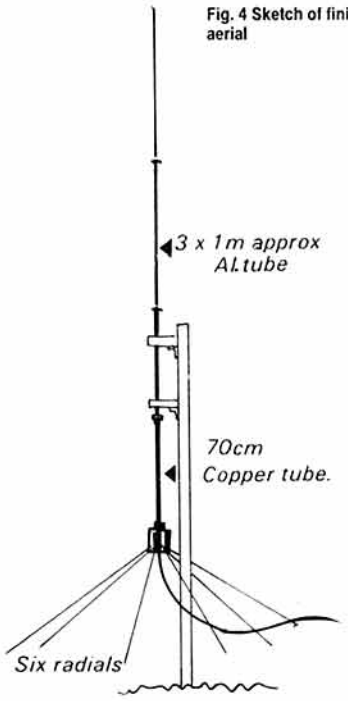
AERIAL TUNING

Tuning is achieved simply by varying the overall length of the vertical element, this is done by loosening the lowest jubilee clip and sliding the two tubes inside one another. SWR measurements will reveal when the antenna is presenting the best match and in practice it was found quite easy to obtain a 1:1 SWR.

CONCLUSION

The original antenna was fed with ordinary 50Ω co-axial cable, and using 100W I have been able to work DX as far afield as Chile, Japan, India, Tasmania, Canada and several parts of the USA. Apart from the satisfaction of working distant stations there is no doubt that a great deal of fun and pleasure can be obtained from such a home-brew project - after all it is *one* way of getting rid of old bean tins! □

Fig. 4 Sketch of finished aerial



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Simple 20m beam antenna

F Webb, G0CEK, and W Johnson, G4CNK, put their heads together to produce this simple yet effective 3-element 20m beam

Many projects today seem difficult and expensive. This one is neither and can be built by anyone whether an experienced constructor or not. All that is required is some 300ohm slotted ribbon feeder, ordinary wire, perspex sheet, nylon (or polypropylene) rope, and some lengths of timber.

The average amateur usually cannot improve his station's performance by modifying modern, efficient transceiver equipment. However, worthwhile improvements *can* be obtained by attention to the antenna system. If a 50ft tower and commercial beam is not available, this project could provide a good substitute. The antenna's performance will be interesting, and possibly exciting compared with the usual dipole or end-fed wire! Although the beam is fixed in one chosen direction, it will take a very long time to work out all the stations along that bearing. The bandwith of the antenna permits operation over the whole of 20 metres without adjusting the ATU, unless very low VSWRs are needed at the transmitter. The beam can be designed for other bands using the design formulae shown below.

SPACE REQUIRED, ELEMENT LENGTHS AND HEIGHTS

Our 20 metre antenna was erected in the back garden which is 36ft long and 28ft wide, with the elements stretched between the house facia board and a rope suspended on posts fastened to the boundary fence (**Fig 1**) It is a full-size beam, with a driven element length of 33ft for 20 metres. The reflector and director are 35ft and 32ft respectively, and the effective boom length is 24ft. No actual boom is used, and if the available space is small, the length could be reduced to 14ft (element spacings of 0.1 wavelength), or the element ends could be bent downwards. In our case, the facia board was about 15ft above the ground, but any increase in height would be an advantage.

CONSTRUCTION

If the beam is to point parallel to the house, the two support posts should be fixed to the fence or other suitable supports at least 24ft apart (27ft if you want to reverse the direction of the beam), and at least 36ft from the house. The support rope is stretched between the posts on pulleys so that the antenna can be lowered for easy adjustment. The elements are fastened with insulators to halliards run through loops tied in the support rope. The position of these loops sets the element separations as shown in Fig 1. The halliards will work more smoothly if plastic rings are fastened to the rope in place of the loops, but this is not essential. Screw eyes are run into the house facia board for the halliards or short ropes which support the other end of the elements, again via insulators. As the elements are not the same length, these ropes are used to set the centres of the elements in line before tensioning them with the halliards at the support rope end.

The driven element is a folded dipole made from 300Ω slotted ribbon feeder. The perspex centre insulator is shown in **Fig 2.** The two slots in each end are made to be a tight fit for the 300Ω ribbon element. Pass the ribbon through the end slot, then double it back through the inner slot. Anchor the top two leads to the centre bolt and solder in place. Similarly fasten the lower leads to the remaining bolts, using solder tags if required, and fill the slots with glue to make a strong mechanical joint. Twist the far ends of the element together and temporarily fasten them to the insulators until resonance checks have been completed. Put a short wire link across the terminals A-A for coupling to the grid-dip oscollator. The ends of the other elements are simply passed through their insulators and made secure.

RESONANCE CHECKS

Hoist the driven element on its own to a height where the centre is still accessible with a step-

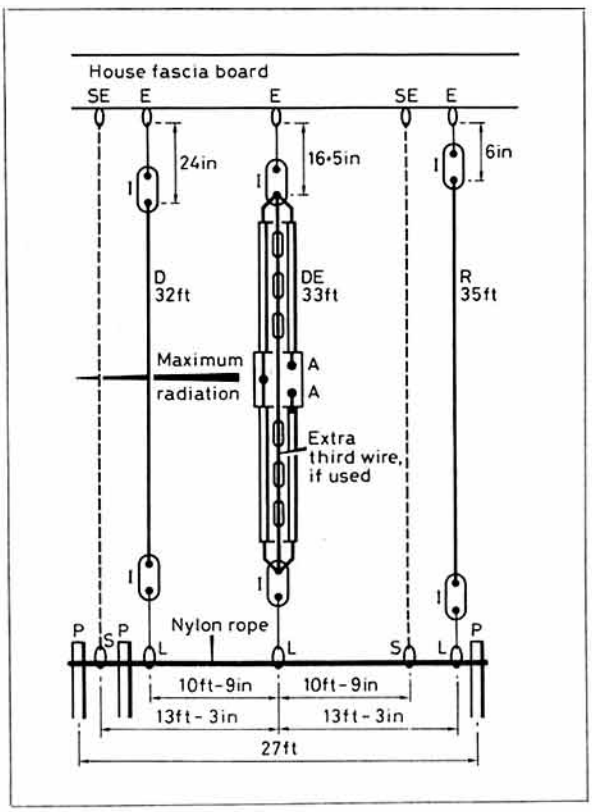

Fig. 1 Mounting details for the 20m antenna.
L = loops or plastic rings,
S = spare loops or plastic rings,
P = post,
I = insulator,
E = eye,
SE = spare eye.

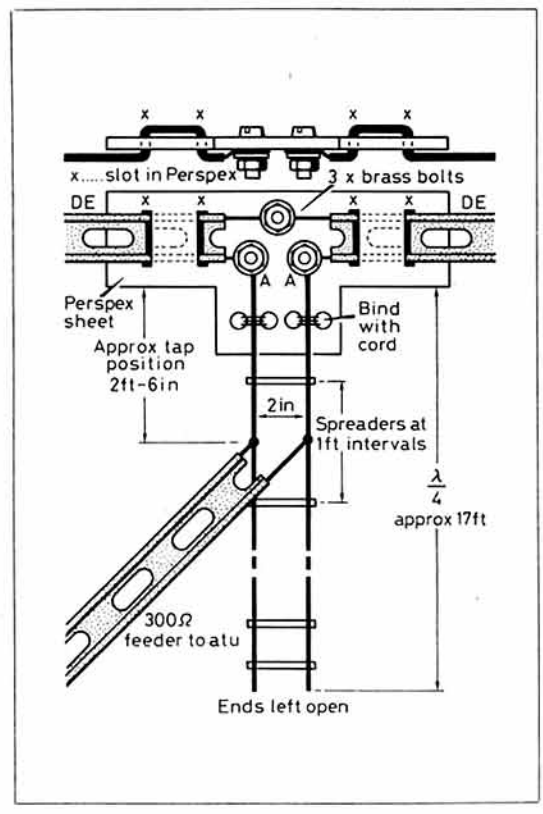

Fig. 2 Driven element connection details

ladder. Couple the grid dip oscillator to the centre link and tune carefully for a dip. Check the frequency against the station receiver, as this is much more accurate than the grid dip oscillator. If the frequency is low, trim a little off each end of the element until resonance is obtained at about 14.15MHz, which will provide a good compromise for both CW and SSB operation. In our installation, the final length was exactly 33ft, and if resonance checks cannot be made, an element cut to exactly this length should be suitable. When all is correct, permanently solder and glue the ends of the elements to their insulators. Remove the link from the centre of the driven element.

IMPEDANCE MATCHING ARRANGEMENTS

Whilst a folded dipole at least a half wavelength above ground should theoretically provide a good match to a 300Ω feeder, in this case the antenna is low, which with the presence of the other elements greatly reduces the input impedance of the dipole. One way of achieving a match is to tap the feeder on to an open-circuit stub, which has the advantage that the input impendence need not be known as the match can be obtained experimentally. **Fig 3** shows the current distribution on a quarter-wave open-circuit stub. The impedence is low at the antenna and high at the open end, and somewhere along the stub there will be a 300Ω point to connect the feeder for a good match. Antenna reactance can be compensated for by adjusting the stub length as described below. The stub can be of any convenient (high) impedance. Our stub was made from 22swg wire spaced about 2 inches apart with perspex spreaders held in place by small pieces of wire soldered to the stub. The impedance was about 600Ω, and a quarter wavelength stub of this type is around 17ft long for 20 metres. Solder the stub to points A-A (Fig 2) and bind the wires to the insulator with cord passed through suitably placed holes.

Any length of 300Ω twin feeder can be used to connect the antenna to a balanced antenna tuning unit at the transmitter, as the antenna is matched to the feeder. Details of our ATU are shown in **Fig 4**, where C1 was 100pF per section, although a 50pF unit with wide spaced plates will do. The whole capacitor must be carefully insulated from ground, and the tuning knob connected to the spindle by an insulated shaft or other arrangement. C2 can be 200 to 300pF, and the plates need not be wide spaced. L1 was a 12 turn centre-tapped coil about 2 inches long on a 2.5 inch former, with 3 turns of well insulated wire wound round the centre of the link L2. The centre tap of L1 should be connected to the station earth, as the antenna has no other earth leakage path to prevent the buildup of static electricity.

ATU AND STUB ADJUSTMENTS

The antenna tuning unit is first adjusted for a match into a 300ohm dummy load. A low wattage carbon resistor with crocodile clips will do if suitably low powers are used during tuning. Place an SWR meter between the transmitter and the ATU and connect the load resistor to taps which are equally spaced either side of the centre tap on L1. Tune the transmitter to 14.15MHz then adjust C1 and C2 and the coil taps in equal steps either side of the centre until a match is obtained. Note the dummy load tap positions on L1, remove the

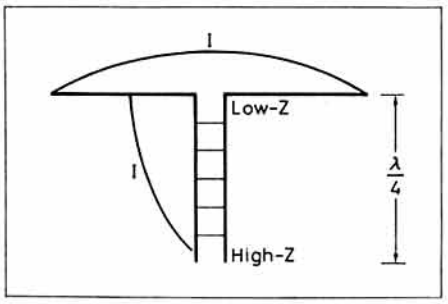

Fig. 3 Current distribution on a quarter-wave open-circuit stub

load and connect the feeder to the same taps. Using crocodile clips, connect the other end of the feeder to the tuning stub about 2ft below the driven element. Hoist all the antenna elements to their working height.

Without touching the ATU settings, adjust the position of the feeder on the stub for the lowest SWR. Note the SWR, then cut a few inches off the stub and repeat these two steps until the best SWR is obtained, then solder the feeder in place. In our case the stub length was around 12ft when tuning was complete. Use an insulator to secure the free end of the stub to a stake, but note that high voltages will be present at the bottom of the stub when transmitting, so make sure that it cannot be touched accidentally. The folded dipole gives the antenna a fairly wide bandwidth, and we found that it was not really necessary to adjust the ATU for transmissions anywhere in the 20m band.

RESULTS AND GENERAL POINTS

The test configuration was as follows: beam direction was fixed at 240 degrees (magnetic), the transmitter was an old Labgear LG300 with a KW low pass filter, the receiver was an ARBB with headphones and CW was used throughout the tests. Performance was found to be much better than dipole and end-fed antennas which were at greater heights, and at times multiple replies resulted from CQ calls. Over 500 DX stations were worked between May and August 1987, including five VK stations, three ZL and many VE, USA and South American stations. A PY station was worked several times over a few days, and a report from a PT was just one S point below another G station using a linear amplifier, tower and beam antenna.

Initially, some TVI was caused at the adjoining house in the beam direction, but this was cured by a filter in the television downlead. No other problems have occurred, although there are

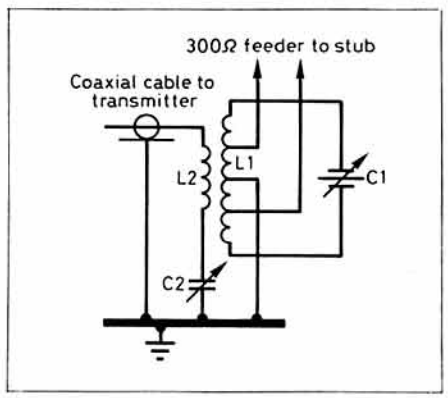

Fig. 4 Suitable ATU for the antenna

houses all around and transmissions have been made at all times of day using around 100W output. In addition to a low TVI profile, and because all the wires ran parallel to the garden, the antenna has a low visual impact — not looking the least bit unsightly.

AN ALTERNATIVE DIPOLE AND FEED

After very strong winds during which the stub took a beating, we decided to remove it and connect the feeder directly to the centre of the driven element. A third wire was woven through the slots of the ribbon dipole and connected to either end of the dipole element to make a three-wire folded dipole (Fig 1). The match was still very good with the ATU set for a 300Ω load, although this may not be true for antenna heights other than ours. However, the antenna and feeder can be tuned for a match between the transmitter and feeder terminals using the ATU.

NOTES FOR EXPERIMENTERS

The basic antenna was dimensioned as follows, and can be scaled for other frequencies. The wavelength is given by L=984/F ft, or about 70ft at 14MHz. The reflector, driven element and director were cut to 492/F, 468/F and 450/F respectively, with a reflector to driven element spacing of 0.2 wavelengths. The director was placed 0.15 wavelengths in front of the driven element.

The element spacing could be reduced to 0.1 wavelengths, and if space is short, the ends of the elements could be dropped down or folded to reduce the span, although in either case, the bandwidth will be smaller and the stub adjustment may be more critical. The optimum element lengths will be different, although References 1 and 2 contain useful information about this. A two element beam would still provide useful gain if space is at a premium. If 50 or 75Ω twin feeder is available, an open wire dipole could be used for the driven element, although a broader bandwidth can be obtained with a folded dipole fed with 300Ω ribbon feeder.

The beam direction could easily be turned through 180 degrees by providing extra loops and halliards in the support rope and extra screw-eyes at the house facia board at the correct spacing as shown in Figure 1. It would then be a simple matter to lower the reflector and director and move them to their alternative positions. If space permits, the beam can be set at any angle to the house, but the distances between the loops and the lengths of the support ropes will depend on the angle chosen. A good sketch of the layout would help in working out the dimensions to ensure that the element centres are in line and at right angles to the elements.

IN CONCLUSION

It is hoped that this article will steer the reader towards thoughts of installing a fixed-beam HF Yagi antenna. While theoretical design is complicated, we have described a practical design that has been proved to work. The builder is not restricted to making an exact replica of the original, and construction can be adapted to individual requirements. Planning permission may not be required although this should be checked with the local authority. □

REFERENCES

[1] The ARRL Handbook
[2] The ARRL Antenna Handbook

Leicester Show Preview

WHERE TO STAY

If you're planning to stay in a hotel, here are some you might like to consider. First of all, block bookings have been made at the Grand Hotel in Granby Street and a room there costs £28.00 per person per night. The telephone number is Leicester 555599, the STD code being 0533. Then there's the Alexandra Hotel in London Road; £26.50 per night for a single room and £36.00 for a double or twin. English breakfast is thrown in, and they're on Leicester 703056. Next comes the Post House in Braunstone Lane, which will do you a single room for £18.00 and a double for £24.00; here again you get a free English breakfast. This establishment is on Leicester 896688. Finally there's the Belmont Hotel in De Montfort Street, where a special show price for TWO nights has been negotiated. For bath, bed, breakfast and dinner it costs £62.00 per person; book up on Leicester 544773.

If you book at any of these hotels, do remember to mention that you're taking advantage of the Leicester Amateur Radio Show block booking - otherwise you'll pay rather more than the concessionary prices listed above.

FAST LANE

SMC have a new rig '...for the amateur who lives in the fast lane' (?). Be that as it may, the rest of the press release said 'SMC are proud to introduce the introduction of the FT1000, a dynamic HF transceiver designed exclusively for elite world-class contest and DX operators. The FT1000 is the culmination of a three-year design effort to address the many shortcomings of other manufacturer's top-of-the-line products. The result is a dominating tool...features may include dual receive with two tuning knobs, balance control for dual receive, dual frequency displays, standard filter bandwidths of 2400, 2000, 500 and 250Hz, direct digital synthesis and narrow-range PLL sub-loops for low phase noise and a fast-acting auto-tracking ATU'. Go for it, all you elite world-class contest and DX operators. Me, I just want to go on 3·5MHz and moan about the weather so I'll obviously have to wait for the FT 3 and a quarter.

CHEAPER AMTOR

ICS Electronics is showing the new AMT-3. In a press release, the company said 'Until recently, it has been relatively inexpensive to become active on packet radio but much more so to become active on AMTOR. The normal route has been to use a relatively expensive multi-mode terminal unit such as the AEA PK-232. AMTOR is far more suitable for HF communication than packet, frequently giving error-free messages when signals cannot be heard in the noise! In contrast, packet requires signals good enough for speech communication before it will work at all.' They go on to say that the AMT-3 is a low-cost AMTOR/RTTY terminal unit which '...incorporates only those modes which are useful for HF data communication... An excellent tuning indicator is incorporated, as well as full status indication for AMTOR'. Apparently the firmware of the AMT-3 was designed by Peter Martinez, G3PLX, who's more or less the father of AMTOR, so it ought to be pretty good. Together with the unit itself, you get split-screen host mode software for the IBM PC thrown in - all for £169.95.

HANDY SCANNER

Waters & Stanton will be showing a number of new products, including the Jupiter II hand-portable scanner covering 25-550 and 800-1300MHz at £299 and the companion Jupiter Mobile/Base scanner covering 25 to 1300MHz ('below £400'). They'll also have the Mizuho 10W HF amplifier, which matches the 2W SSB/CW transceiver. Two versions are available, single-banders covering 3·5, 7 and 14MHz and a wideband job for 3-30MHz. There should also be some new items from Alinco on show.

TINY TNC

In a last-minute fax to HQ, Siskin Electronics said that they'd be launching '...a completely new concept in amateur radio; a hand-held TNC no larger than a packet of King Size cigarettes'. Siskin tells us that packet radio is much safer than smoking, so it won't carry a government health warning, but the new box - which is apparently code-named 'Le TNC' is essentially a miniature version of the popular PacComm Tiny-2 and it's designed specifically for use with hand-held wirelesses of the Icom 2E/4E, Kenwood TH series and the Yaesu FT family. Features will apparently include the PacComm Personal Message System, full TNC2 capability (including provision for NET-ROM/TheNet), a metal cabinet for full RF screening and conventional RS232 connections. Additionally there's a ni-cad battery option and a '...family of support accessories such as higher-speed modems including the G3RUH 9600 baud modem'. Siskin couldn't quote a price at presstime but said that 'Le TNC' would retail in the UK and Europe at '...under £200'.

QRM ELIMINATOR

The Isle of Man-based company SEM Ltd will be showing its 'QRM Eliminator' which apparently allowed W4CXH to report that '... the power line noise is S7 and your are coming through 5 and 4'. Remarkable.

YOUR SOCIETY

RSGB - well, what can we say about quite the best national amateur radio society in the UK? We'll be there in force, of course, with lots of books and other items for sale and staff from Membership Services to help you with any problems.

CLEVER KITS

C M Howes Communications will be unveiling the latest addition to their kit range. They said that this '...is a frequency counter which can be used as a digital readout for receivers, transmitters and transceivers built with Howes kits. The display has five digits and can be selected to show 100Hz or 1kHz resolution on any band between 1·8 and 30MHz. The circuitry has been designed to minimise 'digital noise' and can therefore be installed in the same case as a receiver without the EMC problems this often causes. With the addition of this new kit to the Howes range, it is now possible to build a receiver or transceiver with all

Yaesu's new top range FT1000.

A cheaper way into AMTOR from ICS.

the major front-panel features normally found on factory-made equipment. Designated the FD5, a demonstration unit will be available at the show for visitor's inspection'. Sounds nice - we really must get round to trying some of these Howes kits some time and tell you how we get on.

2/10M TRANSVERTER

R N Electronics said that they'd be launching a 2/10 metre transverter with 25W PEP output. The spec says that the second harmonic is better than -70dB and spurii are better than -60dB; intermod is quoted as '-32dB' (it didn't say which order and with reference to what) and the noise figure is better than 2·5dB. There are also masthead preamps for 70, 144, 430 and 934MHz. Apparently '...The power handling is up to 200W with a low noise figure of less than 1dB. The gain of these preamplifiers is set to give the best compromise between system noise figure and system intermodulation performance'. No doubt they'll be glad to give you more info on the stand.

BOOST YOUR HANDHELD

Nevada are showing a couple of 'docking boosters' which increase the power of a VHF handheld to 25W. It says here that 'By sliding the handheld radio on to the unit, the handheld is converted into a mobile or base radio that may be used at high or low power. For mobile use, the 'docking booster' is supplied complete with a fixing bracket for installation in a car. At home, the unit may be powered from any 12DC mains adaptor' *(really? the spec says it needs 13·8V at 6A, which means a moderately beefy PSU - Ed)*. Model BS25 is designed for the Icom IC2E, CTE CT1600, Kenpro and similar models. Model BS23 is for the Yaesu FT23 and similar machines. The spec says that both units over 1400-174MHz and give 25W output; input power is quoted as 3·W. Both models cost £59.95.

Jupiter II handy scanner.

BADGER BOARDS

Badger Boards of Sutton Coldfield will be showing the full set of PCBs for the G3TXQ transceiver; they're ready-drilled and roller-tinned and all seven are available from stock. John Badger will also be showing a range of preamp kits, the 'Scanner Vox', a 144MHz amplifier and various other items will be available — and there'll also be a demonstration of computer-aided design of PCBs. We saw a Badger board the other week and must say it was beautifully made - a lot nicer than some so-called 'professional' ones we've come across...

TEN TEC TASTY

Fred Rendell and the gang at HRS will be showing the new Ten-Tec Omni V HF transceiver which we mentioned last month - very tasty.

SSTV AND FAX

Technical Software will be coming down from Caernarvon to show their new GX-2 fax and SSTV transceive system. Apparently the fax has '...full 320 x 256 pixel definition with 7-level grey-scale, full or quarter-screen transmission at all IOCs with phasing signal and stop tone... Reception at any speed, picture reverse and screen dump to printer. Optional direct printout of received signals with auto phasing for top-quality charts and pictures'. For SSTV you get '...colour and monochrome transmission and reception, complete compatibility with existing Robot colour, line sequential colour and mono equipment and automatic operation in Robot mode. All timing standards are supported. Flywheel synchronization to combat noise and QRM, screen dump to printer and lots of other features'. The press release adds a lot more detail and the GX-2 certainly sounds amazingly clever. If fax and SSTV is your thing, you can get one for £99 - or £119 including the fax direct printing option. Technical Software is run by Richard Wilmot, GW3RRI, and an exceedingly bright chap he is too - we've used some of his software in the past and been most pleased with it.

MODULAR KITS

A new name at Leicester this year is Jandek, who will be showing a range of kits. The press release said that Jandek kits have been designed to encourage construction amongst radio amateurs and listeners and that a modular approach has been adopted so that the various items can be used with each other or with the constructor's own circuitry. Amongst those available are two audio amplifiers, the JD001 and JD006; these are based on the LM380 IC and produce about 0·7W into 8ohms from a 12V rail - just the thing for an RX. There are also two active audio filters, the JD002-C for CW reception and the JD002-S for SSB. Both use the TL074 low-noise JFET quad op-amp in a six-pole low-pass filter configuration. Cut-off frequencies are typically 1120 and 2560Hz respectively. The JD003 is a product detector module based on the MC1496 double-balanced mixer and the JD004 is a VFO based on a BF256 in a Colpitts arrangement, followed by another BF256 as a buffer and a tuned 2N2222 buffer. This VFO can be supplied to cover any single amateur band from 1·8 to 14MHz and the output can be fed directly into the JD009 broadband amplifier using a BSX20 to form a simple CW transmitter. There's more - pop along to the Jandek stand and talk to the proprietor, Derek Pearson, G3ZOM.

NAVICO BIRTHDAY

Navico have been in touch to say that although they won't be launching any new products at the show this year, it is neverthelss 'a bit of an occasion' for them. To celebrate the first anniversary of the launch of the AMR1000S, they're running a special offer: if you buy an AMR1000 or AMR1000S at the show you'll get a free extension speaker (worth £11.44) and a free 2m antenna (worth £14.99).

'Docking booster' for handhelds from Nevada.

MUTEK

Last exhibitor to send in some stuff to us was the reincarnated muTek, now doing very nicely in the hands of Mike, G6GEJ. We mentioned the new front-end board for the IC202 last month, and now the TVVF50c 50MHz transverter is back in MkII guise. This has 25W PEP output, as opposed to the 10W of the earlier model, and other figures have been improved too; the output 3rd-order intermod intercept is 5dB higher at +60dBm and the spurii are further down. As we went to press, the following muTek products were listed in their catalogue; TVVF50c and TVVF144a transverters for 144/50 and 28/144MHz respectively, the SLNA433sp 430MHz masthead preamp with 12dB gain and 1·3dB noise figure, two low-noise preamplifiers for 144MHz and replacement boards for the FT221, FT225, IC211 and 251, IC271 and the IC202. Incidentally, the muTek catalogue said that the new front-end board for the IC202 would be available from 30 October 1989 if there were no snags during initial production, but no doubt Mike will tell us the latest on his stand.

ANTENNA PEOPLE

By way of a final, we had occasion recently to visit Dee Comm - the antenna and metalwork people in the West Midlands - and I must say I haven't come across such a pleasant and helpful bunch for ages and ages. I happened to need some distinctly non-standard alloy tubing and fittings, most of which they didn't have. But they went to great trouble to locate a supplier and got the tubing on the following day! I had the distinct impression that if they didn't have it they'd either find it or make it. We don't know what they'll be showing, but it'll no doubt be good - if you need anything for putting antennas up, try them.

...ALSO PRESENT

By press-time we'd gathered that Newton Engraving, Quartslab, JMA Power Supplies, G4 Keys and MFM Supplies will also be at the show, but we didn't know which stands they'd be on. □

The AMR1000 2m transceiver

High performance technology made simple

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In the AMR1000, Navico has produced what so many radio amateurs have been waiting years for - a superbly designed, no-frills transceiver that offers sheer quality of performance for those who are more interested in communicating simply and clearly than in playing with complicated electronic gadgetry.

The AMR1000 is the product of the very best in user-conscious design. New comers to 2m will find the operation is pitched at exactly the right level to give the ease of operation they need, without unnecessary complications. More experienced operators enjoy the versatility and ergonomically designed accuracy of a rig that according to Chris Lorek of HRT "...makes Japanese black boxes appear rather limited."

The list of features is impressively functional and includes:-

- Reversible angled front panel that is conveniently visible however mounted
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- New fist microphone with channel change facility
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The simple quality and attention to detail make this the most exciting British-designed and British-made contribution to amateur radio this decade.

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LEICESTER SHOW

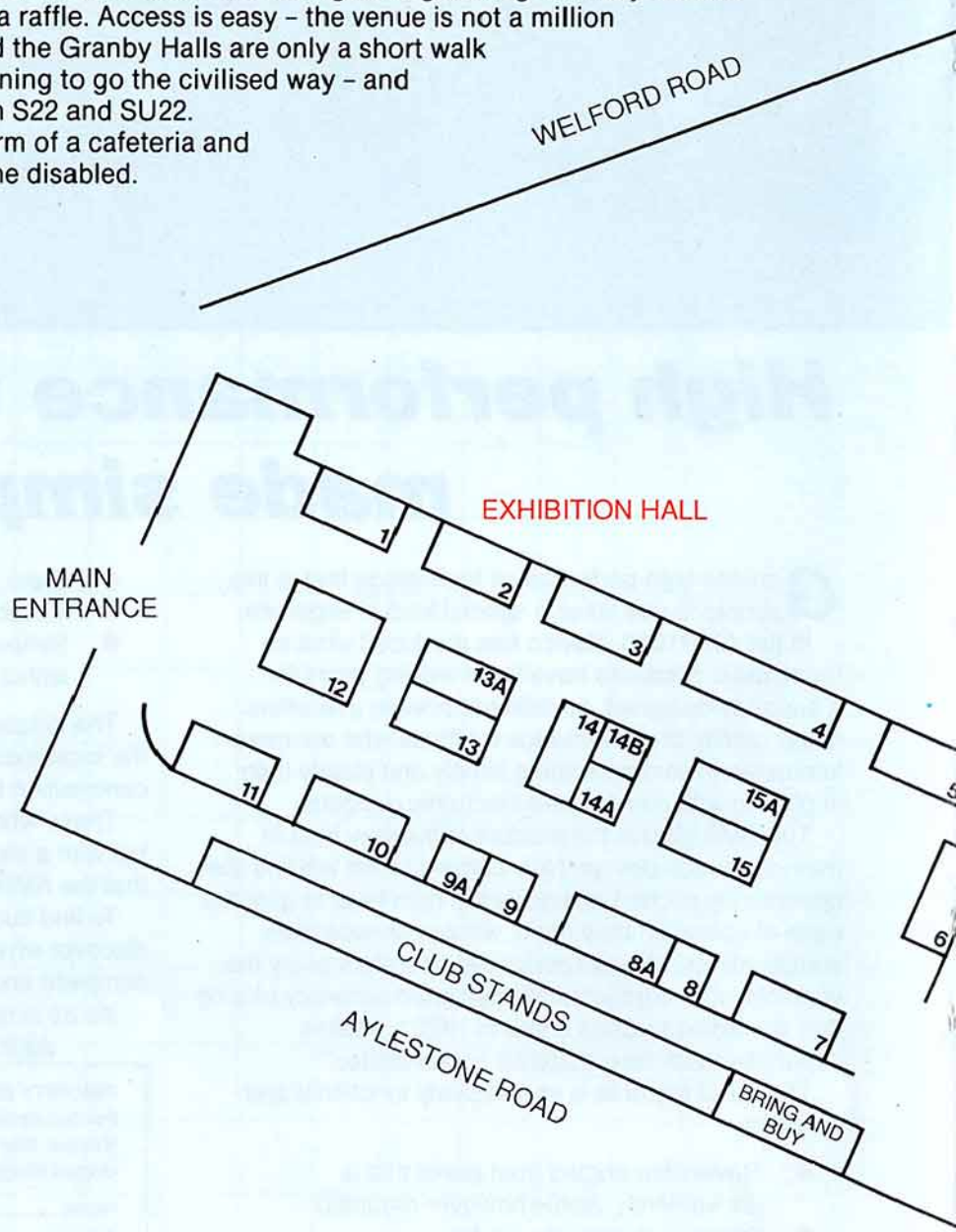
Well, it's that time of year again – time for that hardy annual, the Leicester Amateur Radio Show. This year's extravaganza (which is now in its eighteenth year) takes place on Friday 27 and Saturday 28 October, and as usual the venue is the Granby Halls in Aylestone Road. The 'Leicester Show' is organised by the Leicester Amateur Radio Club and supported by all the clubs in Leicestershire; surprisingly enough it's a non-profit-making event and the surplus is distributed around the local clubs according to their level of participation in the event.

Some 5000 visitors are expected to pass through the imposing portals of the Granby Halls, and as usual there's a large trade show. In addition, Leicester ARS is organising a bring-and-buy and the Leicester Repeater Group is running a raffle. Access is easy – the venue is not a million miles from Junction 21 of the M1, and the Granby Halls are only a short walk from the railway station if you're planning to go the civilised way – and talk-in will be available via GB2GH on S22 and SU22.

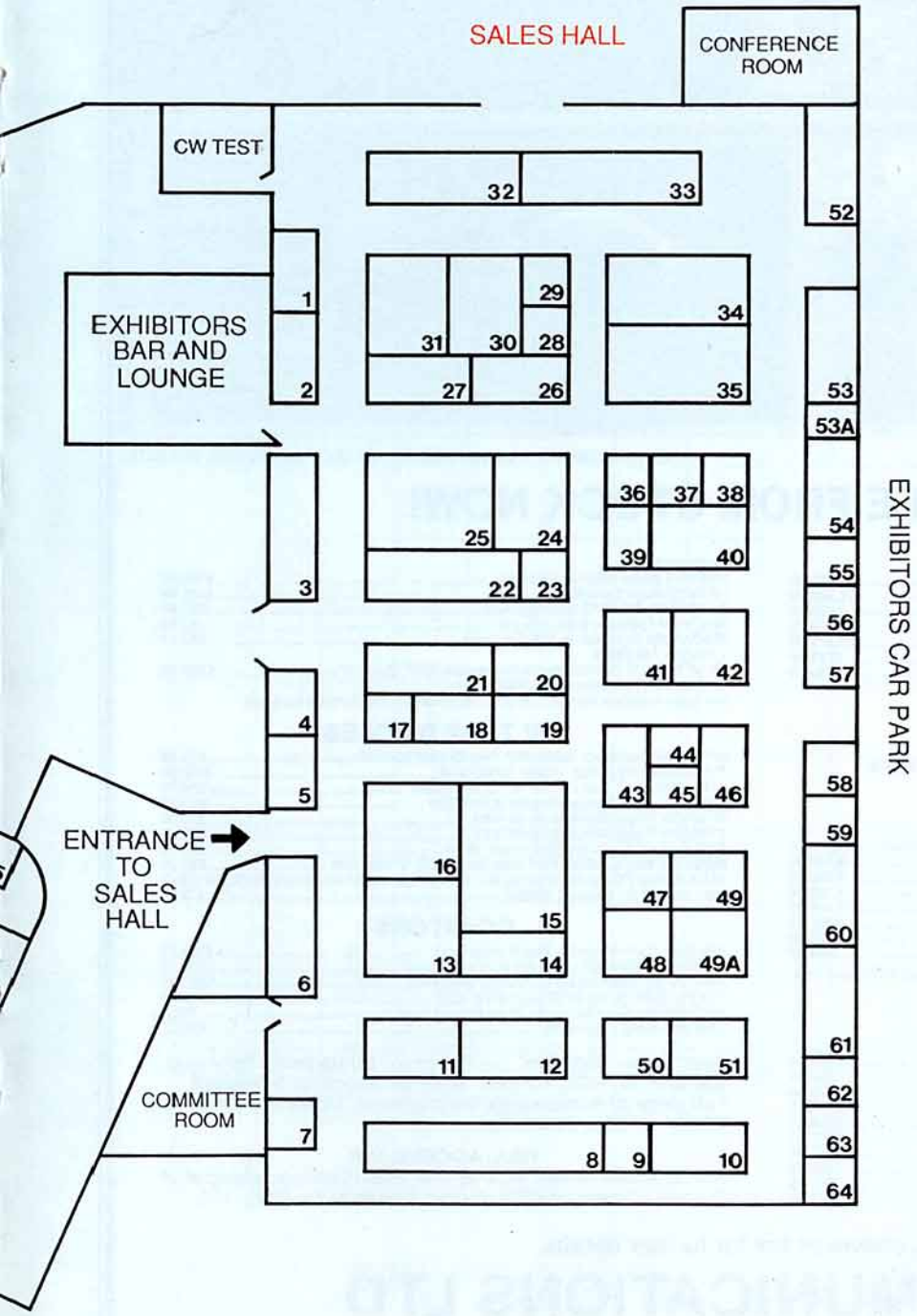
Refreshment facilities will take the form of a cafeteria and bar and there are good facilities for the disabled.

EXHIBITION HALL

EXHIBITOR	STAND NO
A1 Electronics	14
Amdat	15
Ham Radio Today	10
Howes Communications	9a
HRS Electronics	11
Icom	2
ICS Electronics	7
Jandek	9
Jaybeam	6
R A Kent (Engineers)	14a
LMW Electronics	15a
Lowe Electronics	12
Merlin Systems	8
Navico	1
Practical Wireless/ Short Wave Magazine	3
Procom (UK)	8a
Rich Electronics	13
RSGB	4
Sandpiper Communications	5
Technical Software	14b
T W Wraith	13a



FLOOR PLAN AND EXHIBITORS



SALES HALL

EXHIBITOR	STAND NO
Altron Communications Equipment	32
Amateur Radio Communications	10
ARE Communications	41
Arrow Electronics	33
Astley Videos	45
Badger Boards	57
Barenco	26
J Birkett	27
BNOS	22
Bonex	64
Brial Services	43
CapCo	31
Computer Junk Shop	48
Dee Comm	60
Dewsbury Electronics	4
Display Electronics	13
Dressler Communications	18/19
Elliott Electronics	6
Gemini Electronics	1/2
Giacomelli	49
Greens Telecom	5
Grosvenor Software	62
Ham Shack	46
Heatherlite	20
Hilton Plant	53a
J & P Electronics	37
JMG Electronics	16
JPE Computers	9
Alan Kelly Communications	25
KW Communications	21
Lee Electronics	53
M & B Radio	40
Marco Trading	34
MGR Communications	11
H Morgan Smith	23
muTek	17
Nevada	42
New Cross	51
R.A.S. (Nottingham)	47
Radio Shack	61
Radiotronics	52
Raycomm Communications	36
RN Electronics	58
SEM	55
SGS Electronics	35
Siskin Electronics	44
Sitek	59
South Midlands Communications	8
Spectrum Communications	29
Strumech Engineering	14
Syon Trading	30
TAR Aerials	54
Taurus Electronics	3
UMF	24
Waters & Stanton	15
Weirmead	12
Westlake	50
Wilson Valves	6a

OPENING SHORTLY

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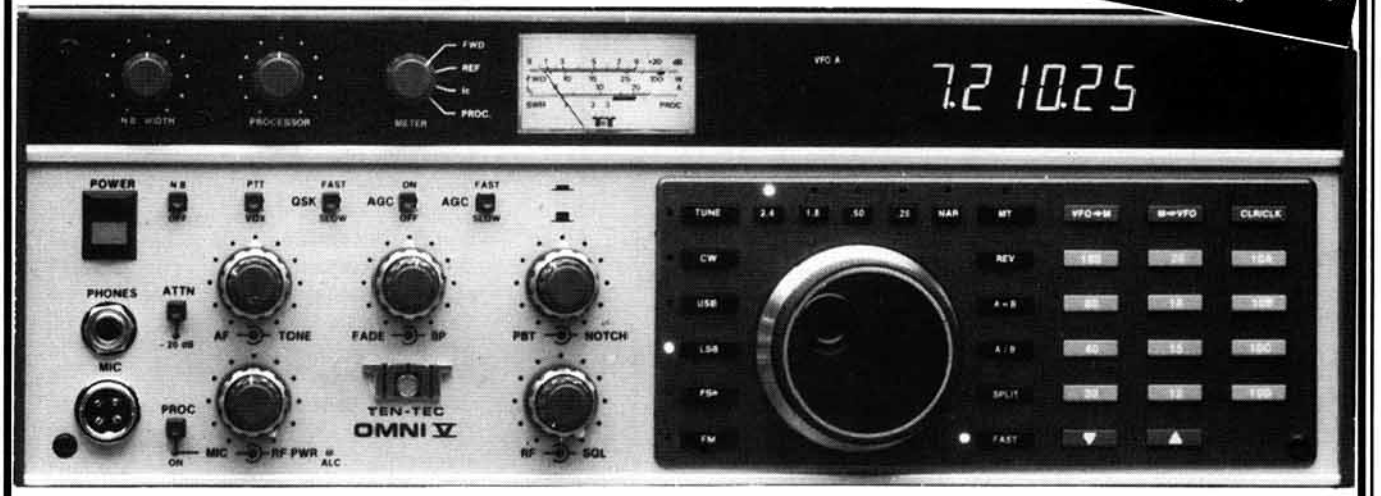

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IN PRACTICE

This month we look at some more of your letters and consider some of the things we need to bear in mind about heatsinks. Remember, by the way, that this is very much *your* column - which, incidentally, will appear every month from now on. We'd much rather use the space to deal with *your* practical amateur radio-related problems than second-guess you and write reams about technical and practical matters which aren't necessarily what you want to know. So do keep those letters coming; we'll do our best to find answers for you. The first one this month picks up on something in last month's piece about electrolytic capacitors.

Reforming Electrolytics

'In your item about using electrolytics in series, you said that if they were surplus or ex-equipment, they ought to be 're-formed' before putting them into service. I've seen this mentioned several times in books and articles, but technical authors all too often throw away little phrases like this on the assumption that we know all about these things. What exactly is 're-forming' in this sense, and what's the mechanism by which it works?'
C S, Blackburn

Basically, an electrolytic capacitor consists of two aluminium foils interleaved with an absorbent material - paper is the most common - and then wound into a cylinder. This is then impregnated with a suitable electrolyte and placed into a container, usually aluminium. When a voltage is applied across the foils, a dielectric layer of aluminium oxide is formed on the surface of one of them; this becomes the positive electrode, or anode, of the capacitor. The electrolyte forms the other plate, and has the secondary role of repairing any flaws in the oxide film which appear when the capacitor has a voltage applied to it.

The oxide film which forms on the positive foil when a voltage is applied during manufacture is an insulator, and in a 25V working component it is only about 0.5μm thick. For this reason, an electrolytic capacitor has very high capacitance for its size. The problem is that when a voltage is not applied to an electrolytic (when it is stored, for instance, or if the equipment containing it is switched off for a long period), the oxide film formed on the anode foil gradually deteriorates. This is another way of saying that electrolytics which aren't used for a long period gradually lose their capacitance. So if you leave one in your junk-box for a long time and then want to use it for something, you may find that the circuit which it is in doesn't behave properly. Equally, if you buy a big electrolytic at a rally for use as the reservoir capacitor in a PSU, the component may not have been used for a considerable time and the same problems might arise. As well as an apparent loss of capacitance (especially noticeable in the small wire-ended variety), the leakage current of a long-unused electrolytic can be very high when it's first switched on; in severe cases this can lead to rapid internal heating, thermal runaway and a loud explosion.

Reforming Circuit

However, the process which led to the deterioration can be reversed - and this is where 're-forming' comes in. All you have to do is to apply a voltage across the capacitor which is equal to its rated working voltage - but you must also connect a resistor in series to limit the current through it. It's also a good move to connect a milliammeter in series with the capacitor as well so that you can measure the leakage current (**Fig 1**). The value of the resistor should be chosen on the basis that if it was connected directly across the supply there would be about 50mA drawn; for a 500V working component we'd use a 10k resistor, for example. This will limit the current flowing in the capacitor if it happens to be short-circuit or extremely leaky. Equally, if it has high leakage current, some volts will be dropped across the resistor and consequently a lower voltage will be applied to the capacitor. As its leakage current falls during the re-forming process, the voltage across the electrolytic will gradually increase to somewhere near that of the supply.

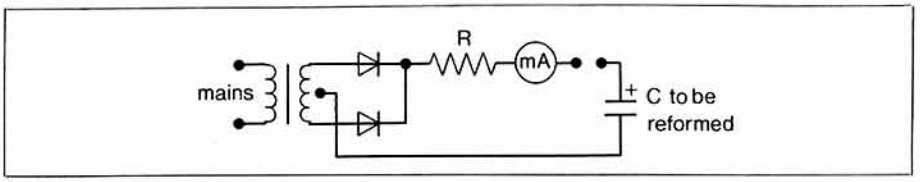
When you connect a suitable supply via a resistor and milliammeter to an electrolytic which hasn't been used for some time, you might well see anywhere between less than 1 and more than 20mA of current indicated. This is the leakage current of the capacitor; whatever its initial value, the important thing to look out for is that it should begin to decrease almost immediately unless it was only a few milliamps to start with. It's impossible to give precise figures because there are so many variables involved, but as a rule-of-thumb the leakage current of an electrolytic should be in single figures of milliamps after ten or fifteen minutes unless the capacitor is in a bad way. I tend to think that after 30 minutes the leakage current is about as low as it will ever be, although you'll find that good-quality components often display extremely low leakage currents after a few hundred hours' continuous use.

Going back to last month's example of a 100μF 450V working component, I'd expect to find after about half-an-hour of re-forming that its leakage current was around 1mA or less. A high-capacitance low-voltage electrolytic will tend to have a higher leakage current and take longer for it to reduce, but look for a steadily decreasing trend on the milliammeter over a period of time. If you're down to 10mA or so after 30 minutes, the capacitor should be perfectly reliable in normal service.

One last tip is that it's worth taking some trouble to make up a 're-forming' supply whose output voltage is equal to the capacitor's working voltage. Particularly with the higher-voltage components, it's asking for trouble to re-form them at a lower figure than their rating and then use them in a circuit which applies the full working voltage. That's another good way to blow up the shack!

It's sensible to re-form all electrolytic capacitors if they're anything other than brand-new, although the smaller ones don't deteriorate with time and disuse as much as the power-supply variety. STC Capacitors suggest that components with a working voltage rating of 100V or less should not deteriorate sufficiently to require re-forming for at least three years after manufacture under normal storage conditions. However, they add that higher-voltage components should be reformed after 18 months. Many of the examples you see at rallies have a date code on them, which should assist you in deciding whether re-forming is necessary or not.

Fig. 1 Circuit for re-forming an electrolytic capacitor. The resistor R is chosen so that not more than about 50mA could flow in the capacitor even if it was dead short-circuit, and also to reduce the voltage applied to the capacitor when its leakage current is high — as when the re-forming process is first started. The milliammeter is to monitor the leakage current.



Safe Operating Area

'Mulling over some back copies of RadCom, *I read an article in which the designer of a particular circuit mentioned something called the 'safe operating area' (SOAR) of a power transistor. I can't find any mention of it in my textbooks - can you tell me what it means and whether it's important?' M W, Walton-on-Thames*

It's highly important, but even professional designers occasionally come unstuck because they sometimes forget about it. There are several ways of thinking about SOAR, but what it amounts to is this. Bipolar transistors are prone to a failure mode called 'second breakdown'. At high currents and voltages the transistor junctions don't conduct equally over their entire areas and what are colloquially called 'hot spots' start to form. These are small areas carrying more current than the bulk of the adjacent structure. Because of this they get hotter, and in bipolar transistors this unfortunately means that their resistance falls - so they conduct even more current and get even more hot. And so on until the device fails.

Second breakdown sets a restriction on the simultaneous voltage and current that a bipolar transistor can handle. The manufacturer's data sheet for a power device will give a maximum collector-emitter voltage, a maximum current and a maximum dissipation - but don't stop reading it at this point because these are emphatically not the whole story. The data sheet will also contain a family of curves which display voltage against current for a particular time. In a way these are more important than the simple numbers for volts and amps; the reason is that the area under the curves shows the regions in which you can use the device without it running into second breakdown. This is known as the 'safe operating area' which is often referred to by semiconductor manufacturers as SOAR.

It's important to be aware of the concept of safe operating area whenever you use bipolar power transistors, but the time to have a careful look at the SOAR curves is when you're thinking of using a particular device as a pass element in a power supply. In this case, you're interested in what the data sheet usually refers to as the DC SOAR - the area under this curve shows you the maximum voltage you can apply between collector and emitter when a particular current is continuously flowing. The other curves relate to repetitive pulse operation for given 'on' times of the device, and they're important if you're using the transistor in some sort of high-speed switching application

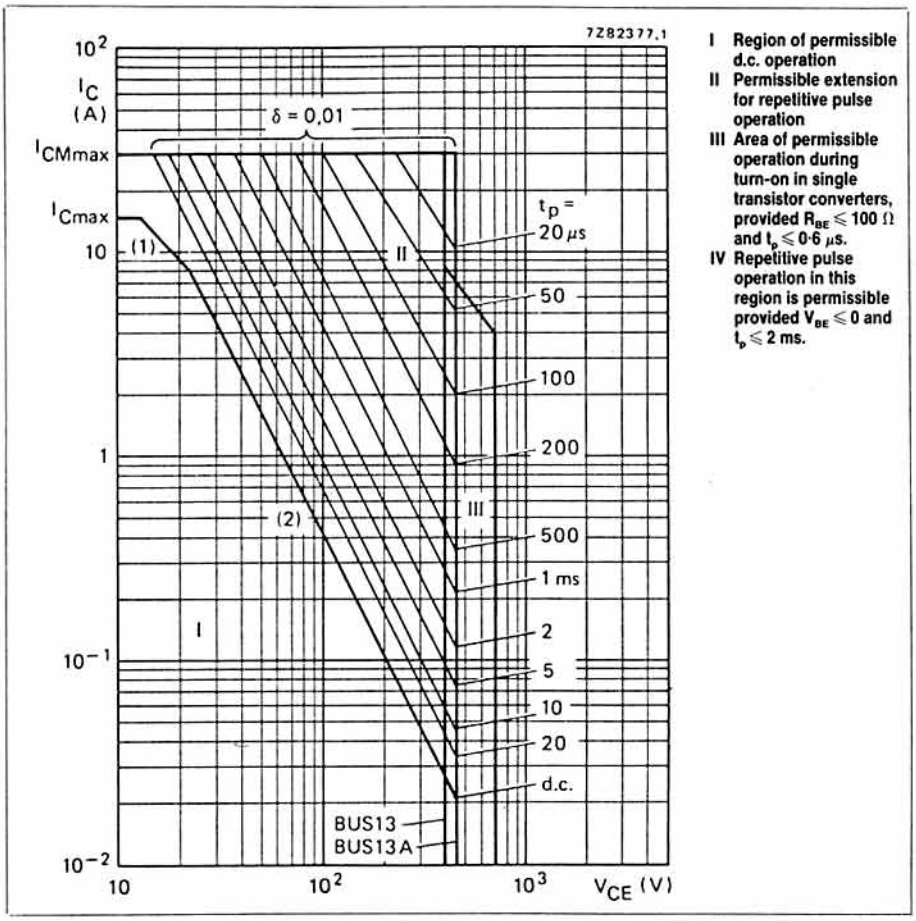


Fig. 2 The safe operating area (SOAR) curves for a BUS13A power bipolar transistor, which has replaced the obsolescent BU208 in many applications. When any power transistor is used as a pass device in a regulated PSU, it is important to ensure that the applied voltage and current are inside the area on the graph marked I — 'region of permissible DC operation'. Failure to do so may result in the device having a very short life because of 'second breakdown'. This is due to the formation of 'hot spots' in the transistor's junction. Note that power FETs do not suffer from this limitation. (Reproduction by courtesy of Mullard Limited).

such as a switched-mode power supply.

If you frequently suffer from strange failures of bipolar power transistors in a PSU, dig out the data sheet and check that their working conditions are within the DC SOAR. It might be an enlightening experience. Equally, if you're designing something for publication, make sure that you've checked this point. For instance, the circuit on page 37 of Technical Topics in July 1989 (Fig 5) might not be all that reliable in the long term. The reason is that although the BU208A is only dissipating about 7W, its working point is outside the DC SOAR for the device - according to the Mullard data sheet for it. Incidentally, FETs aren't subject to second breakdown, which is a good reason for using them as the pass elements in PSUs.

Quite why the notion of safe operating area is so neglected in the literature is a bit of a mystery. It's highly important to know about SOAR if you want to design reliable circuits with power bipolar transistors.

Mains-borne Noise

'I have terrible trouble with mains-borne noise coming into my HF receiver. The low-frequency bands seem worst affected but even 28MHz suffers quite often, especially when my DIY-mad neighbour gets his electric drill out at the weekend! Also, my Icom IC251E sometimes seems to be affected by surges on the mains and goes into a mode when the display goes on working but it won't receive or transmit. This seems to be especially triggered by our immersion heater switching on and off, although it misbehaves at other times as well. Are these things linked, and can I do anything about them?' B T, Northallerton.

If what we hear is anything to go by, problems caused by noisy mains supplies are becoming more common - especially when the incoming mains supply utilizes the so-called 'protective multiple earth' or PME system. Happily, mains-borne interference can usually be easily removed by fitting an RF mains filter of some kind. The increase in popularity of the home computer has led to the appearance of many types of filter built into the enlarged body of a standard 13A plug. All you need to do is to replace the existing plug with one of these; the local computer shop will almost certainly keep them. Alternatively, Electromail does a range of three which handle successively greater currents - the stock numbers are 238-902 for the 3A version, 238-918 for a 7A component and 238-924 for a 13A job. If you prefer, you can buy a dual 13A mains socket which contains an integral filter. These fit into the standard 35mm-deep wall-box and in our experience do a very good job of removing mains-borne interference in HF receivers. Some plug-in types which resemble a 13A adaptor are also available, and we've seen these at rallies for a few pounds; you plug them into the normal 13A socket and then plug the equipment you want to protect into them.

If your equipment has the common three-pin 'IEC' mains socket and there's enough room available, you could replace the socket with one containing an integral filter. Have a look in the Electromail catalogue, where they have a wide variety with different suppression performance and current handling.

For a little more money you can buy multi-way distribution boards which contain integral filtering. These are very useful in the average amateur situation where several items of equipment need to be connected to the mains, and the filter performance is usually superior to that of the plug-mounted variety. Most contain chokes in the earth line as well, which is useful in cases where interference is simultaneously carried on all three mains lines. In our experience, filters of this type are essential if you live in a rural area where the supply comes in on an overhead line and it's a PME system. Incidentally, we're still not happy about certain aspects of PME - which was discussed in an article by Peter Chadwick, G3RZP, a year or two ago in these pages - and we're planning to go into it again shortly.

Transient Suppressors

Most of the filters we've mentioned so far will probably cure the microprocessor-crash syndrome which affects not only the 251E but several other rigs as well. The reason is not primarily their filtering ability - although that probably helps - but because they also contain a 'transient suppressor' in the shape of a voltage-dependent resistor or VDR. These are extremely useful devices, and we'll look at them in more detail in a subsequent *In Practice*. Suffice it to say for now that they act as a very fast-acting clamp to voltages in excess of the ones they're rated for, so they soak up spikes and glitches on the mains very well indeed. It's the latter which tend to cause microprocessors in rigs (and also in items such as video recorders and CD players, not to mention the CMOS input switching in some hi-fi preamplifiers) to 'crash' and do strange things. My own IC251E used to get confused by mains spikes and fall over at least once a week, but since I fitted mains filtering and VDR protection a couple of years ago the problem has completely disappeared. Incidentally, any equipment containing thyristors or triacs for phase-angle control also tends to be hyper-sensitive to noise and spikes on the mains - so if you have a clever home-brew thyristor-controlled PSU which misbehaves for no good reason, try some filtering and a VDR or two.

Before you buy a particular mains filter, it's worth checking whether it incorporates some form of transient suppression. Having said that, it's easy enough to fit a VDR inside every one of your mains-powered items and this has the benefit of conferring protection on the equipment whatever it's plugged into. We've always used the GE-MOV II devices made by General Electric and available from the likes of Farnell, Maplin and Jermyn - although VDRs are also made by several other companies such as Harris Semiconductors and Philips Components (Mullard). For UK mains voltages, the GE device you want is the V250L40B

- it's like a large red ceramic capacitor and you just wire it across the primary of the mains transformer or any other suitable point where you can get at phase and neutral. This will stop any surge voltages dead, and 'crashes' become a thing of the past; a secondary benefit is that the rectifier(s) and other components are given protection from mains surges, which is especially important in the case of high-voltage supplies with several rectifiers in series. In fact, it doesn't hurt to fit integral mains filtering and VDR protection to the power supplies of everything in the shack. You can get everything you need at rallies for a few pounds, and the benefits are out of all proportion to the costs. If you really don't fancy connecting things to the mains circuitry inside your rig, you can buy 13A plugs which contain integral VDRs - again, the local computer shop is a good source, or Electromail does them under the stock number 238-665. However, you may as well pay a little extra and get a plug which contains an RF filter as well as a VDR or two.

Having done all this, of course, you will then discover that you have S5 power-line noise - which you couldn't hear previously because of all the din coming down the mains...

RFI from the Hi-Fi

'Please can you help me with a very strange problem. I have a moderately expensive valve audio amplifier, which lives in the lounge along with the rest of the hi-fi system. My shack is in an upstairs bedroom directly over the lounge, and - you won't believe this - the audio amplifier creates a very high noise level on the LF bands when it's switched on! There's about S6 noise on 3.5MHz, although it's only just detectable on 7MHz; it sounds like a 50 or 100Hz waveform which is rich in harmonics. A medium-wave transistor radio in the kitchen is almost unusable. The amplifier sounds fine, but the noise is there even when there's no signal. Could it be unstable? Neither the supplier nor the (American) manufacturer of the amplifier has been able to help - can you?' M McB, Edinburgh

If the amplifier sounds OK and isn't blowing up tweeters with monotonous regularity, the odds are that it isn't a stability problem. We suspect that the interference is almost certainly being generated by the rectifier in the amplifier and either radiated by the associated wiring or coupled back into the mains in some way.

This is probably the cue for an item about some of the finer points of rectifiers. On the face of it you might think that there weren't many, but actually there are quite a few factors to take into account when designing rectifier circuits, even if you merely want to know which component to use with a particular transformer and reservoir capacitor. We'll confine ourselves to some basic points for now and perhaps consider the subject in more detail later on.

Put simply, the function of a rectifier is to change AC to DC; we normally use the word in the context of converting the AC voltage from the secondary of the mains transformer in a PSU to a pulsating DC waveform, which is then smoothed to something approaching true DC by the reservoir capacitor and any subsequent components such as a smoothing choke or resistor and a smoothing capacitor. A rectifier consists of one or more diodes, which as we know have the ability to pass current in one direction and block it in the other. There is a wide variety of possible configurations

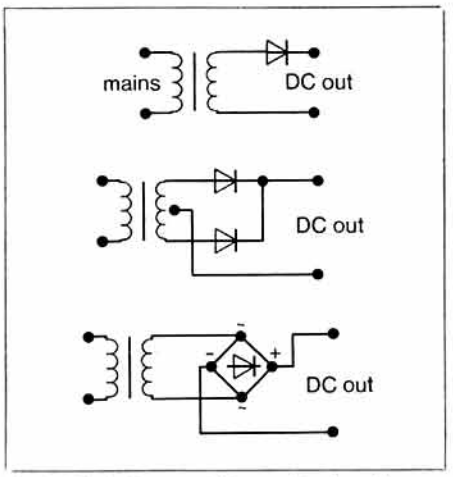


Fig. 3(a) The half-wave rectifier — seldom found in modern equipment. Ripple frequency is 50Hz, and the DC flowing in the transformer core can cause problems at high current.

Fig. 3(b) The full-wave (strictly 'bi-phase half-wave') rectifier. Requires a centre-tapped transformer secondary and was popular in the thermionic era when two rectifier diodes were often placed in a common envelope. Ripple frequency is 100Hz.

Fig. 3(c) The full-wave or 'bridge' rectifier. Makes better use of the transformer than the bi-phase and does not require a centre-tap; is easy to implement with semiconductor rectifiers, especially since modules containing four rectifier diodes are cheap and common.

for rectifiers, but for our purposes we can divide them into two families. These are known as 'half-wave' and 'full-wave' respectively - see **Fig 2.** With the advent of solid-state diodes the half-wave type has become almost extinct in amateur shacks for applications requiring much in the way of current, so we'll neglect it for now and concentrate on full-wave rectifiers.

In 99% of domestic and amateur applications, a full-wave rectifier will use one of two configurations - the 'bi-phase half-wave' or the 'bridge' with the bi-phase needing a centre-tapped secondary on the transformer. For reasons we won't go into now, the bridge rectifier makes rather better use of the transformer than the bi-phase and is much more common in modern equipment. You can also use a bridge to get double the voltage from a transformer originally intended for use with a bi-phase rectifier, which can be useful if you're careful about the current you draw from it.

Rectifier Interference

All rectifier circuits have great potential for generating interference. You might find this

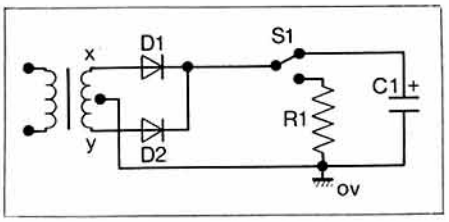


Fig. 4 Circuit to illustrate the concept of 'conduction angle'. When S1 is sete to connect the rectified output from the transformer to R1, the rectifiers conduct for almost all of each half-cycle from the secondary. However, when S1 connects C1 instead, the rectifiers conduct for only a very short time on each half-cycle. Consequently, the current into C1 flows in the form of short pulses with a repetition frequency of 100Hz. This is a possible source of RF interference.

surprising - how can a humble power diode or two produce copious amounts of RF? The reason is a little complicated to explain, but the diagrams may help. In essence, the rectifier diodes begin to conduct when their anodes are taken anything more than about 0·6V more positive than their cathodes; in this condition we say that they are 'forward-biased'. Now the waveform at the secondary of the transformer in **Fig 3** is an alternating sine (ish) wave with a frequency of 50Hz. Let's suppose that at one particular time which we'll refer to as T, the voltage at point X on the transformer secondary is at its maximum positive value with respect to the centre-tap. It follows that at point Y it'll be at its most negative. Assume for the moment that S1 is set so as to connect R1 between the output of the rectifier and the negative (0V) rail.

At time T, the anode of D1 is positive with respect to its cathode and it will conduct - connecting point X directly to S1. So current from the transformer is supplied to R1 via D1. Conversely, the anode of D2 is negative with respect to its cathode so it is 'reverse-biased' and won't conduct at all; at time T, D2 might as well not be there. However, when the secondary voltage reverses its polarity (at T plus 10 milliseconds for a 50Hz supply), the situation is changed. Point Y is now positive with respect to 0V and point X is negative, so current flows from point Y via D2 - which is now forward-biased - to R1. It is D1 which is reverse-biased now and plays no part in the circuit action.

So the essence of this form of rectifier is that the two diodes conduct on alternate half-cycles of the secondary voltage waveform and pass current to R1. Each one begins conducting as soon as its anode voltage is anything more than about 0·6V higher than its cathode voltage. Remember that in this example the cathodes of both diodes are connected (albeit via a resistor) to 0V; if you think about it, you'll see that D1 will start to conduct as soon as point X reaches about +0·6V with respect to the 0V rail and it will keep conducting for the rest of the half-cycle until the point where the voltage waveform is again passing through about 0·6V on its way down to zero - after which D2 will take over for the next half-cycle and so on.

In other words, you could say that the 'conduction angle' of both D1 and D2 with a resistive load is not far off 180° - and that will be true irrespective of the transformer's secondary voltage unless it's very low and 0·6V is an appreciable fraction of it. Now let's consider what happens when we switch C1 into circuit instead of R1. It will charge up very quickly to somewhere around $\sqrt{2}$ times the supply voltage and - since there's nowhere for the charge to go apart from any leakage current in C1 and perhaps a very small amount of reverse current through D1 and D2 - the DC voltage (which you could measure with a meter) at the cathodes of D1 and D2 will be very nearly the same as the peak voltage produced by the transformer secondary.

This is going to make a drastic difference to the working conditions of D1 and D2. Instead of conducting for almost 180° of the half-cycle, each one is going to conduct for almost none of it. As we've seen, the only time either diode can connect the transformer to C1 is when one or other of them is forward-biased. However, if their cathodes are kept at almost the full peak secondary voltage by the voltage on C1, they can only become forward-biased at the absolute peak of the secondary waveform - meaning that they conduct for a very short time indeed before becoming reverse-

biased again. If you measured the conduction angle with an oscilloscope, you'd probably find it was only a degree or two. It certainly wouldn't be anywhere near 180°.

The Bottom Line

Can you see where this is leading? Audio power amplifiers (and of course RF linear amplifiers) tend to have beefy power supplies with high-value reservoir capacitors. In use, the amplifier is drawing current from the reservoir, which - to put it colloquially - is 'topped up' 100 times every second by the rectifier. But as we've seen, the top-up current will be in the form of a very narrow pulse. It won't be quite as narrow as the pulse in our example above because there's now a load on the supply. So the average voltage on the reservoir capacitor won't be as high as the peak voltage from the transformer secondary. Consequently, the voltage on the rectifier diode cathodes will be lower than the secondary voltage on the anodes for a greater proportion of the half-cycle, so they'll conduct for rather longer. But the important point to grasp is that the required current has to flow from the transformer into the reservoir capacitor in an awful lot less than 50 milliseconds. And instead of there being a smooth transition from reverse- to forward-biasing - as was the case when R1 was in circuit - the diode now switches abruptly from the reverse-biased 'off' state into heavy forward conduction. In mathematical language, dI/dT is very much higher when C1 is connected.

The actual conduction angle depends on the load current, the size of the reservoir capacitors and a few other parameters, so it's not possible to quote hard-and-fast figures. What you can say is that with a capacitor-input filter it's always going to be very much shorter than 180°.

In other words, heavy current pulses with a very short rise-time and a repetition frequency of 100Hz are flowing in the rectifier and associated wiring. Incidentally, this is why the data sheet for some rectifier diodes places an upper limit on the size of the reservoir capacitors which may be used with them. This phenomenon also has an important bearing on the choice of rectifier for use in a particular application, which we'll consider on another occasion. The fast rise-time means a high harmonic content, and the high current implies high energy therein. Unless the equipment is very well screened, there will inevitably be lots of RF radiation from the rectifier wiring. In some cases it can also couple quite nicely into the mains. As a digression, and just to show that even highly-respected professional designers can't think of everything, one of the finest audio power amplifiers in the world - the Krell KSA-80 - is also an extremely good generator of RF hash from its rectifiers!

Happily, it's usually easy to cure the problem of rectifier interference. First, check the screening of the offending amplifier. Then do what most manufacturers of HF linear amplifiers do and connect a 100nF capacitor (with a suitable working voltage) across the secondary of the mains transformer and another one across the rectifier output. For split-rail supplies, use a capacitor across each rectifier output to earth. If that doesn't stop the hash, try small chokes in series with each 'leg' of the rectifier output; about 1mH should do. Capacitors connected directly in parallel with each diode in the rectifier can also have an effect; experiment with anything between 1 and 100nF. If all else fails, try a mains filter on the input of the offending unit and another one on the affected rig - or, if you don't mind modifying the unit, see whether you can screen the rectifier and its wiring in some fashion. If you're home-brewing an RF linear amplifier (or an audio power amp, come to that) it's a good move to design such suppression into the rectifier circuitry early on.

Rectifier interference has been with us for many years, and it's strange that almost none of the standard textbooks seem to mention it. Bear it in mind as a possible source of mysterious 100Hz-based interference in your Rx.

Get your FT101 on the new bands

Harry Leeming, G3LLL, of Holdings Amateur Electronics has been burning the midnight oil to work out how to get FT101s from the Mk1 to the '101E on to the new bands (but *not* the '101ZD). We thought that with the release of 18 and 24MHz, it would be a good idea to describe how to do it. Harry points out that the mods are simple but some experience is necessary. Here's the info:

PARTS: 2 crystals, 1 SPST switch and 1 low-capacity SPDT relay.

1) Make sure that the rig is in good working order, then disconnect it from the mains.

2) Remove cabinet and base.

3) Identify the 21MHz and 27MHz crystals and oscillator trimmers (touching the hot end with an insulated screwdriver will cause the note to change when the Rx is tuned to the calibrator on the appropriate range).

4) Fit a 24·02MHz crystal temporarily in place of the 21MHz one and fit a 30·52MHz crystal in place of the 27MHz rock.

5) Check the rig on receive. 18·1MHz should come in at '100' on the black dial and peak at around 7 on the preselector. 24·9MHz comes in at '900' on the red dial and peaks similarly at about 8 on the preselector. The mod usually works without any alignment being required; however, if the Rx is dead on either band, tweak the 21 or 27MHz trimmer by the minimum amount necessary for the rig to burst into life. See the section in the manual entitled 'Heterodyne Crystal Oscillator' and align correctly after you've completely finished the mod - or just peak for maximum drive if you haven't got a VTVM or whatever. The setting of the 21MHz trimmer will be a compromise between that band and 18MHz, but it isn't critical.

6) Remove the top of the PA cage and locate the loading capacitor. MAKE SURE you've discharged the 600V rail before sticking your pinkies inside.

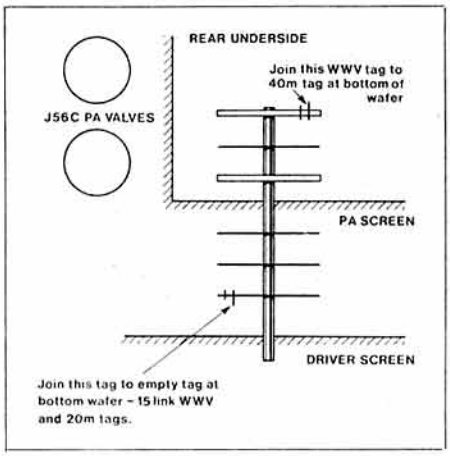
7) Strap the two sections of the loading capacitor in parallel by soldering a short lead between the two top live terminals - then refit the PA cage.

8) Remove the screening cover over the driver/range switch and strap the switch as shown in **Fig.1**. You'll need a long and thin bit on the soldering iron. Refit the screening.

9) Ensure that the 30·52MHz crystal is in the 27MHz position. Then fit the 24·02MHz rock in the spare ('X') position and the 21MHz one back in its original place.

10) Remove the two screws from the crystal panel and withdraw it slightly. Place the rig on its side (mind you don't lose the spacers) and unsolder the lead from the 'hot' end of the 21MHz crystal socket - that's the end which is NOT commoned with the other rocks.

11) Wire two short insulated leads to the hot ends of the 'X' and 21MHz crystal sockets - then refit the crystal panel.



12) Mount the relay with suitable adhesive in an inverted position adjacent to the 'X' crystal socket. Solder a thick wire to one side of the relay coil and connect this to chassis via one of the screws on the crystal board.

13) Wire the centre contact of the relay to the wire which originally went to the 21MHz crystal socket.

14) Wire the relay contact which is made when energized to the hot end of the 'X' socket.

15) Wire the contact made when the relay is NOT energized to the hot end of the 21MHz crystal socket.

16) Wire the free end of the relay coil to a length of insulated wire and route this towards the rear of the rig.

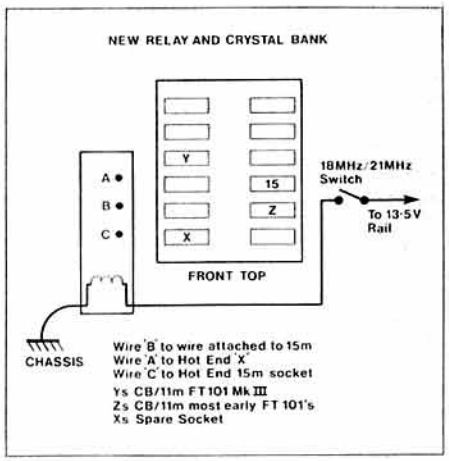
17) Fit the new switch (which is henceforth the '18/21MHz' switch) by filing out the hole which holds a cabinet screw above the IF and AF phono sockets at the rear.

18) Wire one side of the switch to the 13·5V rail and the other to the wire going off to the relay coil.

You've now finished the hard bit. Next, check the crystal oscillator trimming - see **5)**.

You should now find that the '15m' position tunes 21·21·5 or 18·18·5MHz as selected by the new switch and '11m' tunes 24·5-25MHz.

The 21 and 28MHz bands will operate as before except that the loading will be about 2 points clockwise of where it was. The PA will tune the new bands around the 15-20m point. Holdings advise keeping the power to a maximum of 50W and using an antenna tuner to ensure a clean signal. 10W is equivalent to about 100mA anode



current and 200mA gives about 50W CW; 130mA peak is about 50W PEP.

Finally, you might like to note that the '11m' crystal is marked 33·02 and the '15m' crystal 27·02. If you're using the 'X' socket, you'll need to wire in a crystal holder and run one end to the relay and t'other to the cold end of the 'X' crystal. NB - late production FT101Es label the CB band 'AUX'; earlier ones call it '11m'.

Thanks to Harry for these mods — great stuff.

Heatsinks and Hi-Fi?

Last month I had a wee dig at the wacky world of hi-fi. There must be some very creative PR men working for audio amplifier manufacturers; if you remember I quoted part of a press release which claimed that the sound quality of the Mk II version of a certain British hi-fi amplifier was greatly improved by the different heatsinks with which its output transistors were fitted. No doubt the Mk III will sound even better because the colour of the power-on LED will be changed from red to yellow. Anyway - we took that as our cue to consider heatsinks from a slightly more useful point of view.

In case you hadn't noticed, we've had a most un-traditional English summer. As usual in such circumstances, there's been a surge in the sales of beer, soft drinks, ice-cream - and RF power transistors. It's an unfortunate fact that when the hot sun shines on your equipment sitting by the shack window (or on the boot of your car with the mobile PA inside) you may be about to come face-to-chequebook with the problems associated with heat dissipation.

Electronic components hate high temperatures - and transistors in power amplifiers dread them most of all. The tiny semiconductor chip can be dissipating a good 100W of heat, and the problem is to get that heat away before the temperature rises too far and the device fails. The usual failure mechanisms are bound up with an increased susceptibility at elevated temperatures to excessive drive power, high voltages or high VSWR. There's also the phenomenon known as 'thermal runaway'.

The only thing to be said in favour of thermal runaway is that it is a problem confined to bipolar transistors; FETs aren't susceptible to it. On that basis, you won't be surprised to hear that it's related to the second breakdown phenomenon we discussed above. Under constant bias conditions, collector current increases with temperature. This causes more dissipation in the transistor, a rise in temperature, even more collector current... and ultimately the transistor junction melts into a useless lump of slightly impure silicon. Solid-state power amplifiers are particularly prone to thermal runaway, for two reasons; a) they generate considerable heat and b) they need to operate with a small amount of permanent forward bias. As well as subjecting the device to additional electrical stress, excessive drive and/or high output VSWR will also increase the power dissipation - and with it the risk of thermal runaway.

In essence, power transistors opt out when the sun shines if their heatsinks aren't big enough to keep them cool. Largely as a result of the trend towards physically smaller equipment, the manufacturers of transceivers commonly include thermostatically-controlled fans nowadays; equally, many rigs have temperature sensors which reduce the RF drive if you attempt to run full power for too long. But the RF power transistors in older rigs (and in almost every add-on '100W brick') just have to sweat it out and hope for a fresh breeze.

How big should a heatsink be? It all depends on the heat load. At one extreme, a tiny clip-on heatsink may be enough for a small transistor dissipating only a few hundred milliwatts. But a solid-state PA rated for 100W RF output is likely to have to dissipate an additional 100W of heat, and that calls for something much larger. A typical RF PA will contain one or more flange- or stud-mounted RF power transistors which are bolted to a large finned heatsink of extruded aluminium.

All the heat flowing from the semiconductor chip must eventually be given up to the surrounding air. The first stage in the heat transfer path is inside the transistor itself - from the semiconductor junction to the mounting flange or stud. Then the heat has to flow across the barrier between the flange and the heatsink, and finally it has to spread out through the heatsink and cross over into the outside air. The better the heat transfer path, the cooler the semiconductor junction will be and the longer the transistor will last. Since heat flow is very much like electrical current, the same principles apply. Use highly conductive materials with large cross-sections, and make good connections which have a low resistance to heat transfer. As we'll see shortly, a kind of 'Ohm's Law' of heat can be used to work out how well the transistor is being cooled.

Heat Flow

Looking at each of the heat transfer steps in turn, efficient heat flow within the transistor is obviously the responsibility of the semiconductor manufacturer - there's nothing you can do to change it. The datasheet for that transistor will tell you the 'thermal resistance' between the junction and the case; it's usually referred to as 'θjc' (pronounced "theta-j-c") and measured in °C per watt. For example, if θjc is 1·0°C/W, every watt of heat flowing out through the flange causes a 1°C rise in junction temperature.

The next thermal barrier lies between the transistor flange and the heat sink, and this is where home-brewers sometimes come unstuck. You can't simply bolt them together and hope for the best! In modern RF power devices, flat flanges are superseding the older single-stud mounting because they offer a larger area for heat transfer. Ideally, both the heatsink and the transistor flange should be rubbed smooth and flat with very fine emery or grinding paste, with a thin smear of thermal conducting paste on both surfaces to fill any remaining irregularities. One warning, though. Although heatsink paste is a better conductor of heat than ordinary grease (although just as messy), it still isn't particularly good, so never use more than necessary. If the transistor and heatsink mate together properly, there should be no need for excessive tension on the mounting screws, which risks breaking the transistor. For some stud-mounting devices the data sheet will quote a torque figure to which the screws should be tightened - it's important to stick to it. Having done all that, you might be surprised to learn that thermal resistance of the joint is still about 0·5°C/W. This means that the flange of a transistor dissipating 100W will be about 50°C hotter than the heatsink it's mounted on.

Let's now consider the heatsink itself. Most heatsinks are barely big enough, as the following example will show. We'll think about one of those so-called 100W power amplifiers - remember, by the way, that a '100W' solid-state amplifier is highly unlikely to deliver more than 50W PEP of clean SSB - which is typically going to be dissipating a good 100W as heat. What's the junction temperature under these conditions?

A Bit of Maths

We've already thought about the idea of thermal resistance and mentioned an 'Ohm's Law' of heat flow, so here it is in full.

Junction temperature (°C) =
thermal power (W) x (θjc ± θch ± θh (°C/W)) ± ambient temperature (°C)

It's just like the electrical Ohm's Law (think of it as 'Ot's Law), with temperature taking the place of voltage and heat flowing like current - and the higher the thermal resistance, the higher the temperature drop. As we've seen, θjc is the thermal resistance between the transistor junction and the case, and is about 0·7°C/W for a flange-mounting RF power transistor. θch is the thermal resistance of about 0·5°C/W between the flange and the heatsink, and θh is the thermal resistance on the heatsink itself. Strictly speaking, θh is the thermal resistance between the heatsink mounting surface and the surrounding air, and power transistor heatsinks have values typically in the range 0·2 to 1°C/W.

To calculate the junction temperature Tj of a transistor dissipating 100W on a 0·5°/W heatsink at an air temperature of 25°C, we simply apply 'Ot's Law' -

Tj = 100 × (0·7 ± 0·5 ± 0·5) ± 25 = **195°C**

That looks uncomfortably hot, given that most power transistors have an absolute maximum Tj of 250°C and some have a lower one than that, but there's worse to come. Although the power transistor may have a rated thermal dissipation as high as 250W when its case is held at 25°C, the datasheet will invariably show that the device must be derated at higher temperatures — typically by about 1·4W for every degree above 25°C. Applying 'Ots Law to find the temperature of the transistor flange, this works out to be 125°C. This implies that the transistor must be de-rated by 1·4 x (125-25) watts from the original 250W. So the available dissipation at a case temperature of 125°C is thus only 110W — which leaves almost nothing to spare above the 100W we need.

In particular, this leaves no allowance for additional dissipation in poor VSWR conditions, or for the fact that the temperature inside your car boot may not be 25°C. If it's 60°C, for example, all the temperatures along the heat transfer path increase accordingly, pushing the junction temperature up to 230°C and the transistor closer to the edge of breakdown. Exactly the same applies, of course, if the sun is shining directly on the heatsink and pumping in additional heat.

The regrettable conclusion is that a 0·5°C/W heatsink is barely big enough to handle 100W of heat continuously with any margin of safety for the transistor. And how big might such a heatsink be, physically? Well - just about the size of the heatsink on the average 100W 'black brick' alas. It's big enough for normal use, especially on SSB or CW where the low duty-cycle acts in your favour, but there's very little in reserve. If all the factors conspire against you - prolonged use at full power, in full sunlight or in a confined space such as a car boot, and maybe with a poor VSWR as well - don't be surprised if you find yourself facing a bill for a new power transistor.

That's all we have space for this month. If fitting a different heatsink to your transmitter PA makes your audio sound better, hire a PR man and send us a copy of the press release... □

DATACOMMS

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RTTY News

The RTTY repeater GB3PT has changed its speed from 45.45 baud to 50 baud in accordance with RSGB recommendations. The repeater is located at Barkway, near Royston, and operates on input 433.900MHz to output 433.300MHz. In addition to RTTY it supports 300 baud V21 data.

Details were provided by Phillip Mellor, G4BIK.

Dataspace '89.

Connected with this event are two new publications. First, although very late in being published, are the proceedings of last year's symposium. Published by the RSGB it is very informative and well worth reading, setting out all of the papers submitted. Second are the proceedings of Dataspace '89 Published by AMSAT-UK. The copy I received was the Australian version (bound upside down and back to front) but nevertheless a must for all Data and Space enthusiasts.

Your Chance to Influence the Future

I have been asked by Siskin Electronics to canvass all packet users for their suggestions on the next series of TNC firmware (software on the chip inside the TNC).

After the recent proposals from Martin Stubbs, G8IMB, in *Connect International* they are looking at a simpler system for new users of TNCs. For example on power up the user could be faced with a menu offering a list of options like:

MENU (choose number then hit Return)
1)Customise personal details.
2)Set up a connection
3)Toggle Personal Mail System On/Off
4)Check for new mail
5)Enter mail to message system
6)Alter system configuration
If a user typed number 2 they would be prompted with:

ENTER CALLSIGN YOU WISH TO CONNECT TO AND HIT RETURN

ENTER CALLSIGN(S) OR NODES FOR PACKETS TO BE ROUTED VIA
AND HIT RETURN, etc.

This is just an idea but cast your mind back to your first TNC with almost 100 commands available, and only about six you really needed to get started.

This is your chance to make a suggestion to do so drop Phill Bridges a line at Siskin Electronics, 2 South Street, Hythe, Southampton SO4 6EB.

Licences

It's a very quiet month for GB7 licences, with none being issued by the DTI. (This must have something to do with holidays.) I'm pleased to see all of the GB7 calls in use on 70cm, as reported last month, and especially the increase in speed of messages from north to south. With so many more mailboxes now running 24 hours on UHF could this be the start of the system we have all been waiting for?

Next month I hope to be able to report first hand on the latest developments in the packet scene in America. While I am in the USA I have been invited to PacComm to see items for future release, including a working version of the 9600 baud system and the new ultra-miniature TNC that fits inside a laptop.

Beginners - Getting Started

This month I hope to provide you all with the information you need to get on the air and set up a packet station.

If you are new to the mode, don't be put off by some of the technical jargon - it really is quite simple.

What you will need.

(1). Any computer with an RS232 interface or a simple terminal emulator will do. There are many stations using Spectrums and Ataris, and even some using sophisticated equipment such as IBM 386 technology. This is one of the few cases where, unless you intend to run a mailbox, you will not see any difference between the type of computer in use.

(2). Terminal Node Controller (TNC). This is an interface that plugs directly into the RS232 interface and then into any transceiver. It is the encoder/decoder and main controller for the packet system, so choose the type you wish to purchase carefully. With many products on the market offering different facilities you will have to make your own decision here; don't get carried away with flashing lights and multiple ports because it's very hard to hold two real time conversations at once. Some offer the facility of a personal mailbox which enables the user to have other amateurs leave personal messages for them when they are not available. The problem with this system is that the messages are stored in RAM, which is volatile when power is removed. For this reason it is safer to use the mailbox network provided. The best advice I can offer is to keep it simple. Nearly all TNCs have the same command set and if I were to be starting today, my choice of TNC would be made by how clear the manual was.

(3). Software. A large amount of people I meet are under the impression you need an expensive software package, this is not the case. Many stations are using simple terminal emulation software, mostly available as Public Domain software. There are custom designed packages available for certain computers, but although they do make life easy with split screens, storage facilities and methods for changing TNC parameters, they are not a necessity.

(4). Transceiver.

Getting Started.

Now that you have all the equipment it's time to get on the air. The first few chapters of the manual for the TNC are the most important and should be read very carefully. They set out the various diagrams for wiring the TNC to computer and transceiver. The RS232 connections are normally pins 1 thru 8 and no 20 of the RS232 interface plugs. As for the transceiver you will need to connect PTT, TX audio, RX audio and ground. Some transceivers today also are designed with the facility for squelch monitor specially for packet radio, in which case you must follow the manufacturer's instructions.

Once you have connected everything together and followed any instructions supplied with the TNC for calibration, it is time to talk to the TNC before you talk to the world. The TNC on startup will have a set of defaults most of which will be alright to start with. You must tell the TNC your callsign using the command MYCALL or MY; ie MY G6XXX. The TNC will respond with a message similar to:

MYCALL was NOCALL
now G6XXX

Set the TNC to monitor the frequency by typing MON ON. The TNC will respond with a message similar to:
MON was OFF
now ON

For the time being leave all the other parameters as their defaults unless you have a transceiver with relay switching. With slow switching of this type you should alter the parameter called TXDELAY. The default for TXDELAY varies from TNC to TNC but should not be left too low especially when using HF as older valve equipment takes a few milliseconds to get to full output power.

The time has at last come to make your first connection. If you are not sure of your local mailbox leave your system receiving for about 15 minutes and then with the command prompt on the screen (usually cmd:) type MH. A list will appear of all stations that have been heard. At least one of these should have a GB7 + 3 letter callsign. To connect to this mailbox type C GB7xxx (C is the command to connect and xxx are the letters you have seen in you MH list).

Once you have connected you screen will have a message similar to:

Connected to GB7 xxx

followed by the message of the day from the mailbox.

From there, experiment. Typing H will give you a help screen.

Dataspace '89 papers are available from RSGB Headquarters, or from AMSAT-UK. The price is £11.00 plus postage at the 900 gramme rate.

SysOp 7 Shrewsbury 23 July 1989

The SysOp meeting took place as planned in Shrewsbury, with a good turn-out even though the weather was glorious. It was very productive; with varied subjects including:

Confirmation of @ fields and the election of a co-ordinator for them namely Doug Shore G0EOJ @ GB7YAX.

The formation of a co-ordinating committee, to provide co-ordination between all of the various working groups with the aim of solving any of the network problems. This committee will be co-chaired by Paul Guilbert, G0DXX, and myself, Neil Lasher, G6HIU.

Varied discussions about NET/ROM nodes, locking of routes, parameter changes and a submitted paper on standardising level 4 Destination addresses and aliases.

Removal of SSID from GB7 mailboxes.

The next meeting was planned for the end of October/ beginning of November in York, north of the M62, so there will be no excuse for SysOps in GM not to attend...

Finally

That's all for this month apart from a small message to all Clubs and packet groups. Do let me have details of your future events for publication at the above address. Copy dates are 20th of each month.

MICROWAVES

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Recent Microwave Operating Awards

Of a 'collection' of nine operating awards or award stickers notified by the Awards Manager, G4OUT, this month, six of them were for the 1·3GHz band, and one for each of the 2·3, 3·4 and 24GHz bands, thus proving that there is still some activity after all!

On the 1·3GHz band Dave, G6UWO, claimed the Standard award (No80); John, G4BYV, the Senior award (21); John, G4ZTR, the Distance award (127); Ela, G6HKM, the 20 (31) then the 25 Squares (27) award and Keith, G6DER (mentioned in the last awards news) 70 Squares (4).

Keith, G6DER, also gained the 35 Squares award (No.2) on 2·3GHz and the 10 Squares (No2) on 3·4GHz. The final award was to Dave, GM3WIL, for his portable operation on 24GHz where he has won an Intermediate certificate (No7). Well done all stations and thanks to Ian, G4OUT, for the ledger abstract.

Some history from GI

Ian, GI8AYZ, sent an abstract of an old log some time ago which detailed some interesting firsts from GI. He had a one-way QSO from Torr Head, Co. Antrim to Chris, GM8BKE, near Ayr on 11 May 1975, one way because of a receiver fault at Ian's end. The same problem reared its head on 31 May, 1975 in attempts with GM8BKE/P and George, GD3OXX/P (alias GM3OXX).

Success at last on 1 June, 1975 after working on the reciever overnight; Ian was rewarded with a contact between Torr Head and Snaefell (GD3OXX/P) for what was believed to be a 'first out of GI' QSO. Jack, GI8DMX, and Sam, GI8GJX, were both, at that time, 'mucking around with klystrons'.

Ian reported that the following year (1976) GM3YOR and another station, whose callsign and name weren't remembered or recorded in the log, went to GI and did some 10GHz operating. Ian was still active until the end of June 1980 when he had a QSO from Black Head (Belfast Lough) to Paul, GM8AFC/P, near Portpatrick. Thereafter, 10GHz activity in GI seemed to die out completely, with almost nothing reported in the past few years.

Ian felt that most of the GI firsts on 1·3GHz must have gone to Willie, G(I)3VPK, when he took varactor gear over to GI for VHF NFD in 1976 or 1977 - 'certainly all the inter-G firsts would have been done then, also GI-EI to EI6AS. The early QSO's were FM but by 1978, SSB was in use'. Thanks, Ian, for some interesting bits of history.

Eastnet's Experiences

James, G3RUH, (of 9600Bd modem fame), put in some feedback on Eastnet's experiences with 1·3GHz gear for packet links. Not all their experiences have been good, underlining again, I believe, the distinct differences between VHF/UHF equipment and microwave equipment. The group has had experience with a dozen or so of the Cirkit 23cm receiver kits.

Nearly all have suffered a variety of problems, the commonest of which seems to have been too low a level of drive to the first mixer. Various 'fixes' were described: increasing the value of a damping resistor (R18) in the first multiplier of the oscillator chain, adding extra decoupling to one of the transistors (Q5) and changing a choke from a moulded type (L5) to a 4-turn air-spaced coil, 4mm dia. These changes have increased LO drive by as much as 10dB and they are passed on as possible solutions for anyone having problems with the design.

The group also appear to have had problems with low output from the G4DDK oscillator source - all so far built suffered from low output. I personally find this surprising having built a couple of the boards (home produced, incidentally, despite my recent recommendations in *RadCom*!) and both have produced close to design output - one slightly above and one slightly below, but both within a dB as far as I can measure with simple equipment; one is on 1152 and the other on 1297MHz.

However, I can only repeat James' remarks: his group appear to have thought it necessary to increase decoupling around TR4 and TR3, as well as adjusting some of the capacitor values. Some redesign of the oscillator stage was undertaken 'to improve temperature stability'.

In the original design, provided that reasonable care was taken in construction and in selecting the quality of the crystal and the housing of the board - possibly 'neutralising' the crystal by means of a series capacitor or parallel inductor (this can have an effect on the level of output, using amateur standard crystals) - the stability was good enough for narrowband (FM or SSB) applications.

It was also found that the simple FM circuit given in the original article produced significant amount of phase modulation, in addition to FM, above about 1kHz; this is correct and the circuit was originally intended for either speech frequencies or simple FSK use.

10W PA Block

For PA use, the group has adopted a board layout by Mark, G6TIU, which uses the 10W Mitsubishi hybrid power block (as used in Icom rigs) and has inbuilt PIN switching, power output stabilisation, SWR protection using directional couplers and a 10-pole Chebyshev microstrip filter, the whole thing being throttled back to 4W for comfortable running. No doubt interested parties could contact Eastnet to get details and their experiences and suggestions first hand, although I still find it very surprising that they have needed to go to such lengths to modify such a sure-fire design.

From Here and There

Most of the rest of the news this month is made up from snippets (notes from and conversation with various operators) which have been accumulated over the past few months, most of which have been too small to present a coherent story in their own right but put together may present something of a cross-section of what has so-far been a quiet year.

Russ, GW3CCF (near Mold), was the most recent of a number of people who, in the past few months, have wondered whether there would be support for an 'activity night' on the 1·3GHz band. He and others have suggested late in the week (early week evenings often being Club nights) and one fairly common suggestion is 2100 or 2130 (local) on Friday evenings. Why not give it a try?

In the same letter, Russ mentioned that he has had a fairly regular sked with G3BPJ (Leyland) at 1315 hrs, over the last three years. Dennis, G3FNQ (near Southport), also calls in when available and all are equipped for 13cm as well.

QRP

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QRP in Texas

The friendly Texas alternative to 'Have a nice day', 'Y'all come back' is an instant indication of the gregarious nature of the Texan. The friendliness is endemic and the English are singled out for special attention. In 1983 I enjoyed a month in Texas, centred around the ARRL National Convention and when the chance came to return for the ARRL 60th Anniversary Convention, I was pleased to accept.

The QRP ARCI (the American QRP Club) invited the G QRP Club to send speakers to a national QRP Forum organised as part of the convention. It is surprising that Texas, the land of the large, has always provided the strongest support for organised QRP interest in the United States. So in June of this year, Ian Keyser, G3ROO, and I travelled to Dallas for the ARRL National Convention to provide their requirement of lectures on home constructed QRP equipment. I lectured on a range of simple and inexpensive equipment and Ian described buildable superhet and single sideband equipment.

Like most American amateur radio conventions, the event was more alive than our equivalent events, with a full programme of lectures and forums, a flea market larger than the considerable commercial exhibition area and many of the visitors staying for two or three days at hotels on the site. For a part of the world which, in theory, should be the centre of the amateur radio commercialism, the interest in our home constructed equipment and the lectures was very high and the flea market contained a range of items which would delight any builder of equipment. The G QRP Club sent a range of kits, circuit data and the QRP Circuit Handbook for sale on a QRP Booth, and the interest was such that sales of these covered the cost of the trip.

The visit was a resounding success. We returned convinced that home construction is far from dead in the United States and not everyone wants to run a 'Californian Kilowatt'.

Coherent CW

It is some years now since Ray Petit, W7GHM, published information on an experimental method of sending Coherent CW signals (c.c.w.). It was claimed, and largely varified by experiment, that c.c.w. enables operators to increase

(*Left to right*) G3RJV and G3ROO with Ade Weiss, W0RSP, accept certificates from Fred Bonavita, W5QJM. G3ROO was made an Honorary Citizen of Texas.

G3RJV and W0RSP, already given that honour in 1983, were made Honorary Admirals in the Texan Navy!

signal readability by a factor of 10 and simultaneously reduce transmitter output power by a like amount. I outlined the system on page 63 of the *Amateur Radio Operating Manual* (RSGB).

Very briefly, c.c.w. uses the concept of signals transmitted and received in carefully defined time 'windows'. All c.c.w. dots, dashes and spaces are exact multiples of a basic time unit and occur within predictable time frames. Received c.c.w. signals sound like conventional cw signals except they are sent very precisely. As a result very narrow filters may be used. 12 w.p.m. is usual for c.c.w. and filter bandwidths in the order of 10Hz. A 1 watt signal copied through a 10Hz filter is equivalent to a 50 watts signal heard through a 500Hz filter or a 230 watts signal copied through a 2300Hz filter.

The advantages are obvious but the system does require all frequency determining oscillators, including the clock for the keyer, to be accurate within 1 or 2Hz. The transmitter must also be stable, under keying conditions, to within 1 or 2Hz. Crystal controlled QRP transmitters were successfully used in the early experiments. Direct conversion receivers seem ideal for the reception of c.c.w. signals, avoiding the use of another very stable oscillator for the bfo. The filters are capable of being built by anyone who has a little experience of building simple digital equipment. It may sound daunting, but I recall seeing a photograph of an original experimental station which used a Ten Tec PM2 transceiver which is far from the most sophisticated rig ever built.

Coherent CW remains one of the areas of the hobby open to the genuine experimenter. The equipment must be home made but is of modest proportions and cost. Peter Lumb, G3IRM, together with Bert Arnold, G3RHI, are trying to revive the idea and are building equipment. They have copies of much of the relevant information on the system and certainly enough data to enable anyone interested to build c.c.w. equipment. Peter would like to hear from anyone who is interested in joining them in the project. There is a smal section on c.c.w. in all issues of the *ARRL Handbook* and it may be useful to read this before going further. Interested amateurs should contact: Peter Lumb, G3IRM, 2 Briarwood Avenue, Bury St. Edmunds, Suffolk LP33 3QE.

Looking Back

Many QRP operators are builders and modifiers of equipment, so amongst them are a fair number of those radio amateurs who derive pleasure from restoring and using old and classic items of radio communication. The German DL AGCW Group have introduced a new contest which should appeal to such amateurs, for equipment which is either homebrew or over 25 years old.

AGCW DL HOT (Homebrew and Old Time) PARTY 1989
DATE: November 19th, 1989.
TIMES: 1300-1500 UTC on 7010-7040kHz.
1500-1700 UTC on 3510-3560kHz
Class A: TX and RX homemade or older than 25 years
Class B: TX only or RX only homemade or older than 25 years
Class C: TX less than 10w input (5w output) as above.
Call: 'CQ HOT' and exchange RST + serial number, beginning 001 on each band + class. e.g. 579001/A
Scoring: by class working: A-A, A-C, C-C = 3 points, B-A, B-C = 2 points, B-B = 1 point.
Log: UTC, Call, Check Numbers, Scoring and total with a brief description of the station equipment. To be submitted by December 15th to Dr Hartmut Weber, DJ7ST, Schlesierweg 13, D-3320, Salzgitter 1, West Germany.

SWL

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

As October comes round again, time to look forward to an improvement in radio conditions. As we head towards the peak in the Sunspot Cycle, the hope is that the HF bands will once again provide a good deal in the way of DX. 50MHz enthusiasts are hopeful that DX conditions on that band will be the best ever since the band was released to British amateurs. There should be some fine F2 propagation to look forward to. Hopefully, our listeners will be on hand to report the very best in these pages in due course.

Sixth HF Challenge

As we are in to October, it is time once again to plug my annual HF Challenge, which is designed in the hope that listeners will take a look at the bands during the up-and-coming CQWW Contests, log some good DX, and put in a entry for the Challenge. Every year, even in years of low sunspot activity, it is amazing how active the bands are during these two weekends. As this year should see the peak of the Cycle, conditions could be exceptional.

The SSB challenge will be held on 28/29 October, with the CW leg taking place over the weekend of 25/26 November. Once again, the idea will be to log as many countries as possible during the two periods. So that 200 Ws do not appear in logs, only one station from each DXCC country can be logged on each of the six bands. The full rules are as follows: (1) Entries may be single band or multi-band, but not both. (2) Each different country heard on each band will count for points.

(a) Countries in the SWL's own continent count 1 point on 28, 21 and 14MHz, 2 points on 7 and 3.5MHz, and 3 on 1.8MHz.

(b) Countries outside the SWL's own continent count 3 points on 28, 21 and 14MHz, 5 on 7 and 3.5MHz, and 10 points on 1.8MHz.

3. The final score should be calculated as follows:

(a) Single band entries — the total points should be added together and multiplied by the number of DXCC countries heard.

(b) Multi-band entries — the total points from each band should be added together and multiplied by the total number of DXCC countries heard on each band.

4. Entries must either be on standard sized logsheets and written legibly in ink, or on computer generated log sheets with 40 entries to the page. A multiplier checklist showing the countries heard in alphabetical order MUST accompany the log.

5. Entries showing the full callsigns of stations heard, the station being worked, the time and signal strength of the stations heard (minimum acceptable reports being 4x4 on SSB or 449 on CW — note the change from last year). Logs should be sent to me at the address shown at the front of the magazine, to be postmarked no later than 21 November for the SSB leg, or 19 December for the CW leg.

Although there seems to be a current trend against contest participation by SWL's, I hope that the Challenges will, as usual, be well supported.

More on Taking Radio Equipment Abroad

After the piece in my August column about taking radio equipment abroad, G3URE wrote with some further helpful information which is well worth repeating here.

Having travelled for many years into highly sensitive areas carrying radios, recording equipment and computers, he is reasonably well versed with the problems to be encountered at airports. He felt it worth clarifying the difference between 'customs' and 'security'.

Generally, Customs only become involved after landing, and do not care too much about whether your box of shiny knobs will go off bang (as long as it happens outside the Customs Hall!) — they are only interested in whether you bought the box of tricks on your holiday/business trip, or in the UK and have paid VAT and duty. In this case it is always advisable to either obtain a carnet before leaving, or at least carry the UK receipt with you. Computers pose a different problem and it is suggested that professional advice is sought before taking your expensive lap-top out of the country.

Security is a different matter entirely. They will be very interested in finding out whether your black box will play a tune or smoke, before allowing you onto a plane, so it is suggested that removing any batteries is not such a good idea. Experience suggests that Security will be keen to see that you black box does what you say it will. My earlier comments about presenting an open and helpful attitude, whether to Customs or Security, were fully endorsed.

I hope that these helpful comments will straighten the record and will be heeded by listeners and amateurs alike when travelling by plane either for business or pleasure.

Heard All Britain News

Dennis, GW6JNE, provided his now regular update or SWL activity in HAB. A new Awards Manager has been appointed. He is Dave, G4VID. He lives at 5 Braemar Close, Kettering NN15 5DD. Quite a lot of Listener Awards have been issued since the last update. A general overview of listener activity sees SWL Wainwright mentioned 26 times in the listings. He has Class One awards in the Districts, Counties and Large Squares categories.

Chris Gibbs has heard 2600 WAB Bookholders. He also has 150 Islands heard on 3.5MHz. Other listeners who are doing well in collecting islands are SWLs Brown and Sheppard. The 'daddy' of them all, however, is Frank Parkhurst who has achieved 3500 WAB areas on 7MHz and 260 islands on 3.5MHz. More listener achievements are shown in th attached table.

A 50MHz WAB/HAB contest is arranged for 0900-1200 on Sunday 8 October. Listener entries are encouraged and should be sent to Ian Webb at Cornerways, Orchard Road, St Neots, Cambs PE19 3AN.

It is always interesting to hear from Dennis, but I wonder if any of the listeners mentioned here — or any others involved in HAB — would like to write and give me their impressions of the HAB movement. I could then include this news in a later issue along with all the latest HAB news received from Dennis.

HAB AWARDS ISSUED AS OF 12 JULY 1989

	HAB Silver		
36	G Ridgeway	HF	SSB
37	C Gibbs	40m	SSB
	HAB Bronze		
47	C Gibbs	40m	SSB
	3500 Honour Roll		
29	F Parkhurst	40m	SSB
	Districts Class III		
313	E Brown	40m	SSB
316	J Wainwright	HF	SSB
	Districts Class II		
205	E Brown	40m	SSB
206	C Gibbs	40m	SSB
207	J Wainwright	HF	SSB
	Districts Class I		
138	G Ridgeway	HF	SSB
139	C Gibbs	40m	SSB
140	J Wainwright	HF	SSB
	Large Square Class I		
172	G Ridgeway	HF	SSB
174	J Wainwright	HF	SSB
177	C Gibbs	40m	SSB
	Counties Class I		
213	J Wainwright	HF	SSB
216	C Gibbs	40m	SSB
	Books Mixed Series 100 Books		
314	S Rogers	40m	SSB
	900 Books		
64	G Ridgeway	HF	SSB
	2600 Books		
1	C Gibbs	80m	SSB
	Islands Award 24 VHF 40 HF		
113	G Ridgeway	HF	SSB
	70 VHF 80 HF		
49	J Wainwright	HF	SSB
	80 VHF 90 HF		
39	D Davidson		
	140 VHF 150 HF		
8	C Gibbs	HF	SSB
	260 Islands		
1	F Parkhurst	80m	SSB
	Bookholders 20 Bookholders		
10	E Brown		SSB
	40 Bookholders		
5	F Parkhurst		SSB
	60 Bookholders		
3	C Gibbs		
	80 Bookholders		
1	R Sheppeard		SSB

New HF Contest

Malcolm Harrington, BRS20249, reports that the Society are to promote a new LF SSB Contest next year which will be open to SWLs to replace the 7MHz SSB contest which died earlier in the year.

It appears that the contest will be held on 3-4 February between 1200 and 0900. Full rules will appear soon in 'Contest News', but I know that some established listeners will be delighted to know that an LF event is to be re-instated in the Contest Calendar.

Newcomers

Jeff Smith, BRS92044, wrote for the first time as a result of my plea for new SWLs to get in touch. He has been an SWL since April and has heard around 80 countries on HF so far, including AP2ZR, FY4FM, HL1EJ, JA7AER, LU9FFD, VK3VKL, 5N2MSB and 9K2CS. He also monitors SSTV using a Spectrum 48k computer. An FRG7700 is the main receiver with the VHF Converter and antenna tuner. A dipole received the signals on HF and a 10 element yagi does the business on VHF. Jeff shared the view about some CQ calls being unintelligible and garbled and also felt, being an ex RN communications man, that if everybody had a spell as an SWL, there might be better discipline on the amateur bands!

I hope that more newcomers will drop me line in the next few months. I am always interested to read of other SWLs experiences, and will gladly put the best offerings into the column.

Early News of Society's SWL Contest

As the deadline for entries approaches, the number of entries so far received is little down on last year. Logs from Japan, Australia, Belgium and East Germany have been received, as well as a number from these shores. Some quite good scores have been claimed, but we will have to wait for news of the winners until I have been at the logs with my red pen. I hope to have the results into print soon.

One detailed view of the contest has been received from Joan Slater, BRS90400. She had not intended taking a serious part in this year's event, but after she had calculated a provisional score she found she had a better one than in previous years. She therefore took the log on holiday with her and wrote it out, duped and scored it finally either on the beach or at the holiday hotel! She just about had enough logsheets with her to finish the job while away.

Initially, she had decided that there would be no more contests until a decent antenna had been erected, but somehow the 'old' antennas did their stuff. It will probably be her last SWL contest as she passed the last RAE after many hours of studying (Class B licencess can still enter SWL Contests). She had been encouraged by a plaque in the shack which said 'There is no failure except by no longer trying'. She came away with two distinctions. Living 'in a bit of a hole' Joan hopes to catch some good autumnal tropo on 144MHz to prove that the new rig will reach a little further than 'the repeater down the road'!

Finale

That's all for this part of the column. No doubt you have already read my 'Spectrum Analysis' bit. If not, you know what to read next.

I'm still on the look-out for anything of interest to listeners to put in the column, and from this one you will see that I would like some SWL input to HAB and some more Newcomers to write. So, until next month, 73.

The deadline for the Christmas issue is **Saturday 14 October.**

HILARY CLAYTONSMITH, G4JKS
115 Marshalswick Lane, St Albans, Herts AL1 4UU

Protecting products from EMI/RFI requires effective screening, although many firms producing electronic equipment which is housed in shielded cabinets tend to be more concerned with the electronics than with the cabinets themselves. In some cases, the cabinets may be bought in, having been tested in isolation from the product. But for effective screening the case and 'innards' should be thouught of as one system, with testing for shielding effectiveness being carried out accordingly.

Screened Enclosures

As many people are only too aware, manufacturers have tended towards plastic packaging for their products. As plastic does not restrict the path of EMI, and as a remedial method, manufacturers have sought to provide a plastic with the conductive properties of metal, either by using nickel based paints or zinc arc sprays. These two methods have proved partially successful, although Copper/nickel plating is probably the only method which can approach the desired standards at present. The bonding produced by this method is more permanent than the paints and sprays and, because copper is an excellent conductor, the shielding effectiveness against high intensity fields is very good. The emission aspects of EMC are also very important to consider. Any noise which may be emitted from the product through the case may effect nearby equipment.

There is also one other aspect which should be borne in mind - that of security. Electronic eavesdropping has reared its ugly head recently and is at present causing a great deal of concern in the corridors of power. Signals which are fairly structured, such as the drive signals to a VDU, can be reconstructed reasonably easily. VDUs can now be fitted with EMI-shielded windows which prevent such eavesdropping whilst at the same time helping to reduce glare and improve contrast. Another suggested remedy to the problem is the use of 'scramblers' which generate extra signals to prevent sense being made of the data. It doesn't take too much imagination to see the dangers of that so-called solution!

Spray Paint

If you or a neighbour are suffering from direct breakthrough into a TV or radio receiver via its plastic

cabinet you can now screen the product with a plastic RF-proof coating. Radiospares, who also provide the home constructor with components via their Electromail outlet, now sell a metal-based plastic paint which is designed to prevent computer generated RF radiation affecting nearby radio receivers.

The same paint can be sprayed onto the inside and back of radio and TV products to form a thin RF-proof screen. The Radiospares part number is 551 570 and the price is currently around £14 for a 365ml aerosol can. The paint is touch dry in 15 minutes, full conductivity can be obtained after 24 hours, and a large radio and television manufacturer is currently using it to prevent VHF signal breakthrough into TV and VCR IF circuits.

One practical word of warning. Spraying is best accomplished out-of-doors and the product should be left standing in fresh air for a few hours before reinstallation so as to prevent a build up of acrylic fumes in the domestic environment.

Ferrites

Although the Mullard FX1588 toroid has become a standard weapon in the TVI armoury, it is now becoming difficult, and at times expensive, to obtain. An alternative is to use MW ferrite rods which are both cheap and readily available at local radio rallies.

Both the FX1588 and the ferrite rod will require some 15 turns or so in order to block 3.5MHz and higher frequencies from being conducted along mains, loudspeaker or coax cable. When winding onto a ferrite rod, the winding should start at one end and continue to the other, so providing a flat spiral coil. A ferrite ring should be wound so that the 15 or so turns are spaced evenly so that the leads into and out of the winding are not running parallel. This is to prevent coupling between the input and output connections. If possible, there should be 180° spacing between these leads.

In both cases, the ferrite ring or rod should be installed some 15cm or so from the receiver rear panel to prevent direct radiation of RF from the lead or cable effectively bypassing the filtering action.

Cables

RF radiation from your station's feedlines is only as good as the amount you spend on the cables. Obvious perhaps, but there have been one or two cases of RFI and TVI caused by the leakage from the poor weave of cheap cables. Do not skimp on these; ensure they are the best quality you can afford. Incidentally, the same applies to UHF TV coax cable. As the years go by, the outer sheath of many cables are produced with larger and larger holes and its wire construction gets thinner and thinner. You only get what you pay for!

A member has written in reporting interference from his transmissions to one of his extension phones. The problem was satisfactorily cleared up by the use of two TMP Electronic Supplies 0.25" split beads, which are taped to the lead where it entered the phone. It was interesting to note the other phone (made in Taiwan) connected to the same socket had no problems at all.

In the meantime

There is no doubt that the world of EMC is buzzing with activity, both in professional and amateur circles - indeed if paper could cure the problems we would be home and dry! Most people are pretty unenthusiastic about official documents but in this case the mountain is working in our favour. It is generally agreed that the major problem on the amateur EMC scene is poor immunity of domestic electronic equipment. Of course, there is nothing new in the breakthrough problem - one Old Timer used to tell a story about the trouble he had when the first 'talkies' came to his local cinema and his top band AM QSO came over loud and clear in the auditorium - but things have got worse of late simply because there are so many more electronic gadgets about.

The good news is that the authorities in the UK and other EEC countries are presently drafting documents which will define standards of immunity for all manner of domestic and industrial equipment and these will be *obligatory*. The bad news is that although these are intended to come into force in 1992 it will be some time before they become really effective. In a nutshell, things will get worse before they can get better, and the way the Amateur fraternity handle their problems over the next few years could be crucial to the maintenance of the good image that Amateur Radio still enjoys. It is perhaps worth remembering at a time when we are trying to attract young people into Amateur Radio via 'Project Year' that nothing is more likely to deter the parents of young amateurs than the fear - however unfounded it may be - that they will have problems with their neighbours. Well, what can the average amateur do about it? Here are a few suggestions, which may at least act as a stimulus to further discussion:

a) Try to avoid having breakthrough problems from the start by practicing good radio housekeeping, particularly in the siting of antennas. See page 20 of the *1989 Call Book*. This probably won't stop you having the problems, but at least it will reduce them to manageable proportions!

b) Where conditions do not permit an ideal set-up (and this must apply to most of us) take extra care in operating. Everyone knows that is is good operating practice to use only the power necessary to give satisfactory communications, but do we all do it?

c) Consider using 'EMC friendly' modes where possible. Generally FM gives less trouble than SSB, and CW scores because it allows you to use much less power for a given contact than either of the voice modes. (See *Amateur Radio Operating Manual*, Third Edition, p20). At first sight it looks as if RTTY and the new data modes should be 'EMC friendly' because of the basic modulation technique and because they require less power for a given contact than SSB. I would be pleased to receive comments from users of the data modes, particularly where the performance of several modes can be compared.

d) Try to tone down the local club know-all who tells any newcomers that the way to deal with RFI is to bluster and threaten everyone in sight. Breakthrough may not be our fault, but it is definitely *seen* to be our problem.

e) Keep a simple breakthrough kit ready, and respond quickly to any complaint. Nothing impresses a neighbour so much as fixing his problem in a few minutes. A suitable kit is described in the *1989 Call Book*, p22.

f) It is advisable (if funds run to it) for all Clubs to have the full, boxed filter kit which is available from HQ, so that it can be loaned out.

European Meeting at 'ham radio' 89

A further meeting of the EC countries took place during 'ham radio 89' at Friedrichshafen, West Germany, at the end of June. The first meeting of the group occurred earlier in the year when it was agreed to consider the formation of a European Amateur Radio Association.

Unfortunately a meeting of the IARU Region 1 EMC Working Group had been arranged to coincide with the EC meeting and therefore there was a split in the attendance of all interested parties. The RSGB was represented by the President and the EMC Committee Chairman, and the meeting was chaired by Dr John Allaway. The EC Countries were well represented and many of the Region 1 Countries were also present. After much discussion the following resolutions were passed:

1 That EC Matters are taken care of by a special body formed within the IARU Region 1 following IARU terms of reference.

2 That the 12 Amateur Radio Societies within the EC nominate their Representative within two months.

3 That these representatives form the EC Committee of IARU Region 1. One Society produces a Conference Paper for the next Region 1 Conference for approval of this Committee.

4 That UBA is kindly requested to co-ordinate the activities with the EC in the meantime, and to organise the first meeting of this Committee within 6 months, to elect a Chairman and Secretary, and to formulate policies.

5 That all other Societies with an interest in EC Matters are invited to join as observers.

The next meeting is being arranged in Brussels with the European Commission in September.

A meeting took place on the Sunday morning of a sub-committee dealing exclusively with the problems of EMC within the EC. Some very useful work has been done during the spring and early summer, and a number of countries had improved their relationships with their national organisations. The EC EMC Directive has now been fully approved and issued, and work is continuing on implementation agreements. The policing of the new arrangements in 1992/3 has still not been agreed, but the DTI intend publishing a Discussion Document in the near future. If you wish to obtain any information on the EMC Directive, contact the DTI at Waterloo Bridge House, London, who will provide the information free of charge. An article on the EMC Directive will appear in *RadCom* later in the year and a full update on the latest situation will be presented.

EMC helpline

The Society has installed an EMC Helpline at the EMC Committee Chairman's QTH to improve the service to society members who may have EMC problems.

The service is available 24 hours a day on 0329 239644.

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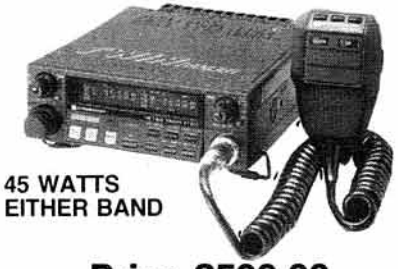

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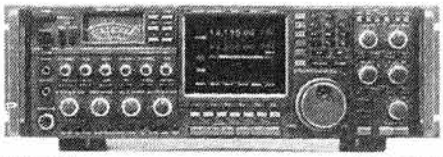

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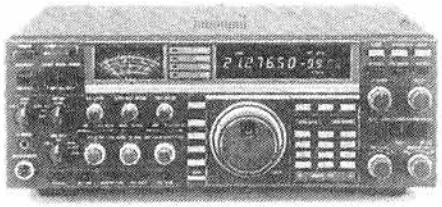

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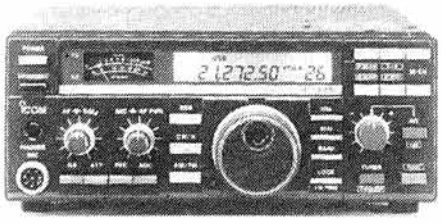

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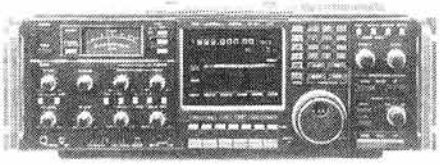
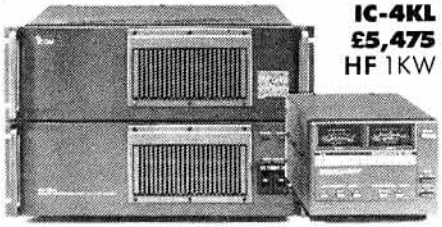


IC-R9000 **£3,995**
30KHz – 1999.99999MHz.

IC-R7000 **£989**
25-1000MHz. 1025-2000MHz.

IC-R71E **£855**
100KHz – 30MHz.

LINEAR AMPLIFIER



IC-4KL
£5,475
HF 1KW

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IC-505 **£529**
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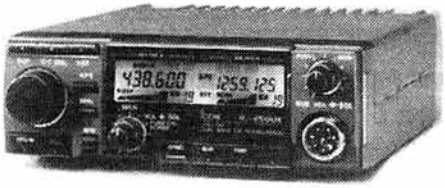
MOBILE TRANSCEIVERS

IC-2400E FM 144/430MHz **£635**



IC-2500E **£675**
FM 430/1200MHz

IC-3210E FM 144/430MHz **£499**

IC-901 MULTIBAND **£799**
FM (SSB) 144/430MHz
VARIOUS OPTIONAL FREQUENCY
UX UNITS INCLUDE ▶

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IC-228H 45W **£385**
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IC-448E 25W **£429**
FM 430MHz

IC-290D 25W **£559**
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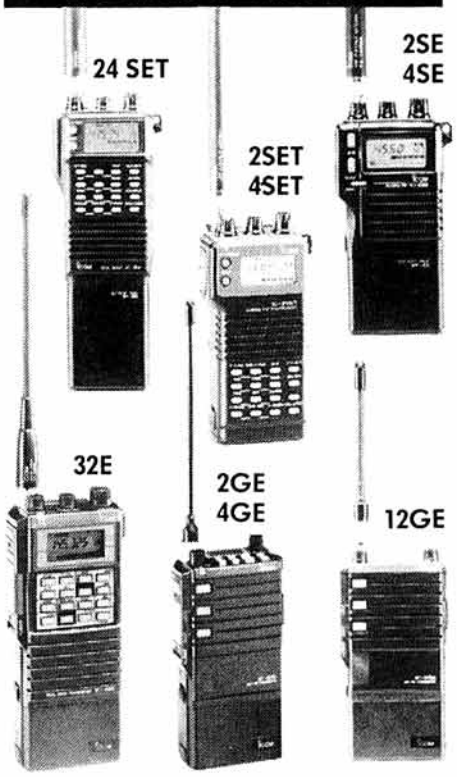
IC-490E 10W **£625**
430MHz SSB. CW. FM.

IC-1201 **FM** 1200MHz **£520**

PRICES AVAILABLE UPON REQUEST

IC-UX19	28MHz	FM
IC-UX59	50MHz	FM
IC-UX129	1200MHz	FM
IC-UXS92	144MHz	SSB.CW
IC-UXR91	RX Unit	FM.AM

HANDHELD TRANSCEIVERS



IC-24SET	**FM** 144/430MHz	**£415**
IC-2SET	**FM** 144MHz	**£295**
IC-4SET	**FM** 430MHz	**£310**
IC-2GE	**FM** 144MHz	**£265**
IC-4GE	**FM** 430MHz	**£299**
IC-32E	**FM** 144/430MHz	**£399**
IC-2SE	**FM** 144MHz	**£275**
IC-4SE	**FM** 430MHz	**£310**
IC-12GE	**FM** 1200MHz	**£365**

NEW MODELS, STAND E2

Helpline: Telephone us free-of-charge on **0800 521145**, Mon-Fri 0900-13.00 and 14.00-17.30. This service is strictly for obtaining information about or ordering Icom equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders, thank you.
Datapost: Despatch on same day whenever possible.
Visa & Mastercards: Telephone orders taken by our mail order dept. instant credit & interest-free H.P.

AZDEN PCS 6000 2M FM RIG

+ "Free Scanning Receiver" 25 WATTS (RX108-180MHz AM/FM)

The Azden PCS 6000 crept on the scene with very little announcement. Those in the "know" immediately realised its potential and snapped the first shipment up. By the time you read this we hope to have bulk supplies. So what is all the fuss about?

The basic transceiver is the same as the competition; 25 Watts of rf output, 144-146MHz, 20 memories, auto tone-burst, excellent receiver sensitivity etc. On the face of it nothing to get excited about! But that's only the beginning, the next part is really exciting. The receiver coverage has been extended from 108 to 179MHz. Yes it covers the aircraft band with a built-in AM detector for reception up to 136MHz and a properly designed front end with AGC and 5kHz steps for offset-VOLMET transmissions. Above this range, reception is FM. The transmitter side has a programmable "tone" module which is also used to programme the tone-burst of 1750Hz. The shift frequency is also programmable and is made to error-out on transmit beyond the range 144-146MHz. However, this can be used in conjunction with the reverse repeater switch to instantly monitor duplex transmissions throughout the entire receiver range. What is particularly attractive is the ability to programme into each memory, a unique shift and if appropriate, a unique tone. This makes the rig somewhat unique when looked at in conjunction with the frequency range. Finally the price: most rigs are well in excess of £350 these days, without all the above listed features. So for £329, we think you will agree that this has to be a very special deal indeed.

HF TRANSCEIVER DISCOUNTS!

Most transeivers are designed for 12 volts. The manufacturer's own PSUs are expensive. But our REVEX "BIG BERTHA" P300 is just as good and a lot, lot cheaper. Fully protected, large hunky transformer, and thermal fan cooled! Below is a list of autumn packages that we invite you to consider. Part exchange welcome. Credit? Most certainly. Just ask for quote.

Model Type	Mfr's PSU	REVEX PSU
Kenwood TS440S	~~£1311.00~~	£1200.00
Kenwood TS140S	~~£1035.00~~	£959.00
Kenwood TS680S	~~£1158.00~~	£1080.00
Yaesu FT747GX	~~£918.00~~	£759.00
Yaesu FT757GX2	~~£1228.00~~	£1069.00
Yaesu FT767GX	~~£1858.00~~	£1699.00
ICOM IC751A	~~£878.00~~	£1589.00
ICOM IC735	~~£1357.00~~	£1069.00
ICOM IC725	~~£1137.00~~	£859.00

The above price comparisons use the manufacturer's nearest equivalent PSU to the P300. Each Revex is fully guaranteed for 12 months as is the matching HF transceiver. All mail orders against credit cards are despatched by 24 hour Securicor at our risk. If payment is made by cheque please allow an extra couple of days for clearance.

A "WORLD FIRST" in SCANNERS!

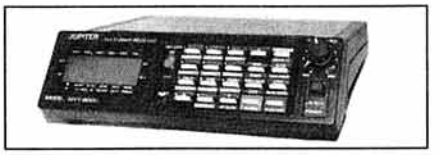
25-1300 MHz* Handheld JUPITER II £299

★ AM/FM
★ Direct up/down tuning
★ 5, 10, 12.5, 25, 30 KHz steps
★ 100 memories
★ 10 programmable bands
★ Step change frequency correction
★ High speed scan 20 per sec.
★ Carrier or audio scan
★ Battery Saver
★ Telescopic antenna (BNC)
★ Fast memo load feature
★ Individual memory unload
★ Uses 4 × AA cells
★ Size 7" × 2.5" × 1.5"
★ 700 MHz first IF
★ Proper English Manual
★ Superb sensitivity.
★ Does not cover 550-800MHz.

No other similar receivers offer the same features at anywhere near the price! And inside the construction is a Joy! Lots of space, nicely laid out boards all linked with quick connect plugs. Not a "Taiwanese Rat's Nest!

- **Direct up/down control.**
No need to punch anything into memories. Just enter frequency and use up/down buttons for manual or electronic tuning.
- **AF Scan.**
No more annoying blank carriers for the receiver to lock on to. Simply tell it to ignore carrierss not containing audio and it will!
- **One Button Memo Read.**
A single button takes you directly into the memory bank. Up/down or scan will quickly move you around or use direct access for a particular channel number.
- **Battery Saver.**
For long term single channel monitoring this feature will reduce battery consumption by 70%.

25-1300 MHz* Mini - mobile/base JUPITER 6000 £379



- **Skip Function**
Whether you want to bypass a single memory channel or an entire bank, this control provides the answer.
- **High Speed Scan.**
Select high speed scan or search and you will whiz through the range at a healthy 20 steps per second! That means you can scan 100 memories in 5 seconds or 1 MHz of space (25kHz steps) in 2 seconds. It really works!
- **Fast Memo Write.**
Enables you to quickly write into the memories, no need to select a number, the receiver will use the next empty memory.
- **User Friendly Search Programm.**
You can search in either direction and change direction at the press of a button. Total agility with a speed to match.
- **Unique Multiband Programme.**
No less than 10 separate band segments can be stored in the receiver's memory.
- **Total Flexibility.**
The basis upon which the receiver has been designed. It means you tailor the receiver to do exactly what you want it to do, almost like having a receiver that was designed for your own personal needs. No other receiver can match it, feature for feature and the good news is the cost.

World demand is tremendous. We are getting only small quantities so pick up the phone now and you could be lucky!

FREE CATALOGUE & PRICE LIST! We now have an illustrated catalogue of some interesting products for the radio amateur that we have never had the space to advertise. Also details of new items coming along. Just drop us a first class stamp and we will send you this plus our price list of over 700 items!

MIZUHO "MX" QRP SSB/CS RIGS £189

Now in stock these 2 watt single banders for 80, 40 or 20 metres are real beauties. VXO control (one xtal supplied) gives 25kHz segments on 80 and 40, and 50kHz on 20 metres. Features IRT, noise blanker, S-meter, speaker, morse key, BNC socket. Powered from AA cells or external supply. Pocket size 66W x 39H x 142mm deep. As used by GBSRN on Ben Nevis. Over 100 in use already. Send for gen.

NEW! SHORT WAVE LISTENERS "CONFIDENTIAL" FREQUENCY LIST. Now replaces old edition of "UKCFL." Fully up-dated it is probably the most comprehensive guide available. £7.95 post

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CLP5130 1-50-1300MHz beam 12dB	£179.00
CLP5130-2 105-1300MHz beam 13dB	£89.00
CP22J 2m 6.5dB base antenna	£49.95
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EL770H 2m/70cm Mobile PL259	£30.00
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GLS Gutter mount/cable for mobiles	£14.95
D24N Duplxer 2m/70cms	£26.95
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CP5 80-10m vert + radials	£189.00

VSWR METRSetc (New Design)

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ADONIS FX-1 Mobile Goose Neck	£55.00
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NOAA BASIC Turnstile antenna **£34.95**
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SAE for full details and prices of other 'separates'

★ ★ ★ ★

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★ Excellent sensitivity (typically 0.4uV for 12dB SINAD)
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★ The basic receiver is single channel crystal controlled.
★ Multichannel option.
★ 2 watt audio output stage having a low quiescent current.
★ Size: 153 x 33 x 13mm ★ Requires 10-14v DC supply

PRICES Stock Versions: (fully assembled, aligned and tested boards) 6m, 4m, 2m and weather sat **£49.95**
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Transmit on 2 with the new IC-2SET £295 and the latest goodies from ICOM. Kenwood's mystery package will be unveiled shortly and we will be happy to send you the details. Yaesu as well will quote for whatever you fancy. We have brand new Rockwell-Collins KWM-380 HF transceivers cheap. Used Drake equipment in stock. Drake owners get on to our list for useful items etc., that turn up.

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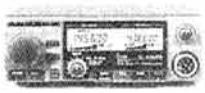

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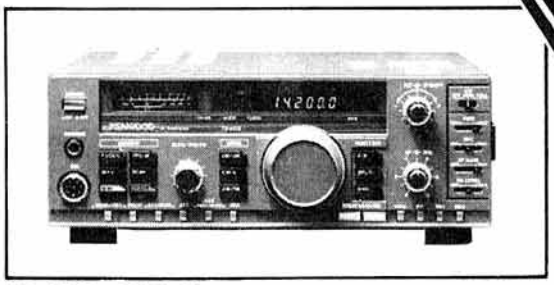

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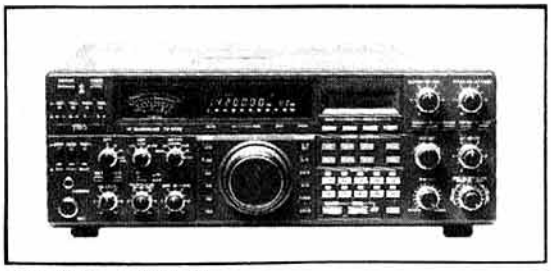

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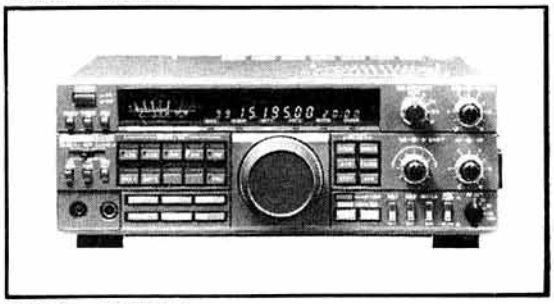

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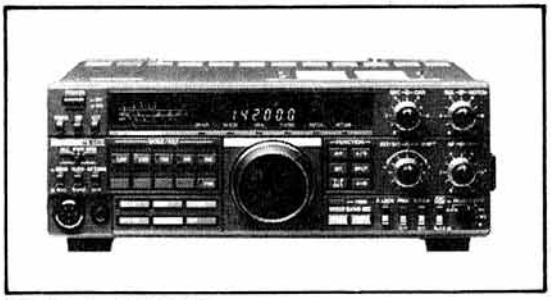

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CONTEST NEWS

RULES

432 MHz CUMULATIVES

Dates: 13 and 29 Oct; 14 and 30 November
Times: 2030 to 2300 clock time (not GMT). Use GMT on logs.
Sections: Single Operator Fixed, All Other.
Scoring: Radial Ring (will be normalised by adjudicator).
Adjudicator: Dr D A Yorke, G4JLG, 40 Edge Fold Road, Worsley, Manchester, M28 4QF.
Rules: as per 1988.

1296 AND 2300MHz CUMULATIVES

Dates: 21 October, 6 and 22 November, 8 December.
Times: 2030 to 2300 clock time (not GMT). Use GMT on logs.
Sections: Single Operator Fixed, All Other.
Scoring: Radial Ring (will be normalised by adjudicator).
Adjudicator: D.J Cannings-Bushell, G4WAD, 24 Almond Close, Evesham, Worcs. WR11 6YH.

ERIC MOLLART MEMORIAL TROPHY HF DF EVENT

Date: Saturday 28 October 1989.
Maps: OS Sheet 175 (Reading and Windsor) and 165 (Aylesbury and Leighton Buzzard)
Assembly: 1900 hrs for 1920 hrs start.
Location: Peppard Common, NGR 709818 (OS Map 175)

Competitors requiring a hot meal after the contest should notify Roger Shepherd, G8WCH, tel. 0494 21063 by 21 October 1989.

6 METRE CW CONTEST

Date: 9 December
Time: 1800-2200 GMT
Sections: One section only.
Scoring: Radial Ring.
Adjudicator: G4WAD
Rules: General Rules published in *RadCom* January 1989 apply.

Certificates for leading fixed station (single op), and leading other station.

Full QTH information to be exchanged (see rule 13).

4 METRE CW CONTEST

Date: 10 December
Time: 0800-1200 GMT
Sections: One section only.
Scoring: Radial Ring.
Adjudicator: J Pillags,G8HHI, 43 Bartons Drive, Yateley, Camberley, Surrey, GU17 7DW.
Rules: General Rules published in *RadCom* January 1989 apply.

Certificates for leading fixed station (single op), and leading other station

Full QTH information to be exchanged (see rule 13).

AFFILIATED SOCIETIES TEAM CONTEST 1990 RULES

1. General. As in 1989, provision of a checklist is a request rather than a requirement, but it is hoped that all groups will comply and thus greatly ease the burden on the adjudication team. Contestants should note the increased frequency allocation for this year's event: 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 operators using the segment should play fair and keep their speed right down. Contestants are reminded that those who operate in a manner not within the spirit of the event render themselves liable to disqualification, as do those who breach the rules.

2. When. 1300GMT to 1700GMT on Sunday 14 January, 1990.

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 held responsible for the entry, and must include a summary sheet (see 'Entries') for each team entered by the club.

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, each team may define a separate 'branch' meeting-place, and the team(s) entered by that branch will be considered to be entirely separate from those entered by other branches, other than in respect of affiliation.
(d) Each station may be single- or multi-operator, as best suits the club, 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 the request that 3,570 to 3,590kHz be 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. No points will be lost if a serial number cannot be obtained from a non-competing station, but any contest exchange sent by that station should be logged.

7. Scoring. Each completed contact scores 10 points. Points may be deducted for errors or illegibility. 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. Stations having more than five unmarked duplicates may be disqualified.

8. Logs and Entries.
(a) Logs must be typed or clearly written on one side only of RSGB HF contest log sheets (form HFC1) or on A4-sized paper, using blue or black ink. Standard fan-fold paper, which differs only slightly in size from A4 is a satisfactory alternative. Computer-generated or hand-drawn log sheets are acceptable provided they correspond with the HFC1 format, ie, forty contacts per A4 page, divided into groups of ten, and with the same columnar arrangement (see (b) below). Logs which are incomplete or illegible, or which differ from the correct format may not be adjudicated.

(b) Logs must show, for each contact, the following information, tabulated across the page:]Time of QSO in GMT]Callsign of station worked]RST and serial number sent to station]RST and serial number received from station]Points claimed
Duplicate contacts must be clearly marked as such, and not claimed for points.

(c) Each individual log must be accompanied by an HF Contest cover sheet (form HFC2), properly completed, with the declaration signed by the person responsible for that station.
(sample copies of Log and Cover sheets are available from RSGB HQ on receipt of a stamped/addressed envelope. Larger quantities may be purchased. Examples of both forms have been printed in RSGB publications, eg *Call Book*, and may be photocopied for use if so desired. Please note that contest adjudicators do not normally carry stocks of these forms).

(d) Entrants are requested to include with every log where more than 80 QSOs appear, a checklist comprising the callsigns of all the stations worked. These should be sorted into order, either fully alphanumerically, or by the first letter of the suffix, and the serial number sent to each station should be shown after the callsign. The object of the checklist is twofold - to assist the entrant in spotting duplicate contacts, both during the event, if the list is completed as contacts are made, and during log transcription; also to aid the adjudicator in locating specific contacts for checking without having to search through the whole log. Club secretaries wanting advice or assistance with any paperwork problems (in respect of AFS only, please) are invited to contact the adjudicator at the address shown below.

(e) 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.

(f) All entries from each competing society are to be sent in one package to *RSGB HF Contests Committee (AFS), c/o. Knowles, G3UFY, 77 Bensham Manor Road, Thornton Heath, Croydon, Surrey, CR4 7AF.* Packages must be postmarked no later than Tuesday 23 January 1990. Entrants must ensure that logs are well packed to avoid loss or damage in transit. Packages which are underpaid or bearing postage due stamps will be refused.

9. Awards.
(a) The Edgware Trophy will be awarded to the leading affiliated society.
(b) Certificates of merit will be awarded to the overall second- and third-placed affiliated societies, and to the leading Scottish society.
(c) A certificate of merit will be awarded to the station having the highest individual checked score.

Foreign entrants to RSGB VHF contests

I have been asked to look at the possibility of allowing foreign amateurs to enter RSGB VHF contests. The following rules have been agreed with members of the VHF Contest Committee:

A foreign amateur is allowed to enter any RSGB VHF contest (even though this may not be specifically stated in the individual contest rules) as long as the station entered is located within the boundaries of the United Kingdom (G, GD, GI, GJ, GM, GU, GW).

The foreign amateur must be a member of his/her own country's national society, and must be able to prove this when entering his/her logs. A photocopy of any relevant document is acceptable.

If there is no national society in the entrant's country of origin then this must be stated on the entry form 427-86. The committee's decision on the validity of the entry must be then be accepted. Any query regarding validity can be checked by writing to G4DEZ QTHR prior to the contest.

Foreign amateurs will be listed separately, and if sufficient numbers enter a contest, then a certificate will be issued to the highest placed entrant. Foreign amateurs will not be entitled to take 'Trophy awards'. The issue of certificates will be at the VHF Contest Committee's discretion.

Foreign amateurs who are also members of the RSGB must also abide by the above rules, but there would be no need to show that they are members of any other society. RSGB membership must be noted on form 427-86 so that membership can be proven.

Definition of major and minor errors in VHF Contests

In an effort to make things a little easier for contestants in VHF Contests, the Committee have drawn up a list of errors that occur in entries. I hope that you will understand that we are trying to reduce the bureaucracy and thus hopefully increase the number of contestants.

Minor errors will be noted and corrected by the adjudicator (no changes will be made to contact information - if it's wrong you will lose points as per normal).

Major errors will be pointed out to the entrant, and the log returned for correction within a fixed time limit (eg a week from the date of posting back to the entrant). If nothing is received within the time limit no reference to the entry will be made in the results.

Where an entry is clearly invalid (eg a /P entry in a fixed station event), a note will be sent to the entrant asking if it can be used as a checklog. The entry will obviously be disqualified from the contest as an entrant.

Minor errors
1. Missing zone information on the 427-86 in zonal contests; the entry will not be valid for a zonal award but will be accepted as an entry.
2. Non-critical details of station equipment incomplete, eg antenna height omitted, RX description missing.
3. Section omitted, but where other information on the 427-86 makes it clear which section is being entered.
4. Location omitted, unless in a county multiplier event.
5. Best DX information missing or rendered invalid during checking.
6. Log sheets not collated correctly (uncut z fold paper).
7. Serial numbers issued in duplicate or out of sequence (although this depends on how bad it is and how often it occurs in the log).

Major errors
1. Declarations unsigned or not dated.
2. Operators not listed.
3. Final stage or power information missing.

4. Registration as per amended rule 16 not complied with (if necessary). Registration should be made with VHFCC Chairman QTHR if your equipment falls within the limits as set out in rule 16.
5. Incorrect stationery used; adjudicator to supply correct forms with returned log.
6. Multiplier lists missing or in wrong format in County/Country multiplier events.

7. Logs with missing contact information, eg no times or no location.
8. Computer generated logs not complying with standard formats, eg too many QSOs per page or columns transposed.
9. Grossly inaccurate scoring (where this is not viewed as a deliberate attempt to inflate the score).
10. Missing summary sheets in multiband, cumulative and AFS events.
11. Entries sent to the wrong address.
12. Missing declarations of club membership in AFS events.

Entries to be treated as check logs
1. Entries not eligible for any section in the event (eg /P in fixed events). Entrant to be advised first.
2. Entries to VHF NFD from groups or individuals that have not registered their site.

Entries to be disqualified automatically
1. Entries from non RSGB members.
2. Entry where power declared exceeds contest limit.
3. Entries where Power Capability of equipment exceeds that laid down in Rule 16 (general rules, amendment), and equipment is not registered.
4. Entries where antenna declared exceeds contest limit.
5. ENTRIES POSTMARKED AFTER THE DEADLINE, or as agreed by the adjudicator (under exceptional circumstances, eg postal strike, proven illness etc).

Disqualifications to be discussed and agreed in committee
1. On grounds of poor signal complaints.
2. On grounds of gross errors, deliberate cheating, overscoring of contact points.
3. Following station inspection, where reasonable cause is found.
4. On grounds of non-observance of band plans or code of practice.

Notes
Please use the correct forms; these can be obtained from the RSGB, or from VHFCC Chairman G4DEZ QTHR - Please enclose large SAE.

Please in future enclose an SAE with your contest entry so that confirmation of receipt of entry can be made and also that notice of correction can be given. If there is no SAE and an error is found, the committee will not be responsible for lack of response.

Regarding multiplier lists see 'County/Country Multiplier Contests' information on page 80 of *RadCom* September 1989.

If you are thinking of using computer generated logs, write to G4JLG, QTHR for information on what is required.

VHF Field Day 1990 Possible Changes

Every now and again I like to stir things up a little just to see who is actually reading *RadCom*. There is always an undercurrent of concern, murmers, or the odd gripe about VHF contests. The complaints range from 'we can't compete with the big boys' to 'we don't have the power, the equipment, the antennas' or in fact any excuse that allows a group to lose gracefully! What I would like to do is to see if we could change things a little (or a lot) so that skill becomes a larger factor in what it takes to making winning group.

Here are my suggestions:

1) Two sections: *Restricted* 25W PEP output from the transmitter and only one antenna per band.
Main section 25W output (yes twenty five watts PEP output from the transmitter), and multi antenna arrays allowed for each band.

2) Three sections: The first two the same as above, the third section allowed to use 400W PEP, or DTI limit (4m & 6m), and multi antenna arrays. For those who have a power complex.

3) Do away with 13cm!

4) Do away with 6m!

Contests are for you the entrant. I would like to know your views, whether controversial or not, for instance why radial rings rather than kilometres. If you have views regarding VHF Field Day this is your chance to air them. If the response is wide enough I will try to answer your questions, possibly make changes, and review the whole subject on the pages of *RadCom*.

Bryn Llewellyn, G4DEZ QTHR

RESULTS

NATIONAL FIELD DAY RESULTS

Please note that the National Field Day results will appear in the November issue of *RadCom*.

144MHz AND SWL CONTEST MAY 1989

This contest was blessed with excellent conditions into most of the UK, only parts of GM, GD and GU finding the going rough. The band was wide open into DL, Y, OK and OZ for many hours on both days with one report of an HA having been heard. Several contestants commented on the lack of splatter on the band, perhaps as a result of a more responsible attitude from contestants or maybe a lack of activity from within the UK.

There were some objections to the fact that the contest coincided with a Bank Holiday, and there were also comments from outlying parts regarding the scoring system and its supposed bias to the South East *(I'm sure I can remember contests being won from GI back in medieval times - G4DEZ)*.

Congratulations to all the winners and runners-up, and thanks to everyone else who entered for an excellent set of logs. Certificates will be awarded to G4APA/P and G0CDA/P in the Multi-Op section, and G4PIQ and G4BZP/P in the Single-Op and BRS31976 in the SWL section.

G4WAD

RSGB HF-DF QUALIFYING EVENT — SOUTH MANCHESTER

10th June 1989

The 1989 South Manchester Direction Finding Event was held on Ordnance Survey Map 118 (Stoke on Trent and Macclesfield Area). The starting point was at the premises of Mr Chris Plummer, G8APB, in a field adjacent to his property. Two good signals were heard by all the competitors at 13-20BST from the two hidden stations.

Transmitter 'A' G3FVA/P 1985kHZ:
This hidden transmitter site was located 12 miles from the start on a bearing of 29° at a place called "Oldgate Nick" (NGR995764) which was an outcrop of rocks close to the edge of the map. This site was over 1200ft in height and offered panoramic views across Derbyshire Peaks.

Transmitter 'B' G3UHF/P 1950kHZ:
This station was hidden in a small copse close to the Trent and Mersey Canal. The site was 7·5 miles from the start on a bearing of 257° (NGR780579), and access to the woods could be gained by using the canal towpath. Approximately, 400 metres of wire was used as an aerial on this site, with a tie thrown across a deep stream into other undergrowth on its opposite bank, this caused several competitors to cross the stream unnecessarily in their search for the transmitter site.

The event was won by Mr Trevor Gage of Mid Thames Radio Direction Finding Club, who found his second hidden station at 15-34BST. Trevor went to Transmitter 'B' first and then to Transmitter 'A'.

Second place was gained by Mr Geoff Foster who located his second Transmitter (B) at 15-35BST.

All competitors located both hidden stations with the exception of Mr R Brewer who due to technical hitches was unable to locate either station.

The following is a list of competitors in Order of Merit:

Name	Club	Time in at Second Station
1 T Gage	Mid Thames	15·34
2 G Foster	Mid Thames	15·35
3 D Newman	Northampton	15·51
4 C Plummer	South Manchester	15·55
5 D Holland	South Manchester	15·56
6 I Morrison	South Manchester	15·56
7 G Whenham	Coventry	15·57
8 W Pechey	Mid Thames	15·59
9 P Lyle	Mid Thames	16·03
10 A Collett	Chelmsford	16·06
11 B Bristow	Mid Thames	16·09
12 G Nicholls	Banbury	16·10
13 M Mallinson	Banbury	16·22
14 K Chan	Mid Thames	16·30
15 R Brewer	South Manchester	—

Geoff Foster and Derrick Newman qualify for the 1989 National Final. Tea was served at the Coach and Horse Inn where the Cup was presented to the Winner, Mr Trevor Gage. Speeches were given by Trevor Gage and Geoff Foster giving reasons for their success.

RSGB HF-DF QUALIFYING EVENT — NORTHAMPTON

25th June 1989

Nineteen teams assembled in bright sunlight on the picturesque banks of the Pitsford Reservoir some ten miles north of Northampton, at 1300hrs.

Despite the fact that one Tx came on the air some seven minutes late (because it was so well hidden that the operators had difficulty in finding it when returning to the site after their lunch!) the competitors were pleased to hear two very good signals. Bearings were plotted and nineteen cars sped off into the Northamptonshire countryside. Both transmitters were within 9km of the start and were about 5km apart. However they proved to be very difficult to find.

Station 'B' manned by G4YJP/P Steve, was located in a brick built culvert in Dale Wood. Generous amounts of aerial wire kept competitors running to and fro in the woods until they finally located the Tx in the small tunnel, hidden behind a tarpaulin screen, and requiring them to wade in ankle deep water.

Station 'A' manned by G4MZX/P Eric, was located in Blue Covert in dense undergrowth and Blackthorn bushes. This Tx proved just as difficult for the competitors to find and they expressed their frustration in no uncertain terms.

The success of the contest was reflected in the results, the winner not finding his second station until after 1600hrs, but most contestants finding both before the end of the event at 1630.

Tea was provided after the contest at Yardley Gobion Village Hall where the Northampton Cup and other prizes were presented to Chris Plummer and Andy Collett who then told how they had struggled through the afternoon.

Thanks are due to Mrs Sue Lineham and her band of helpers for the tea and of course to Eric Young and Steve Stanton for organising this contest.

The full results are as follows:

Name	Club	Time in at Second Station
1 C Plummer	SMRC	16·07
2 A Collett	Chelmsford	16·07+
3 B Bristow	Mid Thames	15·29
3 P Cunningham	Chelmsford	16·08
5 A Simmonds	Mid Thames	15·24
6 W Pechey	Mid Thames	15·34
7 P Lysle	Mid Thames	15·38
8 D Newman	Slade	15·34
9 I Butson	Chelmsford	15·39
10 K Chan	SMAR	16·13
10 T Gage	Mid Thames	15·38
12 G Nichols	Banbury	16·14
13 G Whenham	Coventry	16·16
14 D Holland	SMAR	16·24
15 G Foster	Mid Thames	16·24+
16 G Metcalfe	Mid Thames	15·35
17 A Williams	Braintree	15·36
18 C Wells	SMAR	—

19 Did not find either station.

Chris Plummer (G8APB) and Brian Bristow (G4KBB) qualify to compete in the National Final.

70MHZ CW CONTEST DECEMBER 1988

We apologise for the delay in publishing these results - we hope this hasn't given contestants too many sleepless nights!

Propagation conditions still confound on this band. The previous day's high pressure and fine weather did not provide stations with the results and activity expected. QSB and noise created problems. Leading station contact rates were compatible with the previous two years, the majority of stations being regular contestants.

GM0FRT gave five stations their best DX, but only managed six contacts.

We apologise to casual contestants if they missed the contest owing to an error in dates published in *RadCom*. This was beyond the control of the committee.

Congratulations and certificates to both the winner EI9FK/P and the runner-up, G4RFR. *G8HHI*

MAY 432MHz - 24GHz CONTEST RESULTS

432MHz SINGLE OPERATOR FIXED SECTION

Pos	Callsign	Pts	QSO	LOC	P(W)	Best DX	KM
1*	G6DER	372	40	93GN	60	DF1JM/P	628
2	G1KDF	308	50	83NN	100	F6KSX/P	932
3	G4PMK	123	20	93GT	70	DJ3IW/P	744
4	G8ZQB	111	25	92JN	30	PE0MAR/P	368
5	G4BWP	109	13	02FH	25	PA3BAS	355
6	G6MXL	82	9	80XR	30	PA0GUS/P	579
7	G4LRT	63	13	92KJ	30	PE0MAR/P	360

432MHz ALL OTHER SECTION

Pos	Callsign	Pts	QSO	LOC	P(W)	Best DX	KM
1*	G4GCM/P	4970	337	94RJ	400	HB9STY/P	979
2*	G4HRY/P	4758	326	93XH	400	DL6NAL	905
3	G4JKN/P	3517	261	81CC	400	DH3NAN	1056
4	G8PUB/P	3406	322	01QE	350	F1EIT/P	865
5	G8TFI/P	3192	264	01KK	400	DK2GR	724
6	GW8KQW/P	2647	284	82JG	400	HB9STY/P	926
7	G4VIX/P	2399	214	01PU	300	DL3LAB	659
8	G0FRR/P	2097	210	80UU	300	F1EIT/P	900
9	G4BVY/P	1927	194	81LQ	400	DL2NO	808
10	G3FVA/P	1094	151	93EH	150	F6KSX/P	875
11	G6CSY/P	1035	135	91XG	400	DL2NO	635
12	G1WPF/P	747	122	91SW	50	HB9STY/P	762
13	GW8CMU/P	486	55	81HK	100	DJ3IW/P	765
14	G8VER/P	442	91	91SR	10	HB9STY/P	744

1296MHz SINGLE OPERATOR FIXED SECTION

Pos	Callsign	Pts	QSO	LOC	P(W)	Best DX	KM
1*	G6DER	180	29	93GN	100	PA0VVH	532
2	G8CHW	160	32	91TQ	100	PA0PLY	376
3	G8ZQB	131	25	92JN	50	PA0EZ	437
4	G4PMK	127	19	93GT	60	PE0MAR/P	426
5	G1KDF	94	20	83NN	45	G0FRE/P	346
6	G4LRT	67	10	92KJ	15	F6KSX/P	763
7	G6MXL	21	8	80XR	2	GW8IFT/P	192

1296MHz ALL OTHER SECTION

Pos	Callsign	Pts	QSO	LOC	P(W)	Best DX	KM
1*	G4XUM/P	1463	97	94RJ	200	F6KSX/P	972
2*	G0ALE/P	1319	110	01QE	400	F1EIT/P	866
3	G0FRE/P	1109	110	01KK	400	DK0HT/P	591
4	G4HGU/P	807	61	81CC	200	DJ5AR/A	995
5	GW8IFT/P	516	60	82JG	100	F6KSX/P	815
6	G4IEV/P	477	47	93XH	35	F6KSX/P	849
7	G6SFR/P	400	36	80UU	80	F6KNB/P	878
8	G3UHF/P	314	40	93EH	70	F6BZI/P	766
9	G6CSY/P	121	25	91XG	10	GI4OPH	515
10	GW8CMU/P	2	3	81HK	4	G6SFR/P	100

Check Log received from G3ZDM/P

2320MHz SINGLE OPERATOR FIXED SECTION

Pos	Callsign	Pts	QSO	LOC	P(W)	Best DX	KM
1*	G6DER	1600	12	93GN	20	PE0MAR/P	414
2	G8ZQB	1108	8	92JN	4	G4DDK/P	234
3	G8CHW	781	7	91TQ	0.5	GW0KZP/P	204
4	G4LRT	386	3	92KJ	8	G0EMG/P	225
5	G1KDF	232	4	83NN	0.7	GW0KZP/P	145
5	G4PMK	232	4	93GT	4	G0EMG/P	88

2320MHz ALL OTHER SECTION

Pos	Callsign	Pts	QSO	LOC	P(W)	Best DX	KM
1*	G0EMG/P	11134	32	94RJ	100	PA2HJS	589
2	G4JAR/P	9075	36	01QE	55	DL0HC/P	493
3	G4ZAP/P	6001	26	01KK	40	PA3DIJ	402
4	GW0KZP/P	3907	17	82JG	25	PE0MAR/P	501
5	G4DSF/P	1821	11	93XH	2	PA0EZ	372
6	G4RVJ/P	1752	7	81CC	100	F6KNB/P	926
7	G4RFR/P	181	1	80UU	-	GJ4TAW/P	181
8	G4JLG/P	172	3	93EH	4.7	G8ZQB	87

3400MHz SINGLE OPERATOR FIXED SECTION

Pos	Callsign	Pts	QSO	LOC	P(W)	Best DX	KM
1*	G6DER	400	3	93GN	0.6	G4BYV	188
2	G8CHW	66	0.5	91TQ	Nil	G4EZP/P	133
3	G4PMK	27	1	93GT	0.8	G6DER	27

3456MHz ALL OTHER SECTION

Pos	Callsign	Pts	QSO	LOC	P(W)	Best DX	KM
1*	G4EZP/P	2871	10.5	01QE	6	DF1EQ	401
2	GW8GDZ/P	995	5	82JG	21	G4EZP/P	338

5760MHz SINGLE OPERATOR FIXED SECTION

Pos	Callsign	Pts	QSO	LOC	P(mW)
-	G6DER	Nil	Nil	93GN	150

5760MHz ALL OTHER SECTION

Pos	Callsign	Pts	QSO	LOC	P(mW)	Best DX
1*	G4EZP/P	328	1	01QE	30	PA2HJS

10GHz ALL OTHER SECTION

Pos	Callsign	Pts	QSO	LOC	P(mW)	Best DX	KM
1*	GW0ETU/P	1716	11	82JG	250	G3JMB/P	266
2	G4EZP/P	379	3	01QE	250	PA0EZ	288
3	G0DJA/P	215	3	92DB	10	GW0ETU/P	103
4	G0AOU/P	11	1	93EH	15	G1HWJ/P	11

24GHz ALLOTHER SECTION

Pos	Callsign	Pts	QSO	LOC	P(mW)	Best	DX
1*	G4EZP/P	19	1	01QE	7	G6IDU/P	

POSITION ACHEIVED ON EACH BAND

Pos	Callsign	432MHz	1296MHz	2320MHz	3456MHz	Total Pts
1*	G6DER	1	1	1	1	4000
2	G8ZQB	4	3	2	-	1719
3	G8CHW	-	2	3	2	1542
4	G1KDF	2	5	5	-	1495
5	G4PMK	3	4	5	3	1250
6	G4LRT	7	6	4	-	782
7	G6MXL	6	7	-	-	337
8	G4BWP	5	-	-	-	293

OVERALL POSITIONS - ALL OTHER SECTION
POSITIONS ACHIEVED ON EACH BAND

Pos	Group	432	1296	2320	3456	5760	10GHz	24GHz	Total Points
1*	Hadrabs & Tarts CG	4	2	2	1	1	2	-	1
2*	The Northern Lights	1	1	1	-		-	-	-
3	Wulfrun CG	6	5	4	2	-	1	-	2584
4	Sheppey CG	5	3	3	-	-	-	-	1939
5	Three Spires CG	2	6	5	-	-	-	-	1447
6	Exmoor RC	3	4	6	-	-	-	-	1417
7	Flight Refueling ARS	8	7	7	-	-	-	-	711
8	The Windbreakers	7	-	-	-	-	-	-	483
9	S. Manchester RC	10	8	8	-	-	4	-	456
10	Sheppey West O/cast	9	-	-	-	-	-	-	388
11	11th Hour CG	11	9	-	-	-	-	-	291
12	Wulfrun CG 'B'	12	-	-	-	-	-	-	150
13	GW8CMU/P	13	10	-	-	-	-	-	99

HF DF QUALIFYING ROUND, SALISBURY 1989

16 teams assembled on Sunday 16 July for the Salisbury RSGB DF Qualifying Event. The starting point was a beauty spot at Verely Hill, high up and overlooking the New Forest. Good signals were received from both stations.

The 'A' station did appear to be further from the tea site and most (as expected) headed for it first. Perhaps here the problem was finding the easy approach to West Moors Plantation from the main A31. G3TRY/P was hidden in thicket and deeply furrowed ground. If the right gate was found it was not too far to walk.

It was a very hot day and summer traffic added to the hazard getting over to the 'B' station. G3ZNH/P, hidden in ferns and bracken (plus decoy aerials), was near Fritham towards the north east corner of the Bournemouth map.

The excellent tea was organized by Margaret (XYL of John, G3ZNH) at the Activity Centre, Salisbury. Out-stations were operated by members of the Salisbury Radio and Electronics Society and the event was managed by our chairman Sir Evan Nepean, G5YN. We do appreciate the great support given by so many from around the country. *G2FIX*

SALISBURY DF RESULTS

Posn	Name	Club	A	B
1	P. Clark	Torbay	1418	1507
2	B. Bristow	Mid Thames	1445	1528
3	C. Wells	South Manchester	1448	1545
4	T. Gage	Mid Thames	1450	1545½
5	A. Simmons	Mid Thames	1558½	1441
6	A. Callett	Chelmsford	1558½	1446
7	G. Whenham	Coventry	1519½	1610
8	G. Nicholls	Banbury	1500	1611
9	M. Mailinson	Banbury	1459	1611½
10	D. Newman	Northampton	1503	1612
11	C. Merry	Dartford Heath	1535½	1623
12	M. Standen	Mid Thames	1529	1629
13	S. Holly	Salisbury	—	1442
14	R. Goodearl	Mid Thames	1449	—
15	N. Underwood	Salisbury	—	1506
16	K. Chan	South Manchester	—	1524

P. Clark and C. Wells qualify for the national final in September 1989

LF CUMULATIVES 1989 RESULTS

Well Done! 96 entries received, which is an increase of 21 over last year. Thanks go to all who contributed to the 362 logs received, and a special thank you to those who sent numbered callsign lists and 'Dupe Sheets' – one is always afraid that the extra paperwork involved may frighten off some would-be entrants, but checksheets really are a great help.

The result on 7MHz was an outright win by G3JJG who used a 25J" antenna, centre-fed with open-wire feeders to achieve a margin of 51 points over the tied runners-up. No less than 11 entries on this band (including the four leaders) were completely error-free. On 3.5MHz, G3LET triumphed with the even greater margin of 57 points, and on 1.8MHz the laurels went to G4HTD. Both these stations retained almost all their claimed scores. The three-band certificate goes to G0DJF by the narrowest possible margin (1 point!), and the old-timer's award to G2HLU, who achieved an overall score of 1207 points.

The highest claimed scores for 1.8 and 3.5MHz, as well as the highest three-band total, were submitted by G3TBK. Regrettably he also had the highest number of unmarked duplicate contacts. This is definitely not a winning combination, and in fact led to the exclusion of his entry from the three-band listings.

There were no complaints of lack of activity. Most entrants found more than enough to keep them busy, particularly on 3.5MHz where up to 90 QSOs were made in one session. Many European stations were worked on all three bands, and there is always the unexpected - G3LET managed a QSO with VS6 on 3.5MHz. In addition, one session each on 3.5 and 7MHz coincided with a French contest, which added to the fun (and confusion).

Operators used the usual spread of commercial equipment, and nearly all entrants employed some form of dipole antenna, often extended or strapped for the lower frequency bands. The few exceptions used long-wire or inverted-L (Marconi) antennas. It is evident, however, that cumulative events such as these are won and lost by operating standards and accuracy of logging, rather than by the equipment used. The bulk of the scores were very close on all bands, and very careful checking was required to produce a result.

Of the 1105 points lost by entrants, 594 were due to unmarked duplicate contacts, 375 due to misreading of callsigns, and the remainder due to errors in copying reports. Many unnecessary points are lost as a result of transcription errors, mistaking 'D' for 'O' 'U' for 'V' etc. Get someone who does not know about Amateur Radio to read back to you the list of callsigns from the log. If they misread what you have written, so may the adjudicator!

The primary object of the LF Cumulatives is that of practice and training. Accordingly, the HFCC will be happy to provide details of lost points and to offer advice. Write to the adjudicator's address shown in *RadCom*, or visit the HFCC stand at the HF convention. We look forward to seeing you next time. If the number of entries continues to increase, there won't be room for adjudicator's grumbles in the report. *G3MCX*

RESULTS - THREE-BAND CERTIFICATE

Posn	Callsign	Points
1	*G0DJF	1394
2	G4ARI	1393
3	G4HTD	1349
4	G4OGB	1343
5	G3OLB	1342
6	G4BOU	1282
7	*G2HLU	1207
8	G3LET	1183
9	G3MCX	1169
10	GM3UM	1110
11	G3AWR	1078
12	G3SWH	1064
13	GM4SID	1043
14	G3LIK	1037
15	G3BPM	1004
16	G0IDE	985
17	G4HZF	947
18	G3ZGC	789
19	G4WZV	728
20	G4JSN	712

* = Certificate Winner.

RESULTS - 7MHz

Posn	Callsign	8/1	14/1	22/1	28/1	5/2	Total
1	*G3JJG	-	ck	177	189	201	567
2	G3SWH	162	162	-	192	-	516
2	G4ARI	-	ck	174	180	162	516
4	G0DJF	ck	156	165	180	ck	501
5	G4KGK	-	141	180	168	-	489
6	G0CKP	-	ck	153	179	147	479
7	G4BOU	-	150	159	ck	162	471
8	G4OGB	158	148	158	ck	-	464
9	GM4SID	174	147	-	135	-	456
10	G2HLU	156	-	156	141	ck	453
10	G4HTD	-	ck	147	162	144	453
12	G4LZB	-	132	159	ck	142	433
13	G0IVZ	-	131	146	ck	150	427
14	G4XPE	129	ck	153	ck	144	426
15	GW3SB	135	140	149	ck	-	424
16	G4IQM	-	ck	153	120	144	417
17	G3LIK	126	129	160	-	-	415
18	G4HZF	-	141	134	ck	135	410
19	GM3UM	138	ck	144	ck	123	405
20	G3AWR	ck	117	138	146	ck	401
21	G3MCX	132	ck	144	-	120	396
22	G3OLB	96	-	180	-	101	377
23	G0IDE	117	ck	141	ck	117	375
24	GM3VEY	-	126	127	-	120	373
25	G3ZGC	-	ck	141	108	123	372
25	G4WZV	123	130	119	-	ck	372
27	G0BLQ	-	ck	120	122	123	365
28	G3BPM	123	-	111	ck	98	332
29	G3TBK	-	116	-	-	177	293
30	G3CQR	-	-	129	39	119	287
31	G3LET	147	-	-	-	90	237
32	G4JSN	-	-	62	72	96	230
33	GW4KVJ	-	-	90	-	87	177

RESULTS - 3.5MHz

Posn	Callsign	7/1	15/1	21/1	29/1	4/2	Total
1	*G3LET	-	210	-	248	198	656
2	G3OLB	192	186	-	221	ck	599
3	G4KGK	213	201	181	ck	ck	595
4	G4ASR	218	196	180	ck	ck	594
5	G4ARI	177	194	ck	216	ck	587
6	G3TBK	204	216	-	-	132	552
7	G3GLL	ck	177	164	204	ck	545
8	G4BOU	201	174	163	ck	ck	538
9	G0DJF	ck	174	176	183	ck	533
10	G4OGB	189	174	162	-	-	525
11	G4KGG	178	-	168	177	-	523
12	G4LZB	183	182	ck	156	ck	521
13	G3YAJ	-	189	159	164	-	512
14	G0CKP	-	ck	161	216	125	502
15	G3MCX	164	171	ck	150	ck	485
16	G2HLU	162	-	156	161	ck	479
17	G4HTD	-	ck	165	174	137	476
18	G4ECI	159	177	-	-	132	468
19	GM3UM	150	153	ck	147	ck	450
19	G4EBK	-	-	162	135	153	450
21	G0IVZ	-	128	137	177	ck	442
22	G0CLP	133	138	160	ck	ck	431
23	G3AWR	144	146	ck	138	ck	428
24	G3SWH	225	-	-	198	-	423
25	G3CQR	-	145	132	-	105	382
26	G0IDE	135	123	119	ck	ck	377
27	G4HZF	-	122	120	-	127	369
28	GW3SB	ck	135	117	114	-	366
29	G3LIK	-	189	156	-	-	345
30	GM4SID	167	177	-	-	-	344
31	G3BPM	62	148	114	ck	ck	324
32	G4IQM	-	99	123	ck	90	312
33	G4JSN	ck	108	104	ck	88	300
34	G0HIC	-	129	74	86	-	289
35	G4AUR	-	87	108	93	-	288
36	G4WZV	108	-	141	-	-	249
37	G0HGH	62	87	95	-	-	244
38	G3ZGC/M	-	54	-	-	-	54

Checklog received with thanks: - G3BCC

RESULTS - 1.8MHz

Posn	Callsign	9/1	17/1	25/1	2/2	10/2	Total
1	*G4HTD	-	129	135	156	ck	420
2	G3TBK	155	129	-	-	134	418
3	G3OLB	153	-	-	120	93	366
4	G3ZGC/P	123	120	ck	120	ck	363
5	G0DJF	114	ck	ck	126	120	360
6	G4OGB	147	102	105	-	-	354
7	G3GLL	122	120	ck	ck	108	350
8	G3BPM	120	111	ck	ck	117	348
9	G4ENA	126	111	-	99	-	336
10	G3LET	-	47	90	-	153	290
10	G4ARI	ck	90	ck	99	101	290
12	G3MCX	102	ck	ck	93	93	288
13	G4DJK	-	84	89	114	-	287
14	G3LIK	ck	84	ck	88	105	277
15	G2HLU	99	95	ck	81	ck	275
16	G4BOU	-	-	93	63	117	273
17	GM3UM	78	90	ck	ck	87	255
18	G3AWR	90	78	ck	81	ck	249
19	GM4SID	-	-	-	135	108	243
20	G0IDE	81	ck	ck	79	73	233
21	G4WZV	-	-	-	95	107	202
22	G4JSN	60	53	ck	ck	69	182
23	G4HZF	87	-	51	-	30	168
24	G3SWH	125	-	-	-	-	125
25	G4EBK	-	-	-	-	63	63

Checklog received with thanks: G3BCC

CONTEST LOG SHEETS

Readers are reminded that both HF and VHF logsheets are available from Headquarters in packs of 100. Prices (which include postage and packing) are £3.29 for RSGB members and £3.87 for non-members. When ordering please remember to specify which type of log sheet is required. Send your orders to:

RSBG Sales (CWO)
Lambda House, Cranbourne Road,
Potters Bar, Herts EN6 3JE.

432MHz TROPHY RESULTS

SINGLE OPERATOR FIXED SECTION

Pos	Callsign	Pts	QSO	LOC	P(W)	BestDX	KM
1	*G6TKI	502	47	01FJ	50	DJ9RX	610
2	G7ABI	298	61	92MC	400	FC1GKE	447
3	G1KDF	246	40	83NN	100	PE0MAR/P	582
4	G1HLT	207	36	93KD	30	PA0EZ	439
5	G6MXL	30	5	80XR	30	G4GCM/P	-

ALL OTHER SECTION

Pos	Callsign	Pts	QSO	LOC	P(W)	BestDX	KM
1(T)	G8TFI/P	3192	264	01KK	400	DK2GR	724
2	G4GCM/P	2562	201	94RJ	400	DD8AK	776
3	G4MRS/P	2318	206	01QX	200	FF6KKN/P	685
4	G8PUB/P	2269	200	01QE	350	DK2GR	700
5	G4BVY/P	1927	194	81LQ	400	DL2NO	808
6	G3CKR/P	1881	204	93AD	400	DD5TD/A	817
7	G4VIX/P	1799	161	01PU	300	DL1ZC/P	629
8	G4HRY/P	1462	146	93XH	400	DG5ZI/P	693
9	GW8KQW/P	1323	164	82JG	400	DL2KBB	665
10	G8ZHP	1276	139	92TR	400	DJ9KH	626
11	G6CSY/P	1035	135	91XG	400	DL2NO	635
12	G0FRR/P	827	112	80UU	300	DK3FB	694
13	GW0DVV/P	599	88	83JA	40	PE0MAR/P	509
14	G3FVA/P	485	88	93EH	150	DK0JK/P	721
15	G4LOO/P	467	102	91RU	150	DK0JJ	535
16	G1WPF/P	321	69	91SW	50	DJ3IW/P	586
17	G4BZP/P	305	49	84IG	50	G4LDR/P	424
18	GW8CMU/P	227	32	81HK	100	PE0MAR/P	520
19	G0CPE	224	49	91PF	90	G4GCM/P	353
20	GJ4TAW/P	153	14	89WF	60	G4GCM/P	584
21	G6HLL/P	118	27	83PF	10	G8PUB/P	358
22	G6WVG/P	78	29	84VB	45	G8TFI/P	356

SWL logs gratefully acknowledged from BRS 52543 and BRS 31976

1296MHz TROPHY RESULTS

SINGLE OPERATOR FIXED SECTION

Pos	Callsign	Pts	QSO	LOC	P(W)	BestDX	KM
1*	G8CHW	160	32	91TQ	100	PA0PLY	376
2	G4EQD	139	22	93QN	10	G3SHK	296
3	G1KDF	94	19	83NN	45	G0FRE/P	346
4	G4LRT	65	8	92KJ	15	F6KSX/P	763
5	G6MXL	14	5	80XR	2	GW8IFT/P	192

ALL OTHER SECTION

Pos	Callsign	Pts	QSO	LOC	P(W)	BestDX	KM
1(T)	G4XUM/P	1463	97	94RJ	200	F6KSX/P	972
2	*G0FRE/P	1109	110	01KK	400	DK0HT/P	591
3	GW4HWA/P	1065	88	81LT	400	F6KNB/P	993
4	G4MRS/P	697	90	01QX	150	DL0ZP	613
5	G6SFR/P	400	36	80UU	80	F6KNB/P	878
6	G4SIV	397	43	92TR	150	DA1UM/P	572
7	G3UHF/P	314	40	93EH	70	F6BZI/P	766
8	G4LOO/P	272	44	91RU	30	F6KNB/P	982
9	GJ4TAW/P	131	15	89WF	15	G3KFD	361
10	G6CSY/P	121	25	91XG	10	GI4OPH	515
11	G6WVG/P	63	9	84VB	1.3	G0FRE/P	356

2320MHz TROPHY RESULTS

SINGLE OPERATOR FIXED SECTION

Pos	Callsign	Pts	QSO	LOC	P(W)	BestDX	KM
1	*G4EQD	841	7	93QN	5	G4JAR/P	296
2	G8CHW	781	7	91TQ	0.5	GW0KZP/P	204
3	G4LRT	367	2	92KJ	8	G0EMG/P	225
4	G1KDF	232	4	83NN	0.7	GW0KZP/P	145

ALL OTHER SECTION

Pos	Callsign	Pts	QSO	LOC	P(W)	BestDX	KM
1(T)	G0EMG/P	11134	32	94RJ	100	PA2HJS	589
2	G4DDK/P	6034	30	01QX	12	G4RVJ/P	370
3	G4ZAP/P	6001	26	01KK	40	PA3DIJ	402
4	GJ4TAW/P	1191	5	89WF	2.5	G3KFD	361
5	G4RFR/P	181	1	80UU	-	GJ4TAW/P	181

432 MHz, 1.3 GHz, 2.3 GHz TROPHY CONTEST RESULTS

In an effort to reduce the number of contests in the calendar the Trophy events were included in this one as an experiment. Opinions were mixed on the success of this format, the majority of entrants welcoming the inclusion of the 432MHz Trophy at the start of the contest but most seeming to want the 1296MHz and 2320MHz Trophies on a different weekend.

It was hoped that the separate Trophy sections would help boost activity and possibly help the smaller groups who are unable to man all bands for the full 24 hours to achieve a better overall result.

Activity did increase, particularly on the lower bands, and was aided by enhanced propagation overnight. Those who continued operating on 432MHz after the Trophy had finished enjoyed good contacts into DL, HB, and F. Conditions remained good for the majority for the first few hours of the 1296MHz and 2320MHz Trophy section on Sunday morning, but died once the sun warmed up.

The resulting quandary over whether to work the DX before it fades away or to wait until the contest starts possibly explains why more stations than expected chose to ignore the 1296MHz and 2320MHz Trophy sections and operated in the 24 hour section.

Unfortunately, few groups took equipment for the higher bands, possibly as a result of trying to concentrate resources for a good result in the Trophy sections. Activity suffered as a result. Despite this it is encouraging to see an increase in the number of contacts made on 10GHz and also that Wulfrun tried, albeit unsuccessfully, on 24GHz. G6DER had a system working on 5.7GHz even though he didn't hear anything all weekend!

There were the now statutory complaints about the East Coast stations not beaming inland enough, but as G8TFI commented the points per contact drops whenever they beam away from the continent and while there is more activity there than in the UK what is the incentive? Any suggestions?

Last year the idea of arranging the 10GHz Cumulatives to coincide with this contest was mooted, but very little feedback on this point was received. Does this mean that it is not wanted? Your comments, please, as it is difficult to know what is wanted unless you tell us.

Oh, and while you are writing, would it be better to put the 1296/2320 MHz Trophies on:

(a) the beginning of the October UHF contest?

b) the first weekend of June which would coincide with the continental contest but clash with HF NFD?

or c) a totally separate weekend without the benefit of any co-ordinated continental activity?

In the Overall event G6DER and Hadrabs and Tarts CG won their respective Single Operator and All Other Sections once again — well done.

The 432MHz Trophy (1951 Council Cup) winners were G8TFI/P the Sheppey CG. The 1.3GHz Trophy (VHF Contest Committee Cup) and the 2.3GHz Trophy (G6ZR Trophy) were won by The Northern Lights, G4XUM/P and G0EMG/P respectively.

Thanks once again to all the participants in this event and congratulations to the above mentioned and all the certificate winners. *G4NBS*

CONTESTS CALENDAR

RSGB HF CONTESTS

8 Oct	21/28MHz Phone (Aug89)
9 Oct	28MHz Cumulative (Aug89)
15 Oct	21MHz CW (Jul89)
17 Oct	28MHz Cumulative
25 Oct	28MHz Cumulative
28 Oct	Mollart Memorial Trophy HF DF Event (Oct89)
2 Nov	28MHz Cumulative
10 Nov	28MHz Cumulative
11 Nov	Club Calls Contest 'CCC' [nd] all modes & SWL (Sep89)
18,19 Nov	Second 1·8 MHz CW (Sep89)

1990

24 Feb, 1990	7MHz CW Contest (Aug89)
14 Jan, 1990	AFS Team Contest (Oct89)

RSGB VHF CONTESTS

7,8 Oct	432MHz-24GHz/IARU UHF/SHF
13 Oct	432MHz Cumulative (Oct89)
21 Oct	1·3/2·3GHz Cumulative (Oct89)
29 Oct	432MHz Cumulative (Oct89)
4,5 Nov	144MHz CW
6 Nov	1·3/2·3GHz Cumulative (Oct89)
14 Nov	432MHz Cumulative (Oct89)
22 Nov	1·3/2·3GHz Cumulative (Oct89)
30 Nov	432MHz Cumulative (Oct89)
3 Dec	144MHz Fixed & AFS & SWL
8 Dec	1·3/2·3GHz Cumulative (Oct89)
9 Dec	50MHz CW Contest (Oct89)
10 Dec	70MHz CW Contest (Oct89)

OTHER CONTESTS

11 Nov	Australian Ladies' Amateur Radio Association Contest (Aug89)
13 Jan, 1990	DYLC Mid-Winter Contest (Aug89)

First Tuesday each month 144MHz Scandinavian VHF/UHF/SHF Activity Contest (Jan89 VHF/UHF)
First Thursday each month 432MHz Scandinavian VHF/UHF/SHF Activity Contest (Jan89 VHF/UHF)
First Monday each month Microwave Scandinavian VHF/UHF/SHF Activity Contest (Jan89 VHF/UHF)

Dates of publication of rules in RadCom are shown in parentheses

1988 432 MHz CUMULATIVE CONTEST

Pos	Call	Score	Loc	All Others Best DX	6/10	22/10	7/11	23/11	9/12
1	GW4NGR/P	3000	83JA	532	371	938	707	515	407
2	G4S1V	2465	92TR	544	269	—	582	364	405
3	GD61CR/P	2040	74PD	456	237	38	—	—	492
4	G3RSD/P	1720	93VJ	—	96	215	447	277	271
5	G80OHM	G23	92AJ	535	—	234	242	171	148
6	G8Y25/A	365	91RQ	—	49	67	—	—	43

Pos	Call	Score	Loc	Fixed Best DX	6/10	22/10	7/11	23/11	8/12
1	G8HHI	3000	91OH	551	178	470	587	—	297
2	G81AT	2601	91TV	526	135	441	376	203	187
3	G8HKM	2371	01FT	468	—	—	474	134	260
4	G4PIO	2355	01MM	429	—	360	401	179	—
5	G4NPH	2128	02BI	398	150	—	386	197	184
6	G8CSY	1833	01BJ	446	61	306	160	—	57
7	G1KDF	1775	83NN	—	96	—	207	155	192
8	G8NEY	1718	81VK	508	110	144	301	168	135
9	G1HLT	1134	93KD	429	80	154	1676	104	104
10	G8YLW	739	01HI	453	11	103	161	48	—
11	G8JXV	689	91VE	289	37	39	11	71	76
12	G3JJZ	614	01AJ	310	46	98	115	55	60
13	G4LDR	514	91CD	422	29	38	141	22	55

Check logs gratefully received: G2DHV, G4NBS, G0FKY, GA1DF, G1NRM, BRS31976.

LOCAL AFFILIATED SOCIETIES AND CLUBS

The following list shows all local societies and clubs who are currently affiliated to the RSGB. The details of where the club meets, contact person etc were the best available at the time of going to press. If you have any corrections or additions to this list, please give them to your RSGB Regional Liaison Officer (RLO) whose details are shown at the start of every county. Each club is listed under the administrative county or Scottish region in which it regularly meets. For example the clubs which meet in Bromley whose postal county is Kent can be found in the Greater London section, likewise the Todmorden club is listed under West Yorkshire despite having a Lancashire address. Some affiliated societies, eg contest groups, do not hold formal meetings, and details as to where other clubs meet has proved impossible to obtain. These societies have therefore been listed under the county of their RSGB registered address.

Each county is assigned to an RSGB Zone and elects a Zonal Council Member. There are 7 Zones (A to G) and their Zonal Council Members are:

Zone A: (Northumberland, Tyne & Wear, Co Durham, Cleveland, North, South & West Yorkshire, North Humberside, Cheshire, Greater Manchester, Merseyside, Lancashire, Isle of Man, Cumbria)
Geoff Smith, G4AJJ, "Greenacres", Sawdon, Scarborough, North Yorkshire YO13 9DY. Tel: 0723-85845.

Zone B: (South Humberside, Derbyshire, Northampotonshire, Lincolnshire, Shropshire, Staffordshire, Leicestershire, Cambridgeshire, West Midlands, Hereford & Worcester, Warwickshire, Northamptonshire, Bedfordshire)
John Allen, G3DOT, 4 Philip Avenue, Waltham, South Humberside DN37 0QD. Tel: 0472-825899.

Zone C: (Norfolk, Suffolk, Essex, , Hertfordshire, Essex, Greater London, Surrey, Kent, East & West Sussex)
John Greenwell, G3AEZ, Eastfield, Beare Green, Dorking, Surrey RH4 5RW. Tel: 0306-77236.

Zone D: (Gloucestershire, Oxfordshire, Buckinghamshire, Avon, Wiltshire, Berkshire, Somerset, Cornwall, Devon, Dorset, Hampshire, Isle of Wight, Channel Islands)
Peter Chadwick, G3RZP, "Three Oaks", Braydon, Swindon, Wilts SN5 0AD. Home: 0666-860423. Work: 0793-518080.

Zone E: (Gwynedd, Clwyd, Dyfed, Powys, West, Mid & South Glamorgan, Gwent)
John Case, GW4HWR, 2 Abbey Close, Tyrhiw Taffs Well, Mid Glamorgan CF4 7RS. Tel:0222-810368.

Zone F: (Co Londonderry, Co Antrim, Co Tyrone, Co Fermanagh, Co Armagh, Co Down)
Terry Barnes, GI3USS, "White Gables", 95 Crawfordsburn Road, Bangor, Co Down, BT19 1BJ. Tel: 0247-473948.

Zone G: (Shetland, Orkney, Western Isles, Highland, Grampian, Tayside, Strathclyde, Cewntral, Fife, Lothian, Dumfries & Galloway, Borders)
Frank Hall, GM8BZX, 45 Priory Cottages, Lunanhead, Forfar, Angus DD8 3NR. Tel: 0307-67565.

AVON

Council Zone: D
RLO: Shaun O'Sullivan, G8VPG, 15 Witney Close, Saltford, Bristol, BS18 3DX. Tel: 0225-873098.

BATH & DARC, G4TMH. Meets 8.00pm on alternate Wednesdays in the month, at Englishcombe Inn, Englishcombe Lane, Bath. Details from Mr Eric H Otten, G4GEV, 1 High Street, Wellow, Bath, BA2 8QQ. Tel: 0225-832156.

BATH UNIVERSITY RC, G7ABU. Details c/o 38 Church Road, Peasedown St John, Bath.

BRISTOL ARC, G3TAD. Meets 7.30pm on Tuesdays, at St Aidens Scout HQ, Firtree Lane, St George, Bristol, BS5 8TZ. Details from Mr D J Gully, G4YOC, 46 Shellards Road, Longwell Green, Bristol, BS15 6DU.

BRISTOL RSGB GP. Meets on the last Monday of the month int the Small Lecture Theatre, University of Bristol, University Walk, Clifton, Bristol. Details from Tony Capel, G4ROX, 33 Romney Avenue, Lockleaze, Bristol BS7 9ST. Tel: 0272-513573.

BRISTOL 432MHz Repeater GP, GB3BS, GB3BP. Details from Mr S J Bailey, G4MCO, 50 Quantock Close, North Common, Warmley, Bristol, BS15 5UT.

BRUNEL TECH COLL, G5FS. Details from Phil Brouder, G3ZJH, Dept of Aerospace & Communication Engineering, Brunel Technical College, Ashley Down, Bristol BS7 9BU.

GORDANO ARG, G6GRG. Meets 8.00pm on 4th Thursday in the month, at The Ship, Redcliffe Bay, Portishead, Avon. Details from Mr P T Cooke, G6ETL, 42 Sunnymede Road, Nailsea, Bristol, BS19 1ES. Tel: 0272-855316.

HTV RC, G4HTV. Details from HTV, 470 Bath Road, Bristol, BS4 3HG.

MENDIP REPEATER GP, GB3UB, GB3UT, GB3VS, GB3WR. Details c/o P O Box 73, Radstock, Bath BA3 3GP.

NORTH BRISTOL ARC, G4GCT. Meets 7.00pm on Fridays, at Self Help Enterprise 7, Braemar Close, Northville, Bristol. Details from Mr A V Booth, G4YOO, 656 Southmead Road, Filton Park, Bristol, BS7 8QO. Tel: 0272-690404.

SEVERNSIDE TELEVISION GROUP, GB3ZZ. Details from Shaun O'Sullivan, G8VPG, 15 Witney Close, Saltford, Bristol, BS18 3DX. Tel: 0225-873098.

SHIREHAMPTON ARC, G4AHG. Meets 7.30pm on Fridays, at Twyford House, Lower High Street, Shirehampton, Bristol, BS11 0DE. Details from Mr R G Ford, G4GTD, 2 Jersey Avenue, St Annes, Bristol, BS4 4RA. Tel: 0272-770504.

SOUTH BRISTOL ARC, G4WAW. Meets 7.30pm on Wednesdays, at Whitchurch Folk House, East Dundry Road, Bristol. Details from Mr L F Baker, G4RZY, 62 Court Farm Road, Whitchurch, Bristol, BS14 0EG. Tel: 0272-834282.

THORNBURY & DARC, G4ABC. Meets on alternate Wednesdays at 7.30pm, United Reform Church Hall, Rock Street, Thornbury, Bristol. Details from Mr J A Jones, G8AZT, 9 Queens Walk, Thornbury, Bristol, BS12 1SR. Tel: 0454-416381.

WESTON-SUPER-MARE ARS, G4WSM. Meets 7.30pm on 1st and 3rd Mondays in the month, at The Woodspring Hotel, High Street, Weston-super-Mare, Avon. Details from Mr J H Wills, G0KBT, 17 Moor Lane, Willow Grange, New Bristol Rd, Worle, Weston-super-Mare, Avon, BS22 0SJ. Tel: 0934-514429.

BEDFORDSHIRE

Council Zone: B
RLO: John S Smith, G4KJJ, 30 Rookery Close, St Ives, Cambridgeshire PE17 4FX. Tel: 0480-68330

BEDFORD & DARC, G3WTP. Meets 1st and 3rd Thursdays in the month, at Allen's Club, Queens Park, Bedford. Details from Mr C P Lenn, G4VHF, 25 Red Lion Close, Cranfield, Bedford, MK43 0JA. Tel: 0234-751763.

BEDFORD MODERN SCHOOL, G1BYT. (This club is for school pupils only). Meets at Bedford Modern School, Manton Lane, Bedford, MK41 7NT. Details from Mr N E Kinselley.

MID BEDS CONTEST ASSN, G4MBC. Details from Mr M J Downs, G4ALR, 95 High Street, Henlow, Beds.

PARALLEL LINES CONTEST GP, G4LIP. Details from Mr M H Turner, G4PCS, 35 Culverhouse Road, Luton, LU3 1PY.

SHEFFORD & DARS, G3FJE. Meets 8.00pm on Thursdays, at Church Hall, Silsoe Road, Shefford, Beds. Details from Mr A R Little, G4PSO.

BERKSHIRE

Council Zone: D
RLO: Dave Chislett, G4XDU, Hilltops, 2a St Marks Road, Maidenhead, Berks SL6 6DA. Home: 0628-25720, work: 01-977 3252 ext 2267/2268.

ABINGDON CONTEST GP, G4UHF. Details from Mr Alan Davidson, G4PSU, 21 Cairngorm Road, Thatham, Newbury, Berks, RG13 4FT.

ARIEL RADIO GP, G3SWB. Details from 57 St John's Road, Caversham, Reading.

BRACKNELL ARC, G4BRA, G6BRA. Meets 8.00pm on 2nd Wednesday in the month, at Coopers Hill Community Centre, Bracknell, Berks. Details from Mr David Sugden, G4CGS, 322 Nine Mile Ride, Wokingham, Berks, RG11 3NN. Tel: 0734-733140.

BRITISH AEROSPACE S & SC, G0BAE. Details from Dynamics Group, Downshire Way, Bracknell, Berks, RG12 1QL.

BURNHAM BEECHES RC, G3WIR, G6WIR. Meets 8.00pm on 1st and 3rd Mondays in the month, at Haymill Youth & Community Cen, 112 Burnham Lane, Slough, SL1 6LK. Details from Eileen Chislett, G6EIL, "Hilltops", 2a St Marks Road, Maidenhead, Berks, SL6 6DA. Tel: 0628-25720.

MAIDENHEAD & DARC, G3WKX. Meets 7.30pm on 1st Tuesday and 3rd Thursday in the month, at Red Cross Hall, The Crescent, Maidenhead, Berks. Details from Mr Neil Savin, G8XYN, 7 Bannard Road, Maidenhead, Berks, SL6 4NG. Tel: 0628 25952.

NEWBURY & DARS, G3WOI. Meets 7.30pm on 2nd Thursday in the month. Details from Mr Mike Fereday, G3VOW, Spindlewood, Stoney Lane, Newbury, Berks, RG16 9HQ. Tel: 0635-43048.

NORTH HAMPSHIRE REPEATER GP, GB3AW. Details from Mr Alan Wood, Wood & Douglas, Unit 13, Youngs Industrial Est, Aldermaston, Reading, RG7 4PO.

RACAL MOBILCAL & TACTICOM ARG, G3XOX. (Open to Racal employees only). Details from 464 Basingstoke Road, Reading, RG2 0RY.

READING & DARC, G3ULT. Meets 8.00pm on the 2nd and 4th Thursdays in the month at the Caversham Conservative Club, Mill St, Gosbrook Road, Lower Vaversham, Reading. Details from Mr Mike Anthony, G4THN, 9 Paice Green, Wokingham, Berks RG11 1YN. Tel: 0734-774042.

READING SCHOOL ARC, G4RSC. Details from Reading School, Erleigh Road, Reading, RG1 5LW.

READING TELEPHONE AREA RC, G4LNV. Details from 40 Broad Lane, Upper Bucklebury, Reading, RG7 6QJ.

BORDERS

Council Zone: G
RLO: Ian Wilson, GM4UPX, 30 Howdenburn Court, Jedburgh, Roxburgh TD8 6JP. Tel: 0835-62656.

GALASHIELS & DARC, GM4YEQ. Meets 7.30pm on Wednesdays, at Focus Centre, Galashiels. Details from Mr John Campbell, GM0AMB, 9 Brunton Park, Bowden, Melrose.

KELSO ARS, GM0KEL, GM4KHS. Meets 7.30pm on Mondays, at Abbey Centre, Kelso, Roxburghshire. Details from Mr Ian H Wilson, GM4UPX, 30 Howdenburn Court, Jedburgh, Roxburghshire, TD8 6JP. Tel: 0895-62656.

BUCKINGHAMSHIRE

Council Zone: D
RLO: Ron Ray, G3NCL, Flat 4 Victoria Villas, Gladstone Road, Chesham, Bucks HP5 3AD. Tel: 0494-776420

APPRENTICE TECH C, G4BWD. Details from Apprentice TC Amateur Radio Club, Civil Aviation Authority - STE, Bletchley Park, Milton Keynes, MK3 6EF.

AYLESBURY VALE REPEATER GP, GB3VA. Meets on the 2nd Wednesday in the month at The Bell, Hardwick, Aylesbury. Details from Mr Mike Marsden, G8BQH, Hunters Moon, Buckingham Road, Hardwick, Aylesbury, Bucks, HP22 4EF. Tel: 0296-641783.

AYLESBURY VALE RS, G4VRS. Meets 8.00pm on 1st and 3rd Wednesdays in the month, at Harwick Village Hall, Aylesbury, Bucks. Details from Mr Martin Baker, G0GMB, 25 Pentlands, Hilltop, Stony Stratford, Milton Keynes, MK11 2AF. Tel: 0908-260088.

CHESHAM & DARS, G3MDG. Meets 8.00pm on Wednesdays, at Stable Loft, The Bury Farm, Pednor Road, Chesham, Bucks. Details from Martin Bird, G1DZO, 18 South Road, Amersham, Bucks, HP6 5LU. Tel: 0494-727589.

CHILTERN ARC, G3CAR, G8CAR. Meets 8.00pm on 2nd and 4th Wednesdays in the month, at Sir William Ramsey School, Rose Avenue, Hazelmere, High Wycombe, Bucks. Details from Ron Ray, G3NCL, Flat 4 Victoria Villas, Gladstone Road, Chesham, Bucks HP5 3AD. Tel: 0494-776420

MID-THAMES DF C, G4MDF. Meets at Clayton Arms, Marlow, Bucks. Details from Trevor Gage, G1MPJ, Lowfield House, Bolter End Lane, Lane End, High Wycombe HP14 3NB. Tel:0494-881842.

MILTON KEYNES & DARS, G3HIU. Meets 2nd Monday in the month, at The Meeting Place, Hodge Lea, North Milton Keynes. Details from Tony Burt, G6WXM, 17 Western Road, Wolverton, Milton Keynes, MK12 5AY. Tel: 0908-316435.

RAF HALTON AR, E & CC, G4SQC. Meets 8.00pm on Thursdays, at Building 168, RAF Halton, Aylesbury, Bucks. Details from Sqn Ldr Ted Turk, RAF IPTM, Halton, Aylesbury, Bucks, HP22 5PG. Tel: 0296-623535 Ex 561.

CAMBRIDGESHIRE

Council Zone: G
RLO: See under Bedfordshire

CAMBRIDGE & DARC, G2XV, G8EVY. Meets 7.30pm Fridays during term time, at Visual Aids Room, Coleridge Community College, Radegund Road, Cambridge. Details from Mr Brian Davy, G4TRO, 12 Millington Road, Cambridge, CB3 9HP. Tel: 0223-353664.

CAMBRIDGE UNIV WIRELESS SOC, G6UW. Meets Society meets only during term time. Details from Catherine Carr, G6OQA, c/o Selwyn College, Cambridge.

CAMBRIDGESHIRE REPEATER GP, GB3PI. Details c/o New House, Birdbush Avenue, Saffron Walden, Essex.

GREATER PETERBOROUGH RC, G4EHW. Meets 7.30pm on 4th Thursday in the month, at Southfields Junior School, Stanground, Peterborough. Details from Mr S Meadows, G1UGA, 134 Medeswell, Orton Malborne, Peterborough, Cambs, PE2 0PD Tel: 0733-230088.

HUNTINGDONSHIRE ARS, G0HSR. Details c/o D R Massey, 63 West End, Brampton, Huntingdon, Cambs.

MARCH & DRAS, G3PMH. Meets 7.30pm on Tuesdays, at Room 7, Neale Wade Adult Ed Centre, Station Road, March, Cambs. Details from Mr J Braithwaite, G3PWK, 10 Lawn Lane, Little Downham, Ely, Cambs, CB6 2TS.

NORTH CAMBRIDGESHIRE RG, GB3WI. Details from Mr J P Arnold, G4NPH, 2 Duck Lane,

Haddenham, Ely, Cambridge, CB6 2UE.
PYE TELECOMMS ARG, G3PYE. Details from Mr D B Delanoy, St Andrews Road, Cambridge, CB1 4DW.
RAF WYTON ARC, G3MMH. Meets at RAF Wyton, Huntingdon, Cambs.
S BUCKS CONTEST GROUP, G4NXO. Details from Mr A J Collett, 10 Quince Road, The Limes, Harwick, Cambridge, CB3 7XJ.
WISBECH R & EC, G8NED. Meets 7.30pm on Thursdays, at RAF Assn Club, Astral House on Old Market, Wisbech, Cambs. Details from Mr L N Fennelow, G4ODH, 39 Clarence Road, Wisbech, Cambs, PE13 2ED.

CENTRAL

Council Zone: G
RLO: B J Waddell, GM4XQJ, "Carsemount", 3a Polmont Road, Laurieston, Falkirk FK2 9QQ.
STIRLING & DARS, GM4TMS. Meets every Thursday evening at 7.30pm, Bandeath Industrial Estate, Throsk, Nr. Stirling. Details from Mr Doug Fleming, 6 The Clachan, Ashfield, Dunblane, FK10 2YL. Tel: 0786-824207.

CHESHIRE

Council Zone: A
RLO: G R Morris, GW1ATZ, 6 Kent Avenue, Shotton, Deeside, Clwyd CH5 1BE. Tel: 0244-818252.
CHESTER & DARS, G3GIZ, G8GIZ. Meets 8.00, 2nd and 4th Tuesdays in the month, at Chester RUFC, Hare Lane, Vicars Cross, Chester. Details from Mr D G C Hicks, G6IFA, Beggars Roost, 12 Toll Bar Rd, Cristleton, Chester, CH3 5QX. Tel: 0244-336639.
CONGLETON RC, G0CRS. Meets 8.00pm on 1st Wednesday in the month, at The Library, Congleton, Cheshire. Details from Mr R A Turner, G6OKN, 53 Queens Drive, Sandbach, Cheshire, CW11 9BN. Tel. 0270-765005.
ELLESMERE PORT & DARS, G3CSA. Meets 7.30pm on alternate Tuesdays, at The Grosvenor Hotel, Ellesmere Port, South Wirral. Details from Mr T Bromsgrove, G4STZ, 53 Dublin Croft, Great Sutton, Wirral, L66 2TD. Tel: 061-339 7201.
MACCLESFIELD & DARS, G4MWS, G1MWS. Meets 8.00pm on Tuesdays, at The Fermain Club, Oxford Road, Macclesfield, Cheshire. Details from Mr J R Thornley, G1NUS, 270 Hurdsfield Road, Macclesfield, Cheshire, SK10 2PN. Tel: 0625-24534.
MID-CHESHIRE ARS, G3ZTT. Meets 7.30pm on Wednesdays, at The Cotebrook Village Hall, Cotebrook, Taporley, Cheshire. Details from Mrs E P Fraser, G1SIB, 9 Hunters Hill, Kingsley, Warrington, WA6 8DE. Tel: 0928-88153.
SOUTH CHESHIRE ARS, G6TW, G6TWB. Meets 8.00pm on 2nd Monday in the month, at LMR Sports Club, Goddard Street, Crewe. Details from Mr C R Wiseman, G1PUV, Whiterock, 14 Whitendge Road, Whitehill, Kidsgrove, Stoke-on-Trent, ST7 4TH. Tel: 07816-73185.
UKFM GP WESTERN, GB3MP.
WARRINGTON ARC, G4CDA, G6WRC. Meets 8.00pm on Tuesdays, at Grappenhall Community Centre, Bell House Lane, Warrington. Details from Mr Gordon Carter, G4SCI, 40 Havisham Close, Birchwood, Warrington. Tel:0925-823451.
WIDNES & RUNCORN ARC, G0FWR.

CLEVELAND

Council Zone: A
RLO: Malcolm Brass, G4YMB, 11 Leaholm Way, Guisborough, Cleveland TS14 8LN. Tel: 0287-38119.
STOCKTON & DARG, G4XXG. Meets Wednesday evenings, at Billingham Community Centre, Billingham, Cleveland. Details from Mr G Noble, G0EJX, 2 Kinderton Grove, Stockton-on-Tees, Cleveland, TS20 1QR. Tel: 0642-555923.
TEESIDE RG, GB3TS. Details from Mrs P M Bland, G8MBK, 5 Belgrave Drive, Normanby, Middlesbrough, TS6 0SQ.

CLWYD

Council Zone: E
RLO: Peter Higgs, GW4IGF, Oulton, Parkside, Rossett, Wrexham, Clwyd LL12 0BP. Tel: 0244-570212.
ALYN & DEESIDE, GW0GZR. Meets 8.00pm on alternate Wednesdays, at British Steel Sports & Social Club, Family Room, Rowley's Drive, Shotton, Deeside. Details from Mrs Pauline Coburn, GW1STJ, 54 Queensway, Hope, Wrexham, CLwyd, LL12 9PE. Tel: 0978-760702.
CONWY VALLEY ARC, GW6TM. Meets 8.00pm on 1st Thursday in the month, at The Studio, Penrhos Road, Colwyn Bay, Clwyd. Details from Mervyn Jones, GW4NNL, 72b Princes Drive, Colwyn Bay, Clwyd, LL29, 8PW. Tel: 0492-530725.
DELYN RC, RS91677. Meets 8.00pm on alternate Tuesdays, at Daniel Owen Centre, Mold, Clwyd. Details from Mr Steve Studdart, GW7AAV, 33 Linden Avenue, Connahs Quay, Deeside, Clwyd, CH5 4SN. Tel:0244-819618.
RHYL & DARC, GW4ARC. Meets 7.30pm on 1st and 3rd Mondays in the month, at 2nd Rhyl Scout HQ, Vale Road, Rhyl, Clwyd. Details from Mr Mike Drew, GW0HWK, Warden's Flat, Llysfasi, Llysfasi Coll of Agriculture, Ruthin, Clwyd, LL15 2LB. Tel: 097888-621 or 0978-755822.
RAF SEALAND ARC, GW4RAF, GW8ITZ. Meets most lunchtimes for RAF & MoD personnel. Details from Vince Priamo, c/o Radio Club, No 30 MU, RAF Sealand, Deeside, Clwyd, CH5 2LS. Tel: 0244-812331 Ext 354.
WREXHAM ARS, GW4WXM. Meets 7.30pm on 1st & 3rd Tuesdays in the month, at 'Friends Meeting House', Holt Road, Wrexham. Details from Mr Peter Higgs, GW4IGF, 'Oulton', Parkside, Rossett, Wrexham, Clwyd, LL12 0BP. Tel: 0244-570212.

CORNWALL & ISLES OF SCILLY

Council Zone: D
RLO: Bert Hammett, G3VWK, "Rosehill", Ladock, Truro TR2 4PQ. Tel: 0726-882758.
CORNISH RAC, G4CRC. Meets 1st Thursday & 3rd Thursday, at Perranwell Village Hall, Perranwell, Nr Truro, 2nd Monday in the month, at Treleigh Church Hall, Treleigh, Redruth, Cornwall. Details from Mr Norman Pascoe, G4USB, 'Westwynds', Loscombe Lane, Four Lanes, Redruth. Tel: 0209-212314.
ENGLISH CHINA CLAY RC, G0ECC. Meets Monday evenings, at The Laboratories, ECC Pontewan Road, St Austell, Cornwall. Details from Mr M C Porter, 127 St Mary's Road, Biscovery, Par, Cornwall, PL24 2HA. Tel:072681-3935.
MOUNT'S BAY ARG, RS91400. Meets irregularly. Details from Mr C B Stoakes, G0BBA, Skidden House Hotel, Skidden Hill, St. Ives, Cornwall, TR26 2DU.
NEWQUAY & DARS, G4ADV. Details from Mr Stanley Elworthy, G1ZNC, 17 Castle Hill Court, Cross Lane, Bodmin, Cornwall. Tel: 0208-78406.
SALTASH & DARC, G4GXK. Meets 1st and 3rd Fridays in the month, at Toc H Hall, Warraton Road, Saltash, Cornwall. Details from Mr K Hale, G0AKH, 58 St Stephens Road, Saltash, Cornwall, PL12 4BJ. Tel:07555-3277.

CO ANTRIM

Council Zone F
RLO: Belfast: Gordon Curry, GI6ATZ, 28 Beechill Park South, Belfast BT8 4PB. Tel: 0232-795307. Co Antrim: please refer to Zone F Council Member.
BALLYMENA, GI3FFF. Meets 8.00pm on Thursdays, at 70 Nursery Road, Gracehill, Ballymena, Co Antrim. Details from Mr J P Clarke, GI4HCN, 5 Harberton Park, Ballymena, Co Antrim, BT43 6NF.
BELFAST RSGB GROUP. Meets 3rd Wednesday in the month at 8.00pm at Belmont road. Details from G Curry, GI6ATZ. Tel: 0232-795307.
CARRICKFERGUS ARG, GI0LIX. Details c/o Mr H. K. Knocker, 27 Loughview Drive, Carrickfergus, Co Antrim.
CITY OF BELFAST YMCA, GI6YM. Meets 7.00pm Tuesdays, at Club Room, 4th Floor YMCA, Wellington Place, Belfast, BT1.
COLERAINE & DARS, GI4NRQ.
EAST ANTRIM ARC, GI4KKK. Meets at 8.00pm on 2nd Wednesday in the month at Torrance Memorial Hall, Doagh, Co Antrim. Details from Mr H W B Davidson, GI4BTG, 55 Ballyduff Road, Newtownabbey, Co Antrim, BT36 6PA. Tel: 02313-49277.
LAGAN VALLEY ARS, GI4GTY. Meets 8.00pm on 2nd Wednesday, at Harmony Hill Arts Centre, Harmony Hill, Lisburn, Co Antrim. Details from Mr P Harbinson, GI4NEZ.
LARNE & DARS, GI4PHA. Meets 8.00pm on 1st Wednesday alternate months (starting January), at Curran Bowling Club, Curran Road, Larne, Co Antrim. Details from Mr W Adamson, GI4CPP, 12 Greenland Walk, Ferris Park West, Larne, Co Antrim, BT40 1NJ. Tel: 0574-75407.

CO ARMAGH

Council Zone: F
RLO: (also for Northern Ireland South) Danny Campbell, GI4NKD, 109 Drumgor Park, Craigavon, Co Armagh BT65 4AH. Tel: 0762-42620.
ARMAGH & DUNGANNON ARC, GI0ADD. Meets 8.00pm on 2nd Wednesday of the month, at Co Armagh Golf Club, Newry Road, Armagh. Details from J A Murphy, Tel: 0861-522153.

CO DOWN

Council Zone: F
RLO: Please see under Co Armagh, or Co Antrim (Belfast)
BANGOR & DARC, GI3XRQ. Meets 8.00pm on 1st Friday in the month, at Bangor Rugby Club, Bangor, Co Down. Details from Mr J T Barnes, GI3USS, 95 Crawfordsburn Road, Bangor, Co. Down, BT19 1BJ. Tel: 0247-473948.
BELFAST ROYAL ACADEMY RADIO CLUB, GI7DAW. Details c/o 164 Ardenlee Avenue, Belfast.
MID-ULSTER ARC, GI3VFW. Meets 3.00pm on 2nd Sunday in the month, at The Guide Hall, Castle Hill, Gilford, Co Down. Details from Mr J Lappin, GI1YGS, 46 Grange Road, Kilmore, Armagh, Co. Armagh, BT61 8NX. Tel: 0762-851179.

CO DURHAM

Council Zone: A
RLO: Please see under Cleveland
BISHOP AUCKLAND RAC, G4TTF. Meets Thursday evenings, at Travellers Rest Public House, Evenwood, Bishop Auckland, Co Durham. Details from Mr P Fawcett, G0FBK, 7 Albert Hill, Bishop Auckland, Co Durham, DL14 6EH. Tel: 0388-606819.
DARLINGTON & DARS, G4ZVH. Meets 7.30pm on Fridays, at Hurworth Grange, Hurworth, Darlington, Co Durham. Details from Mr A Marwood, G0DTV, 5 Mulhein Close, Darlington, CO. Durham, DL3 0UJ.
DERWENTSIDE ARS, G4PFQ. Meets Wednesday evenings, at The Steel Club, 36 Medomsley Road, Consett, Co Durham. Details from Mr D Plumbridge, G3KMG, Rose Cottage, Castleside, Consett, Co Durham, DH8 9AW. Tel: 0207-504198.
DURHAM ARS, G4VTV. Meets Friday evenings, at Durham Golf Club, Mount Pleasant, Durham. Details from Mr P Hedley, G0AGG, 7 Midhill Close, Langley Park, Co Durham, DH7 9TY. Tel: 091-373 1487.
EASINGTON ARS, G4APN, G6APN. Meets Thursday evenings, at Southside Social Club, Southside, Easington Village, Peterlee, CO. Durham. Details from Mr T Luxmore, G3AWL, Carnbrag, Stockton Road, Easington, CO. Durham. Tel: 091-527 0153.
GREAT LUMLEY R & ES, G4EUZ. Meets Wednesday evenings, at Community Centre, Great Lumley, Co Durham. Details from Mr K Watts, G4MSF, 7 Turfside, Leam Lane Estate, Gateshead, Tyne & Wear, NE10 8EX. Tel: 091-469 3955.
TYNE & WEAR RG, GB3TW. Details from Mr W Gleave, G8YWK, 8 Abbey Road, Durham, DH1 5DQ. Tel:0385-45425.

CO FERMANAGH

Council Zone: F
RLO: Please see under Co Armagh
LOUGH ERNE ARC, RS51643. Meets 8.00pm on 3rd Thursday in the month, at Railway Hotel, Enniskillen, Co Fermanagh. Details from Mrs V Graham, GI1BEW, Cavan Carragh, Lisbellaw, Co Fermanagh, BT74 6BN.

CO LONDONDERRY

Council Zone: F
RLO: (also for Northern Ireland North) Post vacant, please refer to Zone F Council Member.
NORTH WEST OF IRELAND ARS, GI3CFH. Meets 8.00pm on 1st Monday in the month, at Prehen Municipal Boat House, Victoria Road, Londonderry. Details from Mr D I Fulton, GI4OUN, 21 Alder Road, Bready, Strabane, Co Tyrone, BT82 0DQ. Tel: 0504-84529.

CO TYRONE

Council Zone: F
RLO: Please see under Co Londonderry
WEST ULSTER ARC, GI4OMA.

CUMBRIA

Council Zone: A
RLO: M Gibbings, G3FDW, 5 Meadowbank Lane, Grange over Sands, Cumbria LA11 7AT. Tel: 04484-2435.
ANGLO-SCOTTISH REPEATER GP, GB3AS. Meets 1st Wednesday in the month, at Grovenor House Hotel, Carlisle. Details from Mr Robbie Adamson, GM6KWU, 29 South Square, Newcastleton, Roxburghshire, TD9 0QE.
BORDER TV LTD ARC, G6BTV. (Open only to employees). Details from Amateur Radio Club, Border TV Ltd, Television Studios, Carlisle.
BBC SKELTON ARC, G3ZSK. (Open only to BBC employees). Details from BBC Transmitting Station, Skelton Pastures, Skelton, Penrith, Cumbria.
CARLISLE & DARS, G4ARS. Meets 7.00pm on Mondays, at The Scout HQ, Trinity School, Carlisle. Details from Mr J A Ennis, G3XWA, 30 Hillcrest Avenue, Carlisle, CA1 2QJ. Tel: 0228-27463.
EDEN VALLEY RS, G0ANT. Details from Mr M J Rigby, G4FUI, 35 Maple Drive, High Carleton, Penrith, Cumbria, CA11 8TU. Tel: 0768-66728.
LAKELAND FELLS ARRG, GB3LF. Details c/o Holly Trees, Church Close, Levens, Kendal, Cumbria.
RAF CARLISLE ARS, G3USQ.
SOLWAY RC, G4BBX. Meets Wednesday evenings, at Maryport Ed Settlement, High Street, Maryport, Cumbria. Details from Mr D G Rayner, G0AFP, 55 Mayo Park, Cockermouth, Cumbria, CA13 0BJ. Tel: 0900-826461.
WINDSCALE ARES, G3WIN.
WRAY CASTLE ARS, G1WCC. Meets at Wray Castle Coll of Marine Elc, Ambleside, Cumbria.

DERBYSHIRE

Council Zone: B
RLO: Post vacant, please refer to Zone B Council Member.
ALFRETON & DARC, G0CPO, G1PWH. Meets 8.00pm on Mondays, at ECP Social Club, Carnfield Hall, Alfreton, Derbyshire. Details from Mr Phil Walters, G6YAL, 6 Victoria Street, Alfreton, Derbyshire DE5 7GS. Tel: 0773-835546.
BOLSOVER ARS, G4RSB. Meets 8.00pm on Wednesdays, at Black Bull Hotel, Bolsover, Derbyshire. Details from Jack Poxon, G4UPA, 22 Sandhills Road, Bolsover, Chesterfield, Derbyshire, S44 6EY. Tel: 0246-824924.
BUXTON ARS, G4SPA. Meets 7.30pm on 2nd and 4th Wednesdays, at Haddon Hall Hotel, London Road, Buxton. Details from Derrick Carson, G4IHO, 28 Harris Road, Harpur Hill, Buxton, Derbyshire SK17 9JS.
DERBY & DARS, G2DJ, G3ERD. Meets 7.30, Wednesdays, at 119 Green Lane, Derby. Details from Mr Kevin Jones, G4FPY, 20 Pinecroft Court, Oakwood, Derby DE2 2LL. Tel: 0332-669157.
DERBYSHIRE FIRE SERVICE ARS, G0DFS. (Open only to fire service members).
DERBYSHIRE HILLS CONTEST GP, G4ZAP.
GLOSSOP & DARG, G0GLO. Meets Last Tuesday in the month , at Nags Head Hotel, Charlestown, Glossop, Derbyshire. Details from Mr G Sims, G4GNO, 85 Surrey Street, Glossop, Derbyshire, SK13 9AJ. Tel: 04574-5810.
EVETS COMMUNICATION LTD ARC, G6ECL. Details c/o 121-125 Green Lane Derby.
NOTTS & DERBY BORDER ARC, G4NID. Meets 7.30pm on Tuesdays, at Marlpool United Reform Church, Chapel Street, Marlpool, Ilkeston, Derbyshire. Details from Graham Bromley, G4UTN, 46 Independant Hill, Alfreton, Derbyshire DE5 7DG. Tel:0773-834308.
NUNSFIELD HOUSE ARG, G3EEO. Meets 7.45pm on Friday, at Nunsfield House, Bolton Lane, Alvaston, Derby. Details from Mr J M Robson, G4PZY, 31 Melton Avenue, Littleover, Derby, DE3 7FY. Tel: 0332-767994.
TOR AMATEUR RADIO ASSOCIATION, G0KPT. Meets at 7.30 pm every Tuesday at Grehound Hotel, Cromford, Nr. Matlock, Derbyshire. Details from John C. Kelly, G0HMZ, 7 Collingwood Crescent, Matlock, Derbyshire DE4 3TB.

DEVON

Council Zone: D
RLO: Dave Livsey, G4BQH, 18 Tollards Road, Countess Wear, Exeter EX2 6JJ. Tel: 0392-79876.
APPLEDORE & DARC, RS91376.
AXE VALE ARC, G8CA. Meets 1st Friday in the month Details from Mr B Newland, G3VW, Ham House, Lyme Road, Uplyme, Lyme Regis, Dorset. Tel: 02974-5282.
BOTCHILL HOUSE TST ARS, G0EMU.
BRITANNIA RC, RS38113. (Open to college staff + students only). Meets irregularly during term time. Details from Britannia RN College, Dartmouth, Devon. Tel: 08043-2141 Ex 371.
DARTMOOR RC, G1RCD. Meets irregularly due to contest interest. Details from Mr C R Brown, 12 Hessary Terrace, Princetown, Yelverton, Devon, PL20 6RB.
EXETER ARS, G4ARE. Meets 2nd Monday in the

month, at Community Centre, St David's Hill, Exeter. Details from Mr R J Donno, G3YBK, 6 Mincinglake Road, Exeter, EX4 7EA. Tel: 0392-78710.

EXMOOR RC, G4SSS. Meets at South Moulton Comp School, Old Alswear Road, South Moulton, Devon, EX36 3HO. Details from Mr P Dixon, c/o South Moulton Comp School, Old Alswear Road, South Moulton, Devon, EX36 3HO.

EXMOUTH ARC, G4HOB. Meets alternate Wednesdays, at 6th Exmouth Scout Hut, Marpool Hill, Exmouth. Details from Mr M Newport, G1GZG, 30 Maristow Avenue, Exmouth, Devon, EX8 3JF.

KELLY COLLEGE ARS, G4COF. (Open only to College staff and pupils). Details from Mr R Hooper, c/o Kelly College, Tavistock, Devon, PL14 0HZ. Tel: 0822-2081.

NORTH DEVON RC, RS37569. Meets 1st Wednesday in the month, at Microcentre, Unit 1, Barbican Industrial Estate, Barnstable, Devon. Details from Mr C B Searle, "Brynor", Great Torrington, Devon, EX38 7EN. Tel: 0805-23764.

PLYMOUTH CFE RC, G4VKO. (Open only to college students). Details from Mr N Pearce, Students Union, Kings Road, Devonport, Plymouth, PL1 5OR. Tel: 0752-264714.

PLYMOUTH POLYTECHNIC ARS, G3TCP. (Visitors welcome by prior arrangment). Meets irregularly during term time, at Students Union, Plymouth Poly, Drake Circus, Plymouth, PL4 8AA. Details from the Secretary, c/o Students Union, Plymouth Polytechnic, Drake Circus, Plymouth, PL4 8AA. Tel: 0752-264654.

PLYMOUTH RC, G3PRC.

SIDMOUTH & DARS, G0AXC.

SOUTH DEVON ARC, G4SSD.

TIVERTON RC, G4TSW. Details c/o P O Box 3, Tiverton, Devon.

TORBAY ARS, G3NJA. Meets alternate Thursdays & Fridays + 4th Sat in the month, at ECC Social Club, Highweek, Newton Abbot, Devon. Details from Mr D. Webber G3LHJ. 43 Lime Tree Walk, Milber, Newton Abbot, TQ12 4LF. Tel: 0626-54437

DORSET

Council Zone: D

RLO: Post vacant, please refer to Zone D Council Member.

BOURNEMOUTH RS, G2BRS, G1BRS. Meets 8.00pm on 1st and 3rd Fridays in the month, at Kinson Community Centre, Kinson, Bournemouth, Dorset. Details from Mr Vince Coombs, G4DJG, 10 Maxwell Road, Winton, Bournemouth, Dorset. BH9 1DJ. Tel: 0202-526793.

FLIGHT REFUELLING ARS, G4RFR, G6FSR, G0FRR. Meets 7.30 pm on Wednesdays and Sundays, at Flight Refuelling Social Club, Merley, Wimborne, Dorset. Details from Mr John Goodier, G6AZV, 61 Martin Close, Creekmoor, Poole, Dorset, BH17 7XS. Tel: 0202-602362.

PLESSEY (CHRISTCHURCH) ARS, RS88206. Meets 8.00pm on 2nd Tuesday in the month for main meetings: open every Thursday for other activities at Plessey Sports & Social Club, Grange Road, Somerford, Dorset. Details from Mr Simon Smith, G0FOZ, 14 Cadnay Road, New Milton, Hants BH25 5XA. Work: 0202-404658, home: 0425-618860. Note: this club is not restricted to Plessey employees - all are welcome.

POOLE RAS, G4PRS. Meets 7.30pm on last Friday in the month, at Commanders House, Constitution Hill Road, Poole, Dorset. Details from Mr V Cotton, G3BCI, 45 Branksome Hill Road, Bournemouth, Dorset, BH4 9LF. Tel: 0202-760231.

SOUTH DORSET REPEATER GROUP, GB3SD, GB3DP, GB7SD. Details from Mr Geof Watts, G0EVW, 46 Links Road, Westham, Weymouth, Dorset, DT4 0PE.

SOUTH DORSET RS, G3SDS, G8SDS. Meets 7.30pm on 1st Tuesday in the month, at The Wessex Stadium, Granby Industrial Estate, Weymouth. Details from Mr Konrad R Menzel, G0FIT, 8 Higher Bockhampton, Dorchester, Dorset, DT2 8QJ. Tel: 0305-67596.

WESSEX AMATEUR WIRELESS CLUB, G1WAW. No regular meeting are held, but details can be obtained from Mr Ken Powell, G1NCG, 17 Shipstal Close, Hamworthy, Poole, Dorset, BH16 5AU. Tel: 0202-666050.

DUMFRIES & GALLOWAY

Council Zone: G

RLO: Post vacant, please refer to Zone G Council Member.

DUMFRIES & GALLOWAY RA & EC, GM4HAA. Meets 7.30pm on 1st and 3rd Monday in the month, at Cargenholm Hotel, New Abbey Road, Dumfries. Details from Mr John Young, GM6LYJ, 22 Hallmeadow Place, Annan, Dumfries, DG12 6BZ. Tel: 0387-54056.

MAXWELLTOWN ARC, GM0AEE. Meets 8.00pm on 1st and 3rd Wednesdays in the month, at club premises at rear of Lincluden Inn, Abbey Lane, Lincluden, Dumfries. Details from Mr Crosbie D S Rodgers, GM4NNC, 5 Elder Avenue, Lincluden, Dumfries. DG2 0NL.

WIGTOWNSHIRE ARC, GM4RIV. Meets 7.30pm on Thursdays, at Community Centre, Lewis Street, Stranraer, Wigtownshire. Details from Mr Gerry Maxwell, Northbrae, Brookfield Crescent, Stranraer, DG9 0HY. Tel: 0776-2876.

DYFED

Council Zone: E

RLO: (also for West Glamorgan) W M David, GW4WMD, "Sirmione", Freestone Cross, Cressella, Kilgetty, Dyfed SA68 0SX. Tel: 0646-65168.

ABERPORTH (DYFED) ARS, GW4SZV. Meets 7.00pm on Wednesdays, at Building No 17, The Airfield, Aberporth, Dyfed. Details from Mr Roy Davies, Hafon Lady Road, Blaenporth, Cardigan, Dyfed. Tel: 0239-810205.

ABERYSTWYTH RSGB Group. Meets 7.30pm on 2nd Tuesday of the month, at The Bay Hotel, Aberystwyth. Details from GW0GLT.

CARMARTHEN ARS, GW4YCT. Meets 7.30pm on 2nd and 4th Fridays in the month, at Boat Club, The Quay, Carmarthen. Details from Mr W D Hughes, GW4ZXL, 31 Ystrad Drive, Johnstown, Carmarthen, Dyfed, SA31 3PQ. Tel: 0267-231359.

FISHGUARD & DARS, GW0AQC. Meets 7.30pm on Wednesdays, at Radio Shack, Further Ed Centre, Ropewalk, Fishguard, Dyfed. Details from Mr B Carr, GW3DWY, Killarney, Plasy Fron, Fishguard, Dyfed. Tel: 0348-872671.

LLANELLI ARS, GW0EZO. Meets 7.30pm Mondays, at Coleshill Day Centre, Coleshill Terrace, Llanelli, Dyfed. Details from Mr P K Williams, GW4ZYG, 30 New Street, Barryport, Dyfed, SA16 0RT.

PEMBROKE & DARC, GW2OP. Meets 8.00pm last Friday of the month,, at CEGB Sports Club, Main Street, Pembroke Dock, Dyfed. Details from Mr D J Workman, GW6EHC, 103 High Street, Pembroke Dock, Dyfed, SA72 6PE. Tel: 0646-686532.

PEMBROKESHIRE RS, GW0EJE. Meets 7.30pm on Mondays, at Further Education Centre, Tower Hill, Haverfordwest, Dyfed. Details from Mr P Delaney, GW1TUA, Rosedale, Studdolph, Steynton, Milford Haven, Dyfed, SA73 3UN. Tel: 0348-881346.

EAST SUSSEX

Council Zone: C

RLO: Jim R Harris, G4DRV, Upton, Crowborough Hill, Crowborough, East Sussex TN6 2DA.

BRIGHTON & DRS, G4GQR. Meets 8.00pm on 1st and 3rd Wednesdays in the month, at The Seven Furlong Bar, Brighton Race Course, Brighton. Details from Mr P J S Turner, G4IIL, Flat 6, 132 Marine Parade, Brighton, BN1 1DE. Tel: 0273-607737.

CROWBOROUGH & DARS, G0CRW.

HASTINGS ERC, G6HH. Meets 7.30pm on 3rd Wednesday in the month, at West Hill Community Centre, Croft Road, Hastings, East Sussex. Details from Mr D W Shirley, G4NVO, 93 Alfred Road, Hastings, East Sussex, TN35 5HZ. Tel: 0424-420608.

HASTINGS REPEATER GP, GB3HE.

SOUTHDOWN ARS, G3WQK. Meets 7.30pm on Tuesdays and Fridays, at Hailsham Leisure Centre, Vicarage Lane, Hailsham, East Sussex. Details from Mr C R Evans, G4VOS, Oakside, Waldren, Heathfield, East Sussex, TN21 0NG. Tel: 04352-3168.

ESSEX

Council Zone: C

RLO: Post Vacant, refer to Zonal Council Member.

BRAINTREE & DARS, G4JXG, G6BRH. Meets 8.00pm on 1st and 3rd Mondays in the month, at The Community Centre, Victoria Road (next bus stn), Braintree, Essex. Details from Mr Derek Braids, G0IZW, 3 Coldnalhurst, Braintree, Essex, CM7 7SL. Tel: 0376-44908.

BRENTWOOD & DARS, G0FWL. Meets alternative Tuesdays, at the Hermitage, Shenfield Road, Brentwood, Essex. Details from Mr Joe Wentworth, G0FED, 5 St. Charles Road, Brentwood, Essex, CM14 4TS. Tel: 0268-402829.

CHELSMFORD ARS, RS38117. Meets 7.30pm on 1st Tuesday in the month, at Marconi College, Arbour Lane, Chelmsford, Essex. Details from Gwyn Williams, G4FKH, 21 Borda Close, Chelmsford, Essex, CM1 4JY. Tel: 0245-260831.

CLACTON RC, G3CRC. Meets 7.30pm on 1st and 3rd Wednesdays in the month, at Eldorado Club, The Broadway, Jaywick, Clacton-on-Sea, Essex. Details from Mr Reg Taylor, G1YCT, 14 Meadow Way, Jaywick, Clacton-on-Sea, CO15 2SK. Tel: 0255-430466.

COLCHESTER ARS, G4CRA. Alternate Thursdays in the month, at The Gilberd School, Brinkley Lane, Colchester. Details from Mr Frank Howe, G3FIJ, 29 Kingswood Road, Colchester, Essex, CO4 5JX. Tel: 0206-851189.

ESSEX REPEATER GP, GB3DA. Details c/o 40 Fanton Walk, Shotgate, Wickford, Essex.

GEC ELECTRONICS (BASILDON) ARS, G0GEC. The Shack, GEC Avionics Social Club, Gardiners Way, Basildon, Essex. Details from Mrs Chissie Morrell, G8OIV, 40 Fanton Walk, Shotgate, Wickford, Essex, SS11 8QT. Tel: 0268-22822 Ex 3386.

HARLOW & DARS, G6UT. Meets 8.00pm on Tuesdays, at Mark Hall Barn, First Avenue, Harlow, Essex. Details from Mr P C Hayward, G4PGB, 82 Falconers Park, Sawbridgeworth, Herts, CM21 0AU. Tel: 0279-722618.

LOUGHTON & DARS, G4ONP. Meets 8.00pm on alternate Fridays in the month, at Debden Community Centre, Loughton Hall, Rectory Lane, Loughton, Essex. Details from Mr John Ray, G8DZH, 9 Albion Hill, Loughton, IG10 4RA. Tel: 01-508 3434.

MAYLAND & DARS, G4TVI. Details from Yvonne Taylor, Oak Lodge, Mill Road, Great Totham, Essex CM9 8DH.

MARTLESHAM DX CONTEST GP, G0KPW. Details c/o Fishers Farm, Colchester Road, Tendring, Clackton-on-Sea, Essex.

ROCHFORD & DRC, G0ARR. Meets 8.00pm on last Friday in the month, at Rocheway Centre, Rochway, Rochford. Details from Mr Denis Taylor, G3FGC, 36 Poplars Avenue, Hawkwell, SS5 4NA. Tel: 0702-206887.

SOUTH ESSEX ARS, G4RSE, G6RSE. Meets 8.00pm on Wednesdays, at The Paddocks, Long Road, Canvey Island, Essex. Details from Mr Albert Smith, G4FMK, 8 Parkway, Canvey Island, Essex, SS8 0AA. Tel: 0268-683805.

SOUTHEND & DARS, G5OK, G8MRS. Meets 8.00pm on Fridays, at Rocheway Centre, Rocheway, Rochford, Essex. Details from Mr Alec C Adams, G3YOA, 9 Fairland Close, Rayleigh, Essex, SS6 9PA. Tel: 0268-781126.

STANFORD-LE-HOPE & DARC, G4SLH. Meets 8.00pm on Mondays, at St Joseph Parish Rooms, Scratton Road, Stanford-le-Hope, Essex. Details from Mr Tom Connell, G8EXQ, 32 Hope Avenue, Stanford-le-Hope, Essex, SS17 8DH. Tel: 0375-643078.

VANGE ARS, G3YCW. Meets 8.00pm on Thursdays, at Barnstable Community Centre, Basildon, Essex. Details from Mrs D Thompson, 10 Feering Row, Basildon, Essex, SS14 1TE. Tel: 0268-552606.

FIFE

Council Zone: G

RLO: (also for Tayside) Martin Hobson, GM8KPH, 17 Well Brae, Pitlochry, Perthshire PH16 5HH. Tel: 0796-2140.

GLENROTHES & DARC, GM4GRC. Meets 7.30pm on Wednesdays, at Old Nursery Building, Provost Land, Leslie. Details from Mr John Hardwick, GM4ALA, 4 Hollyrood Avenue, Whinnynowe, Glenrothes, Fife, KY6 3PF. Tel: 0592-742763.

GLOUCESTERSHIRE

Council Zone: D

RLO: F W Mills, G4XXA, 66 Beeches Road, Charlton Kings, Cheltenham, Glos GL53 8NQ. Tel: 0242-579094.

CHELTENHAM ARA, G5BK. Meets 7.30pm on 1st and 3rd Fridays in the month, at Stanton Room, Charlton Kings Library, Cheltenham, Glos. Details from Mrs Pauline I Cratchley, G8MZV, 217 Prestbury Road, Cheltenham, Glos GL52 3ES. Tel: 0242-42336.

GLOUCESTER ARS, G4AYM. Meets 7.30pm on Wednesdays, at St John Ambulance HQ, Heathville Road, Gloucester. Details from Mr Nick Negus, G6AWT, 41 Oxstalls Lane, Longlevens, Gloucester, GL2 9HP. Tel: 0452-504515.

GOVERNMENT COMMS HQ ARC, G3SSO. Details from GCHQ Amateur Radio Club, Priors Road, Cheltenham, Glos, GL5 5AJ.

SMITHS INDUSTRIES RS, G4MEN. Meets 8.00pm on alternate Thursdays in the month, at Sports & Social Club Office, Evesham Road on Bishops Cleve, Cheltenham, Glos, GL52 4SF. Details from Mr Roy Godwin, G4YIX, 65 Lilliesfield Avenue, Barnwood, Gloucester, GL3 3AH. Tel: 0452-617145.

STROUD & DARS, RS87839. Meets 7.30pm on alternate Tuesdays, at Scout HQ, Parliament Street, Bisley Road, Stroud, Glos. Details from Mr Mike J Mills, G3TEV, Shepton, 3 Tylers Way, Chalford Hill, Stroud, Glos, GL6 8ND. Tel: 0453-882476.

STROUD ARS, G4SRS. Meets alternate Thursday evenings, at Red Cross Centre, Caincross, Nr. Stroud, Glos. Details from Mr Mark Lawson, G0FCJ, 13 Cresent Close, Stone House, Glos. GL10 2AP. Tel: 0453-822759.

GRAMPIAN

Council Zone: G

RLO: Allan Duncan, GM4ZUK, 69 Abbotshall Drive, Cults, Aberdeen AB1 9JJ. Tel: 0224-861550.

ABERDEEN ARS, GM3BSQ. Meets 7.30pm every Friday, at 35 Thistle Lane (just off Thistle Street), Aberdeen. Details from Frank Dinger, GM0CSZ, 68 Mosside Drive, Portlethen, Aberdeen, AB1 4QY. Tel: 0224-780519.

BUCHAN ARC, GM0FHE

GRAMPAIN REPEATER GP, GB3GN, GB3NG, GB3AB, GB3PD, GB3BA. Details from Keith Innes, The Smiddy, Drumblade, Huntly, Aberdeenshire, AB5 6EJ.

MORAY FIRTH ARS, GM3TKV. Meets Wednesday evenings, at Moray College of Education, Elgin. Details from Mr Alan Wills, GM4IZY, 23B, South Guildry Street, Elgin, Moray. Tel: 0343-41549.

ROBERT GORDON'S INSTITUTE OF TECHNOLOGY, GM3TDI. (Members of staff & students at RGIT only). Meets irregularly, at School of Electronic & Elec Eng, RGIT. Details from Dr R J Teperek, Sch of Electronic & Elec Eng, RGIT, Schoolhill, Aberdeen.

SPEYSIDE REPEATER GP, GB3SS, GB3KM. Details from Mr E Brumby, GM8YKT, 141 Morriston Road, Elgin, Morayshire. Tel: 0343-44255.

GREATER LONDON

Council Zone: C

RLO: North: (also for Hertfordshire) Roy Charlesworth, G4UNL, 6 Curzon Avenue, Enfield, Middx EN3 4UD. Tel: 01-804 5643 . South: (also for Surrey) Robin Sykes, G3NFV, 16 The Ridgeway, Fetcham, Leatherhead, Surrey KT22 9AZ. Tel: 0372-372587.

ACTON, BRENT & CHISWICK ARC, G3IIU. Meets 7.30pm on Tuesdays, at Chiswick Town Hall, High Road, Chiswick, London, W4. Details from Mr W G Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London, W3 8LB. Tel: 01-992 3778.

ADDISCOMBE ARC, G4ALE. Meets 9.00pm on Tuesdays, at Lion Inn, Pawsons Road, Croydon. Details from Mr P J Hart, G3SJX, 42 Gravel Hill, Addington, Croydon, CR0 5BD. Tel: 01-656 9054.

AQUILA ARC, G3BRK.

ARIEL RADIO GP (London), G8BBC. (Open only to BBC employees).

ARC (London), G4MMK. (Open only to employees).

BARKING R & ES, G3XBF. Meets Mondays, Tuesdays and Thursdays, at Westbury Centre, Ripple Road, Barking, Essex. Tel: 01-594 0291.

BIGGIN HILL ARC, RS89030, G4RQT. Meets 8.00pm on 3rd Tuesday in the month, at Victory Social Club, Kechell Gardens, Hayes, Bromley, Kent. Details from Mr G S Milne, G3UMI, 142 Hayes Lane, Hayes, Bromley, Kent, BR2 9EL.

BRITISH TELECOM HQ ARG, G4THQ. (Open only to BT employees).

BRUNEL UNIVERSITY ARS, G3UBR. Details from Students Union, Brunel University, Uxbridge, Middx. UB8 3PH.

CITY UNIVERSITY ARS, G3UCU. (Open only to university students).

CIVIL SERVICE ARS, G3CSR. Meets 1230 pm at Civil Service Recreation Centre, Monck Street, Westminster, London SW1. on the 1st and 3rd Mondays of the month. Details from Mr C.P. Woolley G6IMM 195 Conisburgh Cres. Catford, London SE6 2SF. Tel: 01-698 4437

CLIFTON ARS, G3GHN. Meets 8.00pm on Fridays, at 'The Duke of Albany', Junction Gelletly Road & Kitto Road, New Cross, London SE14. Details from Mr Martin Brown, G0DCG, 119 Breakspears Road, Brockley, London, SE4 1TY. Tel: 01-691 2341.

COULSDON ATS, G4FUR. Meets 8.00pm on 2nd Monday and last Tuesday in the month, at St Swithuns Church Hall, Grovelands Road, Purley, Surrey. Details from Mr A R Bartle, 105 Mayfield

Road, Thornton Heath, Surrey. Tel: 01-684 0610.
CRAY VALLEY, G3RCV. Meets 8.00pm on 1st and 3rd Thursday in the month, at Progress Hall, Admiral Seymour Road, Eltham, London, SE9. Details from Mr B Rowe, G4WYG 28 Malyons Road, Hextable, Swanley, Kent, BR8 7RE. Tel: 0322-613296.
CRYSTAL PALACE & DRS, G3VCP. Meets 8.00pm on 3rd Saturday in the month, at All Saints Parish Room, Upper Norwood, London, SE19. Details from Mr Geoff Stone, G3FZL, 11 Liphook Crescent, Forest Hill, London, SE23 3BN. Tel: 01-699 6940.
CIRM, RS37900. (Open only to employees).
EALING & DARS, G3UUP. Meets 8.00pm on Tuesdays, at Community Centre, 71 a Northcroft Road, Ealing, London, W13 9SS. Details from Mr A G Fisher, G4VBH, 108 Geston Grange, Heston, Middx TW5 0HD.
EAST LONDON RSGB GP.
EDGWARE & DRS, G3ASR. Meets 8.00pm on Thursdays, at Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware, Middx. Details from Mr I D Cope, G4IUZ, 30 Drovers Way, Hatfield, Herts, AL10 0PX. Tel: 07072-65707.
FANNY HILL RC, RS85830.
FERNDALE RS, G4HDT.
GRAFTON ARS, G3AFT. Meets on 2nd and 4th Friadys 8.00pm, at TS Wizzard, White Hart Lane, London, N17. Details from Mr R Harringan, G0JUZ, 7 Torr8ington Gardens, London N11 2AB. Tel: 01-368 8154.
GILWELL PARK SCOUT ARG, G3WGP, GB2GP. Meets Saturdays, at Gilwell Park, Chingford, Essex. Details from Mr T J Lockyer, 18 Allison Close, Waltham Abbey, EN9 3NY.
HAMMERSMITH HOSPITAL, G4HXX.
HAVERING & DARC, G4HRC. Meets 8.00pm on Wednesdays, at Fairkytes Arts Centre, Billet Lane, Hornchurch, Essex. Details from Mr D S J Gray, G0BOI, 58 Dumont Avenue, Point Clear Street, Osyth, Essex, CO12 8JP.
HOME COUNTIES ATV GROUP, G6HCT. Details c/o The Flat, 5a The Broadway, Southall, Middx.
ILFORD RSGB GP, G3XRT.
IMPERIAL COLLEGE RS, G5YC. (Open only to students).
INMARSAT ARC, G4SAT.
KINGSTON & DARS, RS50685, G3KIN. Meets 8.00pm on 3rd Wednesday in the month, at "Alfriston", 3 Berrylands Road, Surbiton, Surrey. Details from Mr S Walters, Tel: 01-397 6924.
KODAK ARS, G4FVJ. (Open only to employees).
LONDON AIRPORTS AUTHORITY RC, G4GTT.
LONDON WEEKEND TELEVISION RS, G4LWT. (Open only to employees).
MARCONI RS (Middx), G2MT. (Open only to employees).
MULLARD ARS, G1MRV.
NEW SCOTLAND YARD ARS, G4NSY, G6NSY. (Open only to New Scotland Yd members). Details from The Secretary, Amateur Radio Society, Room 99, New Scotland Yard, Broadway, London, SW1H 0BG.
NORTH KENT RS, G4CW. Meets 8.00pm on 1st and 3rd Tuesdays in the month, at The Pop-in-Parlour, Graham Road, Bexleyheath, Kent. Details from Mr Frank Rhodes, G4WNF, 9 Edwin Close, Bexleyheath, Kent DA7 5QH. Tel: 01-310 6096.
PLESSEY RC, G4XOV. (Open only to employees).
QUEEN MARY COLLEGE R & ES, G1XQM.
RS OF HARROW, G3EFX. Meets every Friday. Details from Mr G Munday, G0GXM. 33 Fisher Road, Harrow, Middx, HA3 7JX. Tel: 01-863 2780.
SILVERTHORNE RC, G3SRA. Meets every Friday at 7.30pm at Friday Hill House, Simmons Lane, Chingford, London E4. Details from Mr Brian Hill at Friday Hill House.
SOUTHGATE RC, G3SFG. Meets at Holy Trinity Church Hall (upr), Green Lanes, Winchmore Hill, London, N21. Details from Mr D C Elson, G4YLL. 200 Churchgate Road, Cheshunt, Waltham Cross, Herts, EN8 9EL. Tel: 0992-30051.
ST ANDREWS CoE HIGH SCHOOL ARC, RS37458.
SURREY RADIO CONTEST C, G3SRC. Meets 8.00pm on 1st Monday in the month, at T.S. Terra Nova, 34 The Waldrons, Croydon. Details from Mr Bernard Wynn, 67 Old Lodge Lane, Purley, Surrey, CR2 4DN. Tel: 01-660 7517.
SUTTON & CHEAM, RS37558. Meets 8.00pm on 3rd Friday in the month, at Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey. Details from Mr J L Puttock, G0BWV, 53 Alexandra Avenue, Sutton, Surrey, SM1 2PA.
THAMES TV ARS, G4TTV, G6TTV.
THREE A's CONTEST GP, G0AAA.
UKFM GP (London), GB3SL.
W MIDDX RG, G1WMG.
WIMBLEDON & DRS, G3WIM, G8WIM. Meets 8.00pm on 2nd and last Fridays in the month, at St Andrews Church Hall, Herbert Road, Wimbledon, London, SW19. Details from Mr Lawlor, G6AJY, 115 Bridgewood Road, Worcester Park, Surrey. Tel: 01-330 2703.

GREATER MANCHESTER

Council Zone: A
RLO: Bob Catlow, G4ARP, 137 Haven Lane, Moorside, Oldham, Lancs OL4 2QQ. Tel: 061-652 8617.

ARIEL RG (Manchester), G3ETK. (Open only to BBC employees). Meets at BBC Club, New Broadcasting House, Oxford Road, Manchester.
BOLTON ARC, G0BWC. Meets 7.30pm on Tuesdays, at The Dean Sports Complex, New York, Junction Road, Bolton. Details from Mr D Lewis, G1AEQ, 468 Wigan Road, Bolton, Lancs, BL3 4QH.
BOLTON METROPOLITAN COLLEGE, G8SKM.
DIAL HOUSE RS, G3WDH.
DOUGLAS VALLEY, G3BPK. Meets 8.00pm on 1st and 3rd Thursdays in the month, at Standish Conservative Club, School Lane, Standish, Wigan, Lancs. Details from Mr D Snape, G4GWG, 30 Culcross Avenue, Highfield, Wigan, Lancs, WN3 6AA. Tel: 0942-211397.
ECCLES & DARS, G3GXI, G8GXI. Meets 9.30pm on Tuesdays, at Duke of York Hotel, Church Street, Eccles, Manchester. Details from Mr C G Harrison, G8KRG, 53 Peveril Close, Whitefield, Manchester, M25 5NS. Tel: 061-773 7899.
Makerfield ARS, G0IGW. Details c/o 46 Marlborough Avenue, Spring View, Wigan, Lancs.
MANCHESTER & DARS, G3HOX. Meets every Wednesady at 7.30pm at the Newton House Community Centre, 203 Droylsdon Road, Newton Heath, Manchester. Details from Mr Don Robson, G4UYN, 36 Orford Road, Newton Heath, Manchester M10 6JY.
MARPLE CONTEST CLUB, G4MCC.
NORTH CHESHIRE RC, G0BAA. Details from Mr P J Kirsop, G4WCE, Peel House, 5 Planetree Road, Altrincham, Cheshire, WA15 9JJ. Tel: 061-980 5173.
NORTH TRAFFORD COLLEGE, G4FXP.
NORTHERN AR CONFEDERATION, RS87921.
OLDHAM ARC, G4ORC. Meets 8.30pm on Thursdays, at Moorside Conservative Club, Ripponden Road, Moorside, Oldham. Details from Mrs K M Catlow, G4ZEP, 137 Haven Lane, Moorside, Oldham, Lancs, OL4 2QQ. Tel: 061-624 7354.
SOUTH MANCHESTER RC, G3FVA. Meets 8.00pm on Fridays, at Sale Moor Community Centre, Norris Road, Sale, Cheshire. Details from Mr D Barber, G2AKR, 16 Boxgrove Road, Sale, Cheshire, M33 1QW.
STOCKPORT RS, G6UQ. Meets 8.00pm on Wednesdays, at The Blossoms Hotel, Junc of Bramhall Rd + A6, Stockport, Cheshire. Details from Mr M E Betts, G4FFW, 56 Kingswood Road, Fallowfield, Manchester, M14 6RX. Tel: 061-224 7880.
TRAFFORD ARC, G1TRC. Meets 7.30pm on Thursdays, at The Sea Cadet Unit, Bradshaw Lane, Stretford, Machester. Details from Graham, Tel: 061-748 9804.
UMIST AR & ES, G3CXX. (Open only to students).
WEST MANCHESTER RC, G4MWC. Meets 8.00pm on Wednesdays, at Astley & Tyldesley Miners, Welfare Club on Meanly Road, Gin Pit Vill, Astley, Tyldesley, Manchester. Details from Mr D R Camac, G1IOO, 6 Wisbeck Road, Tonge Fold, Bolton, Lancs, BL2 2TA. Tel: 0204-24104.
WIGAN & DARC, G0HRW. Meets 7.30pm on Wednesdays, at Poolstock Cricket Club, Poolstock Lane, Wigan, Lancs. Details from Mrs M E Norton, G0DTY, 41 Crestwood Avenue, Goosegreen, Wigan, Lancs, WN3 6SQ. Tel: 0942-47416.

GUERNSEY & DEPENDENCIES

Council Zone: D
RLO: Steven Gibbs, GU3MBS, 44 Les Prins, Vale, Guernsey. Tel: 0481-57605.

GUERNSEY ARS, GU3HFN, GU8NIS. Meets 8.00pm Tuesdays and Fridays, at The Lodge, La Corbinerie, Oberlands, St Martins, Guernsey. Details from The Secretary, GARS, PO Box 100, Guernsey. Tel: 0481-25450.

GWENT

Council Zone: E
RLO: Peter Dombrowski, GW1NYO, 30 Hillary Road, Newbridge, Newport, Gwent NP1 5DD. Tel: 0495-246359.

ABERGAVENNY RS, GW4GFL. Meets 7.30pm Thursdays, at Hill Residential College, Pen-y-Pound, Abergavenny Gwent. Details from Mr R. Lloyd, GW4IQA, Llwyn Celyn, Pandy, Abergavenny, Gwent, NP7 8DN. Tel: 0873-890681.
BLACKWOOD & DARS, GW6GW, GW6BK. Meets 7.00pm Fridays, at Oakdale Comprehensive School, Oakdale, Blackwood, Gwent. Details from Mr Brian Matthews, GW0JWF, 25 Manor Park, Newbridge, Gwent, NP1 4RS. Tel: 0495-243858.
CHEPSTOW & DARS, GW4LWZ. Meets 7.30pm on Tuesdays, at Leisure Centre, Chepstow, Gwent. Details from Mr Dan Taylor, GW0EGH, 7 Oaklands Park, Portskewett, Gwent NP6 4UR. Tel: 0291-424725.
EBBW VALE COLLEGE RS, GW0IIW. Meets 7.00pm on Mondays, at Ebbw Vale College of FE, College Road, Ebbw Vale, Gwent. Details from Mr Terry Hayden , GW0HCN, 7 Atlee Close, Ebbw Vale, Gwent NP3 5ES. Tel: 0495-305192.
LCR (TREDEGAR) RC, GW4IYD. Meets 7.15, Tuesdays, at MIM Factory, Woodfield Works, North Avenue, Tredegar, Gwent. Details from Mr Karl Gurmin, GW1EXF, 1 Prospect Place, Georgetown, Tredegar, Gwent, NP2 3JP. Tel: 049525-6560.
NEWPORT ARS, GW4EZW, GW1NRS. Meets 7.30pm on Mondays, at Brynglas Community Centre, Brynglas Road, Newport, Gwent. Details from Mr Kevin Snelling, 91 Oakfield Road, Newport, Gwent NP9 4LP. Tel: 0633-262467.
PONTYPOOL ARS, GW3RNH. Meets 7.00pm Tuesdays, at Settlement, Rockhill Road, Pontypool, Gwent. Details from Mr Ivor Wilkinson, GW4RJA, Troed-y-Bryn, Ty Trappa Road, West Pontnewydd, Gwent, NP4 1BH. Tel: 0633-372110.
RED DRAGON CONTEST GP, GW8GT. Details from Mr Brian Davies, 16 Vancover Drive, Penmaen, Blackwood, Gwent, NP2 0UQ. Tel: 0495-225825.

GWYNEDD

Council Zone: E
RLO: Post vacant, refer to Zonal Council Member.

ARFON REPEATER GP, GB3AR, GB3AN. Details from Mr Cecil Owen, GW3PIO, 13 Brynffynnon, Star, Gaerwen, Anglesey, LL60 6BA. Tel: 0248-714571.
DRAGON ARC, GW4TTA. Meets 8.00pm on 1st and 3rd Mondays in the month, at Four Crosses Hotel, Pentraeth Road, Menai Bridge, Gwynedd. Details from Mr Tony Rees, GW0FMQ, 2 Bryn Poeth, Treearth, Gwynedd, LL57 4PE. Tel: 0248-600963.
HOLYHEAD & DARS, RS87565. Meets 8.00pm once a month, at Foresters Arms, Kingsland, Holyhead, Gwynedd. Details from Mrs B Anziani, 12 London Road, Holyhead, Gwynedd. Tel: 0407-50577.
MEIRION ARS, GW4LZP. Meets 7.30pm on 1st Thursday in the month, at Dolserau Hall Hotel, Bala Road, Dolgellau, Gwynedd. Details from Mr M D Fowler, GW3GKZ, Tyn Gwyn, Abergwynant, Penmeanpool, Dolgellau, Gwynedd, LL40 1YF. Tel: 0341-422447.
PORTHMADOG & DARS, RS86362. Meets 7.30pm on 3rd Thursday in the month, at Harbour Cafe, Ffestiniog Railway, Porthmadog, Gwynedd. Details from Mr D Roberts, GW1EGQ, 8 Cae Eithin, Minfford, Gwynedd, LL48 6EF. Tel: 0766-770298

HAMPSHIRE

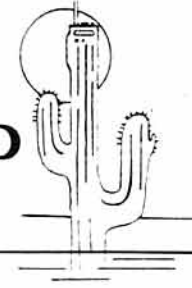
Council Zone: D
RLO: Trevor Emery, G3KWU, 75 Haig Road, Bishopstoke, Eastleigh, Hants SO5 6JF. Tel: 0703-693673.

ANDOVER RAC. G0ARC. Meets 8.00pm 1st and 3rd Wednesdays in the month, at Wolversdene Club, Love Lane, Andover, Hants. Details from Mr J T Cull, G8ALR, 29 Strathfield Road, Andover, Hants, SP10 2HH. Tel: 0264-23741.
BASINGSTOKE ARC, G3TCR, G8JYN. Meets 7.30pm on 1st Monday in the month, at Forest Ring Community Centre, Sycamore Way, Basingstoke. Details from Mr David J Deane, G3ZOI, 10 Stephens Road, Mortimer Common, Nr Reading, Berks, RG7 3TU. Tel: 0734-332777.
COLLINGWOOD RS, G3CRS.
CRAWLEY COURT ARG, G4IBA, G6IBA. (Open to employees of IBA only). Meets at Crawley Court, Winchester, Hants. Details from Mr S H Andrews, G3OGY, Crawley Ct Amateur Radio Gp, Crawley Court, Winchester, Hants, SO21 2QA. Tel: 0962-822305.
FAREHAM & DARC, G3VEF, G8KGI. Meets 7.30pm on Wednesdays, at Portchester Community Centre, Westlands Grove, Portchester, Hants. Details from Mr S G Davey, G4ITG, 31 Somerwell Drive, Fareham, Hants, PO16 7QL. Tel: 0329-234904.
FARNBOROUGH & DRS, G4FRS, G6FRS. Meets 8.00pm on 2nd and 4th Wednesdays in the month, at Railway Enthusiasts Club, 103 Hawley Lane, Farnborough, Hants. Details from Mr Mike Hearsey, G8ATK, 'Halcyon', Lawday Link, Upper Hale, Farnham, Surrey. Tel: 0252-715765.
HAMPSHIRE POLICE ARC, G0LAW. Details c/o 30 Harewood Close, Boyatt Wood, Eastleigh, Hants.
HORNDEAN & DARC, G4FBS. Meets 7.30pm on 1st Thursday in the month, at Merchiston Hall, London Road, Horndean, Hants. Details from Mr F Charrett, G3COO, 8 Mavis Crescent, Havant, Hants, PO9 2AE.
IBM (SOUTH HAMPSHIRE) ARC, G0JGL, G7BCD. Meets 7.30pm on 2nd and 4th Tuesday in the month, at IBM Social Club, Southmore Lane, Havant, Hants. Details from Mr P A Bleiker, G4KVX, Waterside, 31 North Shore Road, Hayling Island, Hants, PO11 0HL. Tel: 0705-464191.
IBM (UK) LABORATORIES ARC, G3YXR, G8EXR. (Open to employees of IBM only). Meets 7.00pm on Thursdays, at IBM (UK) Laboratories, Hursley House, Hursley Park, Winchester, Hants. Details from Mr Graham Walmsley, G4IXE, Warwick Farm House, Cracknore Hard Lane, Marchwood, Southampton, SO4 4UT.
ITCHEN VALLEY ARC, G0IVR, G6IVR. Meets 7.30pm 2nd & 4th Fridays in the month (except August), at The Scout Hut, Brickfield Lane, Chandlers Ford, Eastleigh, Hants. Details from Mr Maurice Cheeseman, G1IPQ, 63 Ringwood Drive, North Baddesley, Southampton, SO52 9GR. Tel: 0703-736784.
LYMINGTON & DARS, RS85637. Details from Dr Michael Carson, G2AIV, Long Close, Ramley Road, Pennington, Lymington, Hants, SO41 8GQ. Tel: 0590-672844.
MARCONI R & ES (Portsmouth), G4JMR. (Open only to employees). Meets 8.00pm on last Tuesday in the month, at Sports & Social Complex, Broad Oaks, Portsmouth Airport. Details from Mr V G Scambell, G3FWE, "Solent View", 78 Slade Road, Ryde, Isle of Wight. Tel: 0983-616966.
ROWNER & DARS, G4RRS. Meets 7.30pm on the first Wednesday in the month at Victory Hall, Warsash, Hants. Details from Mr W S Blythe, G6WGN, Seymour Cottage, Forest Road, Denmead, Portsmouth, PO7 6UA. Tel: 0705 261977.
SOUTH HANTS INT TELEGRAPHY SOC, G3DIT. (Mainly for those interested in HF cw). Meets 7.30pm on Thursdays, at Portsmouth Community Centre, Malins Road, Portsmouth. Details from Mr Terence Mortimer, G3JZV, 72 Whitworth Road, Portsmouth, PO2 7RU.
SOUTHAMPTON ARS, G3SOU, G8FAB. Meets 7.30pm on 3rd Wednesday in the month, (except Aug.) at Millbrook Community School, Green Lane, Southampton. Details from Mr Malcolm Troy, G1UWL, 90 Evenlode Road, Millbrook, Southampton, SO1 9EH. Tel: 0703-701770.
SOUTHAMPTON UNIVERSITY RC, G3KMI. (Open to university staff & students only). Meets at Student Union, West Building (top floor), University Road, Southampton. Details from The Secretary, Radio Club, Students Union, The University, Highfield, Southampton, SO9 5NH.
SUBMARINE ARC, G7DOL. Details c/o HMS Dolphin, Gosport, Hants.
THREE COUNTIES ARC, G6WWR, G4WWR. Meets 8.00pm on alternate Wednesdays in the month, at Railway Hotel, Liphook, Hants. Details from Mr David Lawrence, G4VKC, 39 The Maltings, Liphook, Hants, GU30 7DG. Tel: 0428-723415.
UK FM (SOUTHERN) REP HOLDING GP. GB3SN. Details from Mrs Carolyn Wood, 45 Maytree Close, Badger Farm, Winchester, Hants, SO22 4JE. Tel: 0962-51362.
WATERSIDE SHORTWAVE RC, G4JYN. Meets 7.30pm on 4th Tuesday in the month, at Blackfield Village Hall, Hampton Lane, Blackfield, Southampton. Details from Mr Peter Fry, G4SBF, 54 Studley Avenue, Holbury, Southampton, SO4 1PP. Tel: 0703-892353.
WINCHESTER ARC, RS89028. Meets 7.30pm on 3rd Friday in the month, at British Red Cross, Durngate House, Durngate, Winchester. Details from Mr Richard Murray, G1XCT, Barton Mark Lodge, London Road, Headbourne Worthy, Winchester, Hants, SO23 7JS. Tel: 0962-880605.

Next month :
Hereford & Worcester to Wiltshire,
Overseas Clubs
National Affiliated Societies

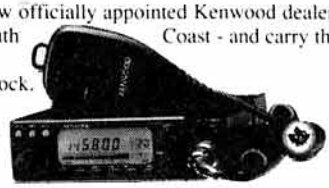
NEVADA...

.....TALK TO THE WORLD



TALK KENWOOD

We are now officially appointed Kenwood dealers for the South Coast - and carry the complete range in stock. Heres a selection:-



TM 231E 2 Mtr mob.	£289
TM 431E 70cm mob.	£318
TM 701E 2/70cm mob.	£469
TR 751E 2/70 mobile	£599
TH 75E 2/70cm H/held	CALL
TS 711E 2 Mtr Multi Mod *(s/soiled)*	£799
TS 440S HF	£1138
TS 940S HF	£1995
R2000 Receiver	£595

TALK ATU'S

TM 1000 1 KW ALL BAND ATU

Using our high power roller coaster this ATU gives effortless matching of all long wire, G5RVvertical and coax fed antennas

Standard Model TM1000	£168
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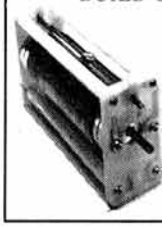
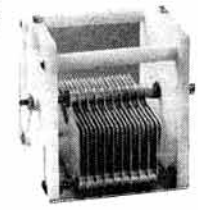
Standard TM1000 Kit Form	£138

(Add £5.75 carriage for all models)

BUILD YOUR OWN AMPLIFIER OR ATU WITH OUR RANGE OF HIGH POWER COMPONENTS



Roller Coaster 30 µH	£28.00
Var. cap 250 pF (8kv)	£19.95
Var. cap 250 + 250 pF (8kv)	£28.00
Var. cap 750 pF (4kv)	£28.00
Turns Counter (For Roller)	£14.95
Empty ATU Case	£26.00
2kw Balun Assembly	£28.00



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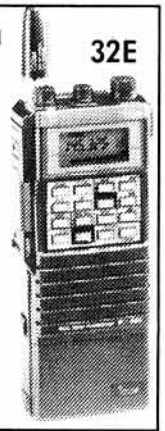

IC - 2SE	Call
IC - 4SE 70cm H/held	Call
IC - 32E 2/70 H/held	Call
IC - 3210E 2/70 Mobile	Call
IC - R7000 Receiver	Call
IC - R71E Receiver	Call
IC - 725 HF TCVR	Call
IC - 735 HF TCVR	Call
IC - 751A HF TCVR	Call
IC - 761 HF TCVR	Call
IC - 228H 2m/45w	Call
IC - 448E 70/25w	Call

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* 25-2100 Mhz
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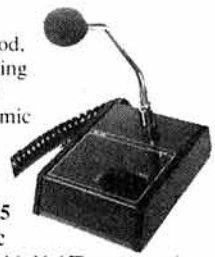
NEVADA HF2 £39.95

Freq:- 1.8 - 185 Mhz
Connections:- S0239
Power:- 1.000 W Pep

NEVADA CAS - A2 £49.95

Freq:- DC - 1.3 Ghz
Connectors:- 'N' Type
Power:- 150/300 Watts

SADELTA XL30 Mic



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Introductory Offer £39.95

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As the XL 30 above, but with Vol/Tone controls

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A professionally built 50 Ohm dummy load that is good to 3 Ghz! using 'N' type connector

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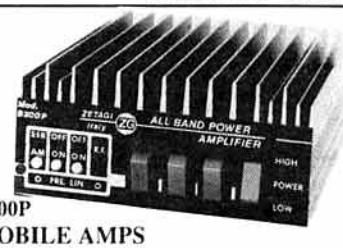

B300P

MOBILE AMPS

B150 180w (26- 30 Mhz)	£54.95
B300P 300w (2- 30 Mhz	£147.52
B550P 500w (2 - 30 Mhz)	£237.00
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TC50DX 50Mhz amplifier

B299 300w (3 - 30 Mhz)	£115
737 80w (26 - 30 Mhz)	£35.41
735 35w (26 - 30 Mhz)	£18.54
B110 110w (142 - 170 Mhz)	£145

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B132 240w (3 - 30 Mhz)	£129
BV131 250w (26 - 30 Mhz)	£115
B507 300w (3 - 30 Mhz)	£278

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Do you suffer from local interference? The answer is probably yes. If you moved your receiver into the country you would be amazed how quiet your reception would be. The noises you hear on the H.F. bands are produced by local electrical equipment.

This completely new idea, developed by S.E.M. can provide the complete removal of any of these problems. You don't even have to know what or where the source is. It can be your own computer next to your receiver or r.f. welding equipment in a factory several miles away.

The QRM Eliminator connects in your aerial lead (you can transmit through it) it requires an auxilary aerial (this can be ANY other aerial e.g. a 2 metre one, or a few metres of wire, because wide band amplifiers are used to boost the level of the QRM). Your unwelcome signal will arrive at the two aerials slightly out of phase and by adjusting the phase of the signal from the auxilary aerial with the Eliminator controls, you can completely remove it BEFORE IT ARRIVES AT YOUR RECEIVER. Forget all the inadequacies of noise blankers, this is a new, different, concept. Sceptical? As W4CXH in Florida says "The power line noise is S 7 and you are coming through 5 and 4." Practical Wireless review says "Does it work? Yes it does". Other comments "A remarkable achievement", "It works like magic", "It even eliminates rain static" and comments about being able to operate again after years of enforced inactivity because of some local problem not previously curable or even traced, are many.

Size: 6" × 2" × 3" deep. Sockets SO239s. Supply 12 V (10-14) 30 mA. Frequency range 500KHz - 60 MHz continuous. May be transmitted through.

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Practical Wireless, Sept. 1989

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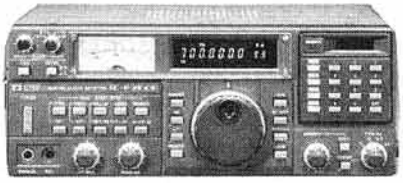

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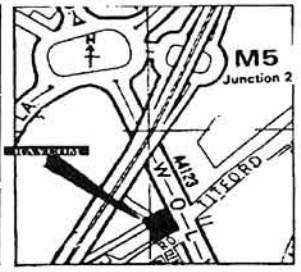

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DISPLAY YOUR QSL's. Plastic wallets, strips of ten, packet of six, £2.80. Kayplas, 49 Headley Way, Headington, Oxford.

FOR SALE: choice of several TR7/R7/17 combinations. CLEARANCE SALE of accessories for Yaesu FT101ZD/101/102/980/FT One equipment. Please send large SAE Plus £1 for complete list. Professional Communications Ltd, Kilcolgan, Co. Galway, Ireland. Phone: (010-353)-91-96091.

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 Sarah Baylis or Jenny Lovell, Amateur Radio Insurance Services Ltd, 4a Russell Hill Road, Purley, Surrey CR2 2LA. Tel: 01-660 0820 or Fax: 01-660 9222.

COMPUTER SOFTWARE HARDWARE

SCOTLAND PACK-AGE! for AEA, Kantronics, PAC-Comm, WX Stations and computers, Atari-ST, WE FAX software for KAM-£15 PACK-AGE, Braeside, Urquhart, Crossford, Fife KY12 8QJ (0383) 721169.

AMSTRAD/IBM PC COMPATIBLE SOFTWARE. Large SAE to Charles Crane G4YFN, 2 Pimento Drive, Earley RG6 2GZ.

THE G4TYFLOG, date, band, power, mode, time, callsign, name, QTH, RX/TX/RPRT, find call, QSL/Log, directory load, auto save, own unique filing system, network facilities, formatter, logbook style and label printout, easy fill features, only four inputs, user friendly. Nice screen display. Includes free resister decoder, contest log. BBC, Commodore 64, Spectrum, £17. Updates. Price difference only. Enclose callsign. E. Aston, 64 Gurney Valley, Bishop Auckland, DL14 8RW. 0388-607500.

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COMPUTER REPAIRS & SALES, all popular makes including Acorn, Amstrad, Commodore, Atari, Sinclair. Repairs from £16.00 including postage and 3 months guarantee. Printer cables, floppy diskettes 5¼" and 3½", printers, disk boxes, joysticks, etc. Please phone or send 9" x 6" SAE for latest discount prices. Advance Electronics (NE) Ltd., The Old Ropery, Deptford Terrace, Sunderland. SR4 6DD. Tel: 091 5108040.

A MORSE TUTOR in your pocket! The Kirsta Morse Tutor for the Psion Organiser (any model) includes 50 plain language texts, groups, 5-40 wpm with adjustable delay, single characters, adjustable character frequency, etc. Designed and written by John Morris, GM4ANB. £29.95 (including VAT & Postage) or SAE for details to Kirsta Products Ltd, Unit 1, Block 2, Victoria Industrial Estate, Airdrie, Scotland ML6 9BY. Tel (0236) 54626. Access & Visa accepted.

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FLYING FROM GATWICK? Stay at Mill Lodge Guest House. 4 minutes from airport. Transport available. Telephone (0293) 771170.

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BRIXHAM, SOUTH DEVON. Fantastic views and radio chat from the hotel that provides great accommodation and the famous WAB (Wireless at Brixham) courses. Phone for brochure Torhaven Hotel (GOJFM) 0803-882281.

BLACKPOOL BREAKS? Stay at New Osterley Hotel. Situated in the town centre close to the Tower and all amenities. All 85 bedrooms colour TV, teamakers. Some en suite. Use of the shack (G0KJV). Telephone (0253) 22987.

MISCELLANEOUS

HEATHKIT UK spares and service centre. Cedar Electronics, Unit 12, Station Drive, Bredon, Tewkesbury, Gloucestershire. Telephone (0684) 73127.

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 JT17, Tuition House, London SW19 4DS. Tel 01-947 7272 (9am-5pm) or use our 24hr Recordacall service 01-946 1102 quoting JT17.

VINTAGE WIRELESS BOOKS/MAGS wanted and for sale. Send for lists — state requirements. Quilltech, 26 Woodside Road, Kingston-on-Thames, Surrey KT2 5AT.

Members' Ads

Conditions of acceptance are published on the Members' Ad order form inserted into the wrapper with every issue of *Radio Communication* posted to members. This form must be used when placing an advertisement; and please note that FOR SALE, WANTED and EXCHANGE advertisements must not be mixed on the same form. A new, more flexible, pricing scheme has been introduced. Details are on the form. Each advertisement must be accompanied by the correct remittance, as a credit card payment, cheque or postal order made payable to the Radio Society of Great Britain. Please note that because this is a subsidised service to members, no correspondence can be entered into.

FOR SALE

● HEATHKIT HW8 QRP tcvr some useful mods: £75ono. G3NTM QTHR. Phone after 6.30pm. (Staines) 0784 456567

● FC700, mint: £76. G4SBZ QTHR. (Louth) 050785 591

● LOWE HF125 with NBFM detector option fitted. Exc cond: £290. Panasonic RFB50L travel portable inc nicads: £45. Allan, G8ZZY QTHR. (Ibstock) 0530 61341

● 2 No Cue-Dee 15ele ants for sale. 1 No boom drilled to suit X/Y operation, other never used. In good cond: £25ea. Carr.extra. 50 ohm note length about 4.000m. Prefer use works number below. Nigel, G6LDO QTHR. (Truro) 0872 79525

● HF linear, 4X6HF5, 800W input Pyramid built from SSB products kit. 3 meters, fan, valves new Feb: £200. Buyer collects or carr. at cost. Short Wave Magazines, Dec 60 to Apr 70. Offers G3UZM QTHR. (Exmouth) 0395 273090

● MINOLTA XGZ F1.7 Rokkor black mint ERC UV hood plus Vivitar macro zoom 28-200mm. Mint: £150. Lens only: £80. Also Dragon 32 BMK s/ware cartridge CW/RTTY/AMTOR/ASCII. TNC included: £40ono. After 11am please. John. (S.London) 01-857 8096

● FIVE volumes computer/comm inst books. Dawe output meter. FT902 range DC/AC leads, new. Uniden 2000 used RX only 2hrs. () 0473 830147

● COMMODORE 64 computer and 1541 disk drive. Lots of s/ware. V. suitable packet: £100ono. G7DWX not QTHR. (Loughborough) 0509 235165

● YAESU FT290R. VGC: £235. Marconi TF801D: £65. Wayne Kerr LCR bridge B521: £35. G4UUI QTHR. Eve. (Ashford) 0233 625090

● TRIO 180S, 100W HF tcvr. WARC, many facilities. GWO, nice cond: £450ovno. Prefer buyer collects/inspects. Could arrange delivery. (Northampton) 0604 862803

● FRG7 2m cvtr HX BX digital r/out: £135ono. Kenwood 205 h/held, nicads, m/bracket, Heatherlite h/set: £165. G0IAX. (Cirencester) 0285 650656

● 2M station FT290R Mutek F/E, nicads and chrgr. Mint cond. 30W m/module linear amp: £270. Tony, G0HTX not QTHR. (London) 01-727 2246

● FRG7, exc.cond with manual: £110. G4DGB QTHR. (Fareham, Hants) 0329 42010

● KW2000E last and best of series. Recently serviced, complete inc manual: £200. QTHR. () 021-745 1000

● YAESU FT726R with 70/2/6/HF modules, satellite unit, CW filter, desk mic, manuals, orig packing. Recent SMC overhaul: £1000. G5NU QTHR. (Reading) 0734 871200

● KW2000B PSU, Shure 201 mic: £180. Uniden 2830 10m USB/LSB/FM/AM/CW: £200. Steve, G4YTK QTHR. (Cannock) 0543 78902

● ULTIMAST 30ft telescopic tiltover c/w winch and ground post. VGC: £145ono. Apple II disk drive : £25. 80col card with font disk: £25. Buyer inspect/collects or arranges carr. G4GPY QTHR. Ring eve. (Beverley) 0482 860440

● TEKTRONIX 547 scope with 1A1 plug-in and inc trolley stand. Works but in need of a service. Any offers? Rather big so prefer buyer collects. GM4MHE QTHR. (Bo'ness) 0506 827228

● SONY ICF2001 world radio with PSU: £95. Sony CDP101 CD player with remote but needs repair, otherwise good cond: £95. Philips portable stereo record player, GF604. Requires stylus. Ideal for youngster: £12. 2x Yaesu FT203R with chrgrs: £99ea. G6FDK. (Chester) 0244 300779

● TS820 HF tcvr with digital display: £400ono. Trio JR500S Ham band RX: £60. Eagle RX60 gen.cov RX: £20. Last 2 items referred to in Amateur Radio mag recently. Carr extra or deliver for petrol cost. G3MNV QTHR. (Bideford) 02372 74564

● ICOM IC751 HF tcvr, SM6 mic, Alinco 25A PSU, 50MHz tvtr: £650. G4VXB QTHR. (Faversham) 0795 533143

● WRASSE SC1 scan cvtr. Fax, high resolution colour. VGC: £740. Save £220. GW6UWT QTHR. (Corwen, N.Wales) 049083 681

● MARCONI 2370 spectrum analyser: £2900. HP8018A serial data gen: £600. HP5500 laser, complete. G1GMM. () 0376 562108

● BARGAIN of the month. Station sell-up due to impending move. HF tcvrs. KW Atlanta c/w PSU/spkr, mic. KW103 swr/pwr meter. E-Zee-Match ATU. LP filter, 80-10m 100W/out. Yaesu FT107M c/w Welz AC38M ATU, Partridge top-band ATU, MH1BB mic, 160-10m 100W/out. Both with manuals. G2DYM trap ant, 1/2G5RV. Hy-gain 18AVQ trap vert, requires 2 short lengths top-section alumin tubing and top-hat. 70cm colour video station inc superb ITT camera. Prof tripod stand with bases, ITT. ITT Spectra recorder plus separate T/V programmer timer. Separate additional mains pwr unit, charges batts for remote use. Carrying case for recorder. 30ft camera ext cable. MMTVT435 transmitter, MMTV cvtr, rcvr. Multibeam 48ele ant with AR40 rotator: £1000 lot. Cash or clear cheques first. Les, G3RCX QTHR. (Southend-on-Sea) 0702 585920

● SINCLAIR QL computer and terminal s/ware: £100ono. AOR2001 VHF scanner: £225. KPC2 TNC: £110. HP41CX calculator: £125. 12ch xtal controlled RX 2ch fitted: £40. All in good cond. All plus carr. Iain GM1PSU. (Livingston) 0506 883091

● KENWOOD TS430S ext spkr. PSU available if req'd: £625. Standard C500 dual-band h/held as new, s/mike, nicads, case: £315. Altron slimline mast rotor cage, g/post: £300. Shure desk mic: £15. Post extra. G4YRR QTHR. (Stoke-on-Trent) 0782 395017

● AMT2 used 1 week only, with Eprom for BBC. I am not good at typing: £200ono. (Portslade) 0273 418713

● TS930S mint cond, hardly used, boxed, auto ATU, Dewsbury FM board, fast TX/RX for AMTOR, MC60 mic, technical manual: £1250. Inc shipping in UK. David, G3NHB QTHR. (Cambridge) 0223 841304 eve.

● TS940 owners. Interested 6m. Have FTV107R tvtr professionally modified recently by Lowes for full compatibility with TS940. Inc patch leads. Absolutely mint cond, boxed with inst: £200. No offers please. G2FZU QTHR. (Southwell, Notts) 0636 813847

● YAESU FT102 tcvr. AM/FM, used RX only. FC707 ATU. MH1 and YM38 mics, SP102 spkr. 2m and 70cm cvtrs: £650. Swedish brass key: £40. Brother HR5 printer c/w mains adaptor, unused: £60. G0EXL QTHR. (Colchester) 0206 382432

● MINOLTA XG2 SLR F1.7 Rokkor ERC filter hood. All mint cond plus mint Vivitar macro zoom 28-200mm. As new, boxed. Both: £150. Lens only: £80. Also Dragon 32, BMK s/ware for RTTY/CW/ASCII/AMTOR with TNC. Offers around: £45. John. () 01-857 8096 after 111089

● TRIO 9R59DS gen.cov rcvr, inc matching spkr SP5DS. VGC: £75ono. G8UHT. (Sandbach) 0270 761120 or 0270 1089

● TEN-TEC Paragon with 1.8 and 0.5 filters fitted, plus FM board and desk mic: £1550 ovno. Daiwa 30A metered PSU: £140. AMT2 c/w Commodore 64 and s/ware. All you need to get going on AMTOR, RTTY etc. All items are in showroom cond. Genuine reason for sale. K. Baker, G4RPV QTHR. During office hours leave message on 056482 2808. (Birmingham) 021-459 7041 after 61089

● FOR sale or exch. Commodore C128 computer, disk drive, colour monitor, printer, all cables, boxes. As new. Also joysticks Expert cartridge games, W.Pro etc. Paper. All mint cond. For modern rcvr Trio, Yaesu, Icom etc. Larkspur outfit, complete, mint. C11 TX R210 RX, mains PSU, ATU, cables, mic, phones, junction boxes. Manual, works FB: £200. Or with C128 outfit for better RX or TX/RX. (Mansfield, Notts) 0623 29473 eve-w/e

● COMMODORE C64 computer, 1701 colour monitor, Datasette recorder, ICS Pakratt/C64 firmware, adaptor cable and overlays. All GWO, boxed with manuals. First sensible offer secures. G3FZW not QTHR. (Lichfield) 0543 262495

● TRIO TS830S with 500kHz CW filter, spare set of driver and PA valves: £675. G4UTQ QTHR. () 0670 824454

● BBC-B 80/40T D/S drive, green monitor, 128k sideways RAM, Epson RX 80FT printer, 100 disks. All in exc.cond: £450. Will split. To see working, please ring for appt. G1AJY QTHR. (Maidstone) 0622 36911 after 7pm1089

● TH6DXX: £130. Buyer collects and checks on air performance. Dismantles on site. Ant needs slight attention. G4MPQ QTHR. (Liskeard) 05034 432

● ICOM IC240 2m tcvr, as new. Mag mount, PSU: £125. G3ZBZ QTHR. (Manchester) 061-437 1734

● KENWOOD TM221E 2m, 45W, tcvr. Boxed, as new. Never used: £210. Icom IC32E with BC35: £280. Icom R71E rcvr, boxed: £525. Trio 10A PSU: £70. Kenwood MC60A mic: £45. (London) 01-852 1141 after 6p1089

● DATONG FL3 filter: £70. Hansen W720S 140-450MHz swr/pwr meter: £30. Yaesu MD1B8 desk mic: £40. G0IIF QTHR. (Selby) 075782 415

● YAESU FT708R 70cm h/held tcvr with chrgr. Exc.cond: £100. G1FUJ QTHR. (Bristol) 0272 674974

● YAESU FT747GX with mic, AM/FM board, CW filter, phones. Swr bridge, mint cond. Inc.carr: £550. John, G4YDM QTHR. (Washington) 091-416 2606

● FT102 with mic, FM/AM board, filters, manuals: £550. Spare set of 3 matched 6146B: £30. 2 driver 12BY7A: £8. Post WW2 VHF/UHF h/held TX/RX type RT159B. Gents sports 10-speed, little used: £80. Collaro 7in reel-to-reel tape deck: £10. Padded bags 4x8in. Qty 300: £20. (Trowbridge) 0225 761819

● FOR collectors. Cosmos, Gecophone, Varley, RI, Parmeko LFTs, LFCs. Variable coupling plug-in coil holders. National Velvet slow motion dials. Johnson ceramic UX TX valve-holders. Wearite coil-packs. Eddystone variable condensers, IFTs, etc. Litherland, G4IMT QTHR. (Chippenham) 0225 891254

● HEWLETT Packard RMS voltmeter 3400A 2Hz-10MHz, 1mV-300V in 12 ranges, manual. Offers. Hitachi AM/FM stereo rcvr SR503L, w/shop manual: £30. Screened valve holders B7G base: 50p each. 24V PCB mounting relays DPCO: 50p each. Pye Pocketphone PF2UB cases: £2.50 each. (Guisborough) 0287 42596

● FT290R complete in box. FRG7700 rcvr in box. FRT7700 tuner. Mic.Mod MML144/100LS 100W. All VGC: £500. May split. (Bolton) 0204 593484

● FT101ZD, WARC, manual, unboxed. Good clean radio: £400. No offers. Mr. Dixon, G4IYK not QTHR. (Cambridge) 0223 860681 x4449 da1089

● QRT sale. FT767GX with 2m module: £1400. KW1000C amp with spare 572BU: £360. 40ft wall-mounted crank-up tower: £280. Electric winch: £225. KR600RC rotator: £120. TB3 Mk3: £180. Hansen PEP meter: £60. SEM ATU with Ezitune: £95. Thandor freq.counter: £65. Complete set Giftu Spectrum programs CW/SSB/RTTY: £20. Spectrum 48k, not working: £10. TVI filters mains filter. Co-ax cable. Many other items. Buyer of tower/ant to dismantle. No timewaster please. G4DXG QTHR. (Tunbridge Wells) 0892 35830 after 6pm1089

● MARCONI standard sig.gen type TF 867/2. Good cond, however needs one coil pack rebuilding. Have details and manual. Range covers 15kcs-440MHz. Built like a battleship and weighs a ton. Needless to say valved!: £15. Buyer collects (Goodmayes) 01-599 6871

● FT200 tcvr, good cond with Homebrew second VFO 6146 PAs, RIT, AF filter: £190. G3VYI QTHR. (Farnham) 0252 722663 eve

● ICOM IC740 with FM, PSU, electronic key: £550. Yaesu FT2700RH FM tcvr for 2m/70cm plus gutter mount ants, 7/8 for 2m, triple 5/8 for 70cm plus hands free mic: £550. Yaesu FC902 ATU: £150. Mutek 28/144 tvtr: £180. Sota 28/432 tvtr: £150. Sota 144/1296 tvtr: £100. New unused 10XY ant: £50. G4HTO QTHR or packet via RP2 CD2 or SF2. (Mansfield) 0623 514974

● COLLINS 30L1 HF linear. New PA valves. PSU rebuilt. Exc.cond. Buyer collects: £500. Chris, G0EXD not QTHR. (Neston) 051-336 1589

● STANDARD C7800 70cm FM mobile, unused: £180. Teac FD55G Hidens disk drive, unused: £60. Panasonic 3.5in disk drive, unused: £45. 3x Claude Lyons mains stabiliser 240V/12A: £150. Torroid 240V-19-0-19V 1kVA: £35. Weller PU2D iron and PSU: £35. Koss ESP9 electrostatic phones with energiser: £50. HRO R/A type dial/drive: £25. Advance M65-10 SMPSU unused: £9. Please add post. Ted G3EJK. (Orpington) 0689 51208

● FRG7 RX: £100. Base scanner PRO2004 25-520MHz, 760MHz-1.3GHz. Almost new: £300. Datong RF processor 0-30dBS hi/lo mic match, wired Kenwood: £50. HF linear, Ameritron 400W. From 4x6MJ6 internal PSU. Very little used. orig.packing and h/book: £400. G3OJA QTHR. (Manchester) 061-445 1026

● IC275E c/w FL83, UT36, CR64, AG25 preamp: £700. IC475E c/w FL83: £650. CT16 sat unit: £50. Will sell complete for: £1300. SMC 25A PSU: £120. All mint and boxed. Also cassette deck modified for M/S: £20. G4JBH QTHR. (Yeovil) 0935 28341

● FT690/2, desk mic, BNOS 50W amp, Azden 2m FM rig, SEM Tranzmatch, ant mast clamps, rotator, 2m/6m beams, cables, bits: £550ono the lot. JVC GX88E colour video camera plus case, PSU, connects to any video: £150ono. G1ECL QTHR. (Milton Keynes) 0908 666861

● YAESU FT200/FP200 HF tcvr basestation 80-10m. All 10m xtals, manual, orig.packing: £100. 14AVQ vert aerial 40-10m. Good cond: £35. 30ft sectional wooden Joymast: £30. Scopex Calscope 10MHz dual beam scope: £100. Buyer collects. G3TJC QTHR. (Bradford) 0274 582781

● KENWOOD HS5 phones. Unwanted gift: £25, Kenwood SP50B/M spkr: £12. Hameg HM207 8MHz scope inc adaptor for monitor scope. Any test: £75. Tandy digital clock 240V: £6. BC221AK manual PSU. Orig. charts: £25. PSU for KW Vespa. G3RHM QTHR. (W.London) 01-423 2329

● SHIMIZU SS105S HF TX/RX SSB/FM all options fitted 15W. Superb first HF or mobile: £200. Hi-fi spkrs good: £30. (Chesterfield) 0246 569527

● LATTICE tower, 3x 12ft 6in sections: £60. All fittings inc. Jaybeam 8 over 8 beam: £15. (Hungerford) 0488 82757

● TS930S: £900. Ten-Tec Century 22: £200. Daiwa CNW419 ATU: £100. Datong morse keyboard: £30. Kenwood LP filter LF30A: £10. G4ZAU. (Oswestry) 0691 657696

● DRAKE T4XC, AC4, R4C. 3 filters, xtals WARC, MS4. All FB: £550. G3GGK QTHR. (Cambridge) 0954 210374

● FT77, no mods, never used mobile. As new, boxed, manual, MH1BB mic: £400. G0BUC QTHR. (Torksey, Lincs) 042771 340

● FTONE Yaesu: £900. FL2100B linear amp: £360. Tono MR150W 2m linear preamp: £100. Multi 700EX 2m FM: £120. Tau SPC ATU: £175. GP432X 70cm colinear: £23. FC902 ATU: £100. All in good cond. Full details. Tony, G4VTC QTHR. (Dorking) 0306 885533

● NORTH Leeds. Large detached house for sale. 4 beds, gas CH. Very high location, over 500ft. Nice gardens, garage, carport. This is an original 1930's large detached property which now needs some modernisation and improvements: £130,000ono. SAE to 34 Nursery Lane, Leeds, LS17 7HM. (Leeds) 0532 683884 eve

● JAYBEAM TB3 complete: £140. Gem quad 2ele: £100. 27ft ex-Army mast c/w kitbag: £15. G5RV TAR full-size: £8. ZX Spectrum 48k boxed: £30. Tape recorder, tapes: £10. B/W port TV: £30. 40ft Homebrew telescopic tilting tower: £150. 10m 3ele yagi. (Yorkshire) 0422 51852

● KENWOOD TR9130 tcvr, hardly used. All std accs, but no manual hence: £310. G.Baraclough, G8DLT QTHR. (Wimborne) 0202 695370 after 6p1089

● FC102 ATU: £150. Available with FAS14R remote ant selector fitted in ATU or can be used externally: £60. Both units VGC. G4UZK QTHR. (Hereford) 0981 540817

● YAESU FT901DM all bands. Mains and mobile operation, manual and leads etc. VGC: £500. Richard BRS88009. (Swindon) 0793 823621

● DRAGON disk drive, single, and DOS: £100. BMK packet program, cartridge, and modem: £50. Various computer and radio items. Move forces sale. No room. No reasonable offer refused, but be reasonable. SAE. R. Woods, 7 Austen Avenue, Sawley, Long Eaton, NG10 3GG. () 0602 731036

● 23CM 10W station complete. 2xD15 ant inc phasing harness, MMT1296/144 tvtr, solid state amp PA2310. Bargain at: £355. ATV cvtr MMC435/600: £20. 6m tvtr Mutek TVVF50C 144/50: £165. Adrian, G4ROA QTHR. (Coventry) 0203 412201

● KENWOOD TS830S and service manual. Also VFO240, both mint in orig cartons: £780ono. GW6RUO QTHR. (Clwyd) 0352 781099

● CROTECH 3133 25MHz bandwidth scope, 3mths old. Cost £385. Will accept any reasonable offer. GW4XLE QTHR. (Bridgend) 0656 740182

● TRIO TS830S HF tcvr. Exc.cond. Very reliable, c/w owners h/book and w/shop manual: £675. G4MPD QTHR. Buyer inspect/collect. (Cheshire) 0606 47552

● QTH 3 bed terrace. Easy access Waterloo, City. Close Richmond Park and Thames. Small gdn but 42ft ant support. Carpets, curtains inc: £145,000. G4HMC QTHR. () 01-878 5303

● TS830M HF tcvr, AT230 ATU, SP230 spkr unit c/w filters: £875. No split, or swap TS440S and ATU. Terry G4OXD. (Hitchin) 0462 35248

● RX No.40A 0.3-33MHz, 8-bands. Battery/mains. BFO. AM. Soiled case: £120ono. Buyer collects. G4KDV. (Otley, W.Yorks) 0943 463083

● JAYBEAM TB3 HF ant. Very good cond, up and running. Examination welcome: £165ono. G4RLZ QTHR. () 0566 82421

● LOWE HF125 all options fitted, FM, portable, keypad, carrycase with orig.box and manual: £395. Creed 444. 10 rolls paper and ST5 TU: £50 the lot. WS19 MK3: £50 inc Variometer 240V AC PSU and headset. G8RCG QTHR. (Knutsford)

056581 2262
● DRAKE T4XB transmitter with AC4 PSU, manual, v good cond: £250. Thandar freq.counter TF200, with TP600 pre-scaler, 600MHz, case, manual, mint cond: £95. Prefer buyer collects. G6AOC QTHR. (Oxford) 0865 243634 after 7p1089
● CTE 1600 2m h/held c/w nicad. Exc.cond: £120. Butternut HF6VX vert 10-80m c/w radial kit. Nearly new: £115. Yaesu FT107V tvtr 2m module fitted, with h/book: £115. KW2000A tcvr c/w PSU, unmarked cond: £175. G0KIJ. (Co.Durham) 091-581 0317
● SONY 2001D rcvr, as new cond: £260. G3UFO QTHR. (Solihull) 0564 777802
● KENWOOD TS430S multimode HF tcvr, inc FM, mic, user and service manuals, together with PS430 PSU and AT130 ATU: £800. Mic. Mod MMT144/28 10m/2m 10W tvtr, with leads for TS430S: £120. Together: £875. Decscope dumb terminal, VT52, Qwerty plus numeric keyboard, RS232 interface, selectable baud rate, parity etc. With manual: £20. HP3721A correlator with manuals, for scope conversion or WHY: £10. RadComs, bulletins, 1952-1983. Offers. Delivery possible reasonable distance from Southampton. G8FHF. () 0794 517484
● TONO 5000E RTTY terminal unit: £250. POCOM FTU2100 RTTY filter, matches POCOM AFR2010 decoder: £200. Penbie printer stand: £25. Datong AD370 active ant w/PSU: £30. Palomar LA1 loop amp w/6 loops 40kHz-15MHz: £100. Alpha Delta RT Transi-trap surge protector w/ spare cartridge: £10. GDC data switch Centronics Type-AB: £50. Edu-Equip PSU variable 0-30V 2A max: £35. Kantronics Signal Enforcer, audio filter, 115VAC or 13.6VDC: £50. Technical Associates active preselector 12VDC: £20. Dymek DP40 passive preselector: £30. Datong Auto woodpecker blanker: £20. Polaroid SX70 Autofocus land camera with self-timer: £50. Shipping extra. (Reading) 0734 722085
● BBC-B Viglen ROM slot cumana 40T/SS/DD Epson RX80FT Zenith mono monitor, View, Viewdata, Viewsheet, joystick. Serious games, chess, Scrabble, Monopoly, Hobbit. All exc.cond with boxes: £425. GM4GXD QTHR. (Pitcaple) 04676 251
● SCOPES. D43 working with copy of manual: £40. Old Cossor 2100: £10. 7854 double tetrode like QQVO6-40 with base: £15. Transformers. 450-0-450, 250mA: £10. 110V/5A: £10. Buyer collects. No offers. G1EHF. (Bracknell) 0344 412072
● POLARPHASER II PL259: £20. Twin Teac 51/4in half height SS40T drives FD55A cased PSU. GWO: £35. Newbrain computer with RS232. GWO: £35. Newbrain disk controller with intermittent fault: £5. 24MHz Prince green screen monitor: £65. Brian, G0KDX not QTHR. (Wigan) 0257 422547
● FDK multi 750E 2m TX/RX CW/SSB/FM 1/10W: £200. BNOS 12V/25A PSU: £200. BNOS linear LPM 144 10/100W: £165. Datong ASP RF speech processor: £65. Sinclair ZX Spectrum 16k: £20. All in mint cond and in orig. boxes. Homebrew PSU 12V/5A crowbar protection: £20. Cushcraft 4ele 2m aerial: £15. Amstrad PCW s/ware: Dr.graph graphics: £20. Statistics programs: Amstat-1/2 descriptive parametric non-parametric statistics: £30. Amstat-3 regression: £20. Amstat-6 Anova: £20. Quasar multipurpose statistics: £20. C-Stam Amstrad PCW to PC transfer: £25. All orig. disks and manuals, books. CP/M plus h/book: £6. Mallard Basic: £5. Radio Communication H/book 5th Ed: £10. VHF/UHF manual 3rd Ed: £5. Solid State Design for the Radio Amateur: £5. Andrew Thomas G8GNI. (Milton Keynes) 0908 568952 after 8.1089
● G2DAF linear using 4-250s. Working, needs some attention: £150. Andy, G4HUE. () 01-989 0867
● FT290R, boxed, nicads, mic, case, strap, 25W linear, PSU, Jaybeam 10XY: £250. Mutek TVVF50c 6m tvtr: £125ono. G1XYE QTHR. (Norwich) 0603 426649
● YAESU FT101 Mk1 with G3LLL speech clipper. New VFO. GWO: £275. Buyer collects. QTHR. () 01-530 5937 after 7p1089
● KENWOOD TS940S tuner, built-in mic. Lowe AM mod. Immac: £1600. Take mint TS711E pt exch. G4BXY, 31 Briants Ave, Caversham, Reading, Berks. ()
● HENRY 2KD classic linear amp. As new, see ads in QST: £1100. G3VXZ QTHR. (Maidenhead) 0628 27350
● KENWOOD TS520S tcvr with DG5 digital display counter. Exc.cond: £450. G4FVR QTHR. (Scarborough) 0723 365043
● YAESU FT101 80-10 HF tcvr, plus Europa-B 2m tvtr 50W O/P. Manuals, unmarked. GWO: £250. G1LCI QTHR. (Maidenhead) 0628 22352
● YAESU FT736R with 6m module, SP767 ext spkr, MD1B8 desk mic plus various ants: £1700ono. G1WXC QTHR. (Worthing) 0903 755898
● ICS Fax-1 demodulator. Decodes fax, RTTY and Navtex. Connects between SSB, RX and Epson compatible printer: £200. Tronix-1 7A PSU: £15. Tech TE22D audio generator, 20/200kHz: £15. G3RDG QTHR. () 01-455 8831
● FT901DE tcvr, memory unit fitted, CW/AM/FM/SSB/FSK, SP901 spkr. VGC: £400. FT290R, nicads, chrgr, soft case. Dial light not working, otherwise OK: £200. Would exch either rig for good HF gen.cov RX, eg R1000, FRG7 etc with cash adjust. G4NNO QTHR. (Merseyside) 051-645 5346
● STRUMECH Versatower 13M20P40 std post mounting with H2R H2R head unit, std winches: £400. G4PPZ QTHR. (Bridport) 0308 897189
● SILENT key, G3NHJ shack clearance. FT101: £150. 2200G Trio with P/S: £40. SEM Tranzmatch with noise bridge: £50. KW Z-Match: £40. Sony 2001: £80. Other small items, swr meters etc. All ono. No contact with widow please. G4OOS QTHR. (Brighton) 0273 307992
● YAESU FRG7700 rcvr with memories. FRV7700 VHF cvtr and FRT7700 ATU. Bought new and unused since A licenced. VGC: £250. Philip, G0FKE QTHR. (Brandon, Suffolk) 0842 810409
● REALISTIC Pro32 h/held scanner programmable 200 mem scan covers 68-88MHz VHF LW, 108-136MHz AM, 138-144MHz gen, 144-148Hz 2m Ham, 148-174 hi VHF, 380-450 7cm ham, 450--470 low UHF, 470-512 hi UHF. As new, in box. Cost £250. Accept: £130. (Bradford) 0274 602866
● SET of Yaesu mobile ants 1/4 wave 2m, 5/8 wave 2m, 80m, 40m, 20m, 15m, 10m, with gutter mount and coax: £50. Mic.Mod 2m preamp with 2 outputs, not RF switched, Belling Lee sockets: £10. Sony AN1 active ant suitable ICF7600, ICF2001: £20. Mini frequency counter, model FC5M, 1kc/s-50mc/s: £25. Shinwa LPF 50 ohm 500W: £10. 4 type HP3A high pass filters: £1ea. Amstrad 6128 computer with built-in disk drive, colour monitor, books etc. Bargain: £150. Homebrew G4IDE RTTY terminal unit: £25. Sanwa radio control outfit with transmitter rcvr, 35mc/s plus 3 OS35 engines, chrgr, batts etc: £75. (Exeter) 0392 877819
● TS830S, MC35S, mic, mint cond: £680. No offers. G4VQH QTHR. (Whitchurch) 094872 460
● RACAL Syncal 30 HF manpack 1.6-30MHz TX/RX, built-in ATU and swr/RF meter, 5/20W output USB/LSB/CW/AM fully waterproof, with nylon case, telescopic ant, headsets, handset, CW key, manual. Highest sensible offer secures. 10m 45W multimode USB/LSB/CW/AM/FM built-in swr/RF meter: £140. MIZHO 20m h/held USB/CW 2wks old: £139. Aircraft altimeter 50,000ft: £15. CCTV lenses zoom f15-150mm: £15. f20-100mm: £10. Racal MA4203 transformer 9x6x3in 240/110/24V from 12V supply: £60. Racal 4014B: £30. MA4280: £10. MA4231: £10. 2x unknown: £5ea. PP extra. (Ruislip) 01-845 4008
● PSION Organiser model L2 c/w case. New, never used: £100. No offers. Des, G4NEK QTHR. (Bedford) 0234 852865
● KENWOOD TS670 quad-bander. All modes. GC RX. Voice synthesiser. Twin VFOs. 80mem. 10W output. 12/13.8V working. VGC: £575. G3GHB QTHR. (Worcester) 0386 792582
● TRIO TR9130 2m multimode. Boxed in manual, mic. Halo ant m/mount. VGC: £330. G4IAR QTHR. (Loughborough) 0509 217655
● ICOM IC202 2m SSB tcvr and helical ant. Boxed: £95. G8IBO. (Reading) 0734 580082
● KW2000E tcvr, manual, spare valves: £250. Altai dip meter 1.5-250MHz. Buyers must collect. Both good cond. All QTHR. (Uttoxeter) 0889 562445
● MOSELEY TA33JR tribander in fair cond, hence: £15. 6ele 2m quad as new: £20. G3MSW QTHR. (Harpenden) 05827 5549
● MARCONI 118T GP RAF airborne RX 150kHz-18MHz AM/CW filmstrip tuning. All valve 28V with spare rotary transformer. Cond unknown, believed working, unmoded. Buyer examine and collect. Offers around: £25. G3AVJ QTHR. (Liverpool area) 051-489 3325
● TS830S boxed in immac cond. Inc 500Hz CW filters and deluxe knob: £700. AT230: £130. SP230: £30. DL600 600W dummy load: £25. LF30A low pass filter: £15. Mark Brincat G0DYX. () 0634 44400 x3769 day1089
● FV101DM remote VFO in GWO: £110ono. Tony G0KUL. (Bognor Regis) 0243 865468
● YAESU FT101ZD, FM, fan. FT901R 6m, 2m. FC902 ATU: £900. No split. 432 tvtr M/M 22m IF: £90. Kenwood 3200 FM and accs: £85. Eddystone 770R Mk2: £40. FT290 Mutek F/E, nicads, r/duck, chrgr: £235. M/mount: £15. MM144/30LS: £70. Alinco ELH230E: £40. Welz SP380 18-200Hz 200W: £30. Hansen SWR50B: £15. Hokusin duplexer 2m/70cm: £15. SEM VHF Tranzmatch: £15. Heathkit regulated HV PSU: £40. G4MH ant: £50. 100W dummy load: £20. High Mound HK704 key: £15. VD84VA mic: £15. AKD WA1: £20. GP432 3x5/8 vert base: £40. GP23 3x5/8 vert 2m: £15. PF70x2 chrgr, m/mount converts to 4m. Plus some xtals: £50. Boot Westminsters, remotes, spkrs, mains PSU. Some xtals 2m/70cm/4m. G6TEQ QTHR. (Newton Abbot) 0626 65754
● YAESU FT101 HF tcvr c/w G3LLL speech clipper. Good cond. Boxed with manual: £250. Buyer collects. G4GTR QTHR. (N.Derybshire) 062987 475
● DATONG PC1 gen.cov RX cvtr: £100. Datong morse tutor D70: £40. Both hardly used. G4FAI QTHR. (London) 01-368 4588
● ICOM IC740 HF tcvr 9MHz and 500Hz CW filters, high shape factor FL44 455kHz SSB filter, FM, electronic keyer, marker unit. Service manual, exc.cond: £650. Bearcat 220 scanner: £70. 2m/70cm colinear: £25. Buyer collects, carr.extra. John, G4PEO QTHR. (Horsham) 0403 67338
● JAYBEAM TB3 tribander, exc.cond: £110. FT709R 70cm h/held with chrgr, FNB4 etc: £140. Kenwood TS820D 160-10m TX/RX, digital display, IF shift, unmarked: £490ovno. Will deliver reasonable distance. G3TCO QTHR. (Bristol) 0272 681068
● YAESU FL2100Z: £600. FT290R: £250. FT780R: £350. YO901P: £350. CBM64 with Comms package: £175. All ono. G4SUI QTHR. () 0924 495916
● COMPLETE Icom HF station with accs switch controlled from tcvr, comprising the following: 740: £600. 720A: £600. ICLKL: £1200. AT500: £300. All with PSU. TB2: £150. Altron 35ft telescopic tiltover wall mounted mast: £300. All the above in mint cond. Would like to sell station complete for £2850, but will consider separately if necessary. Buyer inspects and collects. G0CJU QTHR. 0342 312374 w/e.
● HOWES CTX80 board with xtal £10. CVF80 VFO: £6. Manuals, TS418/U, TF1041B, PTC2107, 1155 photocopy: £3ea. Assort wire-end valves: £2.50ea inc post. M1ZUHO 2m tcvr SSB/CW 250mW h/held. GWO: £35. John, G4VPU QTHR. 091-252 2304.
● IC240 2m mobile with all channel modification: £110. BNOS 50W linear with preamp, nearly new: £75. Will sell as a pair: £175. G4AEZ QTHR. 01-360 7100 eve.
● KENWOOD TR9500 70cm multimode tcvr, mint cond with cavity wavemeter and mobile whip: £275. Matches TR9130. Mic.Mod. 2m gasfet preamp: £20. Howes DC/RX80 rcvr built in metal case: £20. Martin G0HRZ. 01-590 5490.
● YAESU FT208 2m FM h/held 144-148MHz coverage, c/w case, chrgr and spare batts: £125. G4SAI QTHR. 0707 330419.
● YAESU FT290R with Mutek preamp, heavy duty nicads and chrgr. Tono 2m 40G 2m linear, 30W output. Daiwa CN540 swr/pwr meter: £300ono. GM1DSK. 0738 31161 after 6pm.
● YAESU FT101, VGC c/w service manual and spare valves: £300. G0IPD QTHR. 0784 251310.
● TS820S, TB3 tribander, KR600, Kenwood dip meter DM800, Decca KW103 swr/pwr meter. Going QRT. Offers to G4IXX QTHR.
● HI-GAIN TH5DX 3-band beam. VGC: £250. Cu-Dee 4ele 10m mono beam, as new: £30. Cushcraft 3ele 15m mono beam: £90. G3PJK QTHR. 061-653 3213.
● GOING QRT. TS940S little use: £1300. MC60 mic: £40. Kenwood SP230 spkr: £30. Yaesu FC902 ant tuner: £120. Mini-Max 3ele tribander: £170. Cost over £300. New Altron tiltover 30ft mast with KR400RC rotator. Control box needs attention: £180. 10m FM Icom and repeater shift 50W amp: £20. 2x PSUs 8A cont, 10A surge, 3A Bremi: £15 the pair. Welz pwr meter SP350 1.8-500MHz: £40. Adonis mobile mic: £10. Kent brass key: £25. Altai tr.dip meter. Never used: £25. Drae VHF wave meter: £5. Met wide-spaced 5ele 50MHz beam: £20. Brian, G4XWI QTHR. (Gravesend) 0474 566479 w/e.
● HOWES built 80m tvtr: £60. CT30 ATU: £20. Himound MK705 paddle: £20. Touch key: £15. Expander 500 mic: £20. Pair PFI pocket phones plus night chrgr: £25. All immac.cond. Colin, G4ZVS QTHR. (Birmingham) 021-444 7804.
● COLLINS TC5 series TX Col 52245, WW2, 1.5-12MHz with pwr pack. Offers. G4JBL. (Shoreham, Sussex) 0273 452617.
● TRIO TS780 2m/70cm multimode basestation tcvr. Exc.cond: £700. Matching spkr SP71: £30. MC60 desk mic: £50. Trio TR2500 144MHz h/held c/w ST2 base chrgr, MS1 m/mount SMC25 spkr mic, spare PB25 nicad: £160. Bencher chrome lambic paddle and Diawa DK210 electronic keyer. Both mint cond: £75. 70cm 100W linear and PSU, 2x2C39: £100. 2m linear 2x4CX250: £200. Farnell 13.8V 5A PSU: £20. 144MHz 4ele tonna, mint cond: £15. Welz CHZON 2-way N-type coax switch: £20. High pwr VHF/UHF thru line pwr meter: £20. Cushcraft DX120 2m DX-array, unused: £35. LDF450 N-plug: £10. Fluke DMM 8010A. Offers. 12in B/W portable TV: £25. Alan, G4PSU QTHR. 0635 71150 after 7pm.
● YAESU FT726 multimode 70cm/2m/6m plus satellite unit: £950. Mic.Mod 2m/6m tvtr: £200. Lowe SRX 30 comm rcvr: £75. All in VGC. G6ZOI QTHR. (Selby, N. Yorks) 0757 288185.
● YAESU FRG7700 comm rcvr plus FRV7700(2) VHF cvtrs, boxed, unused: £300. Eddystone model 770U plus model 770R reconditioned: £90ea. Eddystone dial, new: £15. Marconi vacuum tube voltmeter, unused: £35. Sig.gen: £30. Scope: £50. 0633 253949.
● HEATHKIT SB102 valve HF tcvr, PSU, spkr: £175. Heathkit SB104 13.8V HF tcvr, PSU, spkr: £350. Maplin TU1000 RTTY terminal unit: £50. Tokyo Hypower Micro 7 70cm handie: £50. All ono. G0CCU QTHR. (Bristol) 0272 721744.
● SSTV robot 400 fitted with 3000C colour board, frame and line sequential, sync separator, manuals, circuits, leads, GEC camera, old but working, colour filters: £350. G4PAD QTHR. (Essex) 0375 671238.
● KANTRONICS KAM 2.85V all-mode with Weefax TNC. All leads 2m, HF. Manual, BBC programs disk, and Eprom programs. 9mths old: £220. Would consider pt exch modern gen.cov HF RX. G4NKH QTHR. 0253 62925.
● YAESU FT211RH 2m/FM mobile 45W as new: £225. Icom 260E 2m multimode: £230. Trio TH205 2m h/held with spkr mic: £170. Yaesu FT221R with Mutek: £350. Icom 202E, VGC: £140. Belcom LA106 2m linear, bust: £40. G0HAS. (Swindon) 0793 874614.
● RA17: £125. Cotron 14in colour VDU plus I/R touch: £50. Apricot FP portable computer, 1M RAM, mouse, loads of s/ware: £250. Philips System-4 phone, working: £50. Storno CQM713P3 2m synth, manual: £25. Storno CQP863R portable, 70cm, manual: £30. HP storage display: £20. Rick G8KSM. 04896 661.
● TENAMAST 42ft/21ft modified c/w 3ele Mosley tribander beam 20/15/10m rotator and cage: £300. Heathkit SB610 monitorscope c/w manual: £45. Sig.gen Taylor 68AM, no manual: £45. All exc.cond. G0GXX QTHR. (Leeds) 0532 537439.
● JAPAN Radio Company NRD515 comm rcvr ser.no BR25534. Pristine cond, one of last batch manufactured. Fully checked by Lowe Electronics July 1989. First sensible offer secures. Heavy duty rotator. Exch 2m mobile or HF mobile. G3LPA QTHR. 0536 760336.
● YAESU FT102HF, FTV901 trans 2m/70cm. FC902 ATU: £550ono. For complete station sale only. G4VTC QTHR. (Dorking) 0306 885705.
● EDDYSTONE EA12 still a v.good rcvr, c/w manual and spkr plinth. (Canworthy Water) 056681 493.
● TOKYO Hi Power 10m SSB/CW tcvr. M/mount, noise blanker fitted: £190. FT23R 2m h/held, batt, chrgr, case: £150. HF6V Butternut HF vert ant: £85. G4IGK QTHR. 0296 747013.
● KW Atlanta tcvr c/w pwr pack, manual, diagram, KW Eze-Match, KW101 swr meter. All in good cond. Has been serviced by KW: £200 the bundle. G3ZOV. 0843 220125 day 0843 227061 eve.
● VIC-20 Datassette, 16k expansion, s/ware inc Music Composer, educational, games, plus Maplins RS232 interface kit, unmade, leads, books, also PAC RTTY module (needs) personal ident Eprom ie TMS2532 otherwise FB. All for: £110ono. Les, G4HBU QTHR. (Bristol) 0272 611093.
● FT101ZD Mk3 FM, fan: £475. SP901 spkr: £30. FC902 ATU with fitted PEP metering: £150. Trio TS120S: £375. Trio 7730 25W 2m FM mobile: £175. Trio 2200 nicads, chrgr: £80. Prefer buyers inspect and collect. Owen, G3NXK QTHR. 0621 816265.
● FT101E: £120. Prefer buyer inspects/collects. MK701 key: £8. Inc.PP. Brian G3NSU. (Leeds) 0532 630661.
● 70CM module for FT726R. Boxed, good cond: £230. G7AFH QTHR. 0772 621948.
● TRIO 751E multimode, purchased late Feb 89. Mint, boxed with mic. Hardly used. Owner decided against mobile use. Ideal for basestation which owner already has. New price £599. Sell for: £475ono for quick sale. G4SIB QTHR. 030677 362.
● DRAKE TR7, updated to TR7A spec. All filters, all bands, noise blanker, PS7 PSU, h/books, Orig.packing: £725. G3FKH QTHR. 0432 267876.
● SUPERB VHF/UHF QTH. 600ft ASL yet only 15 miles central London. Flint and brick semi-det period cottage in completely rural location within the sought-after area of Downe, Kent. 6 miles Bromley. 3 beds, dining room, sitting room, fitted kitchen, bathroom, detached garage, full CH etc. 60ft HD tower, 66 countries worked 144MHz. Offers in the region of £160,000. Clive Penna, G3POI QTHR. 0959 75992.
● ICOM 751 100W HF tcvr, SM6 mic. Alinco 25A PSU: £630. G4VXB QTHR. 0795 533143.
● HANDHELD, Icom IC2E, nicads, mains chrgr, mobile chrgr cord. Separate spkr/mic: £180. G3JIE QTHR. 0603 714686.
● COLLINS KWM2A PM2 312B5, RE: £675. Kenwood TS930S auto ATU extra filters: £1200. Eddystone S940: £110. Consider exch Collins RE 75S3B 3253. Buyers collect. G3GBB not QTHR. 0284 753049 day 037983 657 eve.
● YAESU FT290R Mk2 2m tcvr, FL2025 linear amp, MMB31 m/mount: £375. FRG965 VHF/UHF comm RX inc ext HF conv: £275. G4CXA QTHR. 061-223 7716.
● FT200 matching PSU. Ideal beginners 1st HF rig. Very easy to load 10-80. Would consider exch for FT290R etc or: £225ono. Eamon, 63 Glenariff Cres, Ballymena, BT43 6ET. Sorry no phone. ALA.
● TS520S with mic, CW filter 10MHz: £400. T520 ext VFO: £50. JIL SX200 scanner: £75. Leak Stereo 30 amp: £30. Leak Stereofetic FM tuner: £25. Early ERA Microreader: £75. Carr.extra. Hallicrafter S36 FB R8-143MHz: £70. Collect. G4IOT QTHR. (Folkestone) 0303 276063.
● ICOM IC720A solid state 9-band 100W HF tcvr, 100kHz-30MHz. Gen.cov all modes, FM/SSB/CW/AM/RTTY. Built-in variable speech compressor. Boxed, in exc. working order. £635ono. G4OUB QTHR. 0773 761412.
● VERSATOWER 60ft inc winches and cables. 2m crossed yagi and 70cm beam with 400ft of low loss coax. Bargain at: £425. Diawa MR750P rotator with round controller plus all cables. Cost £254, 6mths old. Will accept: £140. Yaesu FT767GX with 2m/70cm units. All mint: £1275. G1MVO QTHR. 0836 647938 day 0530 417335 after 6pm.
● TRIO 9R59 gen.cov RX. GWO, VGC: £45. National NCX5 tcvr with manuals, circuits, mic, calibrator, spare valves. Working: £125. Hallicrafters S27 RX. Fair cond: £35. KT88 valves x4. Boxed, offers. Eddystone FM tuner. Good cond: £20. P.

Mitchell, 19 Asbourne Ave, London, N20 0AL.
● HL2K HF linear 2x 3-500z: £900. TB2 triband yagi: £130. DB4 4ele 6/4m: £50. 70cm Cushcraft boomer yagi: £50. Braun SE600 digital 2m multimode tcvr: £135. MZ80K computer c/w twin disk and printer: £150. Revox B77 reel-to-reel recorder: £450. Revox linear record deck: £175. M100 DAT recorder: £675. M500 DAT recorder: £725. Bird 43, no elements,: £100. 2m linear 2x 4CX250B. Needs some attention: £295. Hi quality outdoor movement detector: £40. Clarks SCAM pneumatic mast: £500. FTZ700RH 70/2m tcvr: £300. Telequipment D54 split beam scope: £100. Sea-Ranger 5600 marine VHF TX/RX : £130. 50TV 6m module: £175. 0703 255631 day 0703 813922 eve.
● TEN-TEC Century 22 HF CW tcvr 50W 3.5-28.5MHz fitted. C/w keyer and calibrator: £300. Ten-Tec PSU 230VAC/13.5VAC: £60. DC circuit breaker for Century 22: £10. G3UQZ QTHR. 021-373 8806.
● MICROWAVE Modules 70cm pwr amp MML432/30L. Good cond, as new: £150ono. 995 Marconi sig.gen: £50. 1066 Marconi sig.gen: £75. John QTHR. 0353 741354 after 6pm.
● WESTERN Tower 40ft plus head unit attachment, c/w rotator, 2 winches raising and tilting, plus a Western DX33 triband trapped ant penetrator plus 17ele tonna 144MHz plus mast head preamp, coax. The lot: £500ono. Buyer collects. Peter G0KEP. 04867 81358.
● PACKET PC TNC DRSI type 1 VHF/HF: £80. 045383 3411.
● 3ELE beam hy-gain with rotator, cables, balun, control unit. Purchaser dismantles: £100. G4JW QTHR. (Sheffield) 0742 303686.
● PYE 50W transistor PA type A200 on 4m, new, with h/book: £75. CDR AR22 rotator: £35. Tonna F9FT 23cm 23ele: £15. McElroy bug key: £25. 4CX250B chimneys ceramic x2, PTFE x1. Offers. Andrew Helix, new. G4MAW QTHR. 0803 555488.
● COMMODORE C64, Pakratt 64, disk drive, T.deck Seikosha printer, green display monitor, PSU's, Doctor w/p package, s/ware inc Basic programming course plus various other packages. Full supporting manuals. Will not split: £450. G0DCS. 0582 576107.
● ICOM IC2KL linear amp with matching IC2KLPS PSU, as new: £1150. Buyer inspects and collects. EI9FE QTHR. (Tipperary) 062-51592.
● SCOPE Marconi TF2201 dual trace DC-30MHz 0.05-50V/cm, 50nS-500mS/cm with slideback voltage and time measurement scales. Complete set of manuals. Only: £55 for quick sale. Mark Lee, G6FKN QTHR. 01-876 4379 eve.
● RACAL RA17 Mk2 gen.cov RX 0.5-30MHz rack mounting model with manual: £140. G3VSB QTHR. 0889 590289.
● LONG persistance CRT 3FP7 plus base ideal for VLF scope: £4. Stack of 88mH inductors plus inst for W3NGN CW filter as in ARRL h/book: £5. Post £1 on each. G3HNP QTHR. 0493 393560.
● KAM TNC V2.83 with Tandy TRS80 model 3 and loads of s/ware. Make a reasonable offer. G4DRH. 0253 730033.
● CREED 444 with manual plus pag TV. Homebrew: £75. SR9, VHF, VFO plus 3 xtals and m/bracket: £30. SAS. Cash only apply. G6EZK. 0703 260936 anytime.
● TRIO 9130 2m multimode 5/25W. VGC: £350. G0GKL QTHR. 0424 444376.
● DYNAMCO 7100 scope with 1x1 and 1x2 timebases, all manuals and carrying muff. VGC: £125. Star phone 70cm tcvr on RB6: £45. PSU 12V 20A with O/V, O/C and overtemp protection: £70. G3OQO QTHR. 0788 72219.
● COMMODORE PET 3016 green screen 16k RAM with dedicated tape deck: £50. G3WUZ QTHR. 0278 786330.
● SHACK clearance. FT757GX as new, boxed, mic, manuals: £575. Hy-gain tri-band vert: £30. Unused complete VHF rotator: £25. Also dummy loads, ants, dip meter. 150MHz swr bridge, cable etc. Phone for details. G4UPV QTHR. 0705 501718 eve.
● COMPLETE Yaesu HF station. FT757GX, FC757AT, FP757HD, MD1 desk mic, low pass filter: £865. FRG7700 rcvr with ATU and 2m cvtr: £250. KW108 monitor scope: £45. CWR610E CW and RTTY decoder c/w amber monitor: £150. All in PWO and exc unmarked cond. Orig.packing c/w h/books and full inst. Genuine sale due to bad health. Frank, G0HAO QTHR. (Cowes) 0983 293402.
● FT726 owners. 6m module. Boxed with inst, practically unused. Bought new from SMC last year. Sale: £250. No offers please. G2FZU QTHR. (Southwell, Notts) 0636 813847.
● TRIO TS830S HF tcvr. 1st class cond. 160-10m inc WARC bands, SSB and CW. Little used and very reliable: £700. G4MPD QTHR. (Cheshire) 0606 47552 after 6pm.
● KW Vespa Mk2 and orig PSU: £70ono. Sommerkamp FLDX500: £25. Both clean. Carr. at cost. G4ORR. (Hull) 0482 24743.
● FT707, FP707, FC707, m/mount. VGC: £500. G4KIN QTHR. (Liverpool) 051-526 4777 after 6pm.
● ICOM 761, Icom 745 2m and 6m tvtrs. Collins 30LI HF amp c/w control station. Spare valves. Datong FL3 HF, VHF, beams, complete pkt station. 40ft lattice tiltover mast. B/plate mounted c/w rotator plus accs, PSUs meters etc. Moving abroad. Realistic offers only. G0DXC QTHR. (Southampton) 0703 421862 eve-w/e or via pkt on 675.
● SHOLING, 1 mile from Southampton centre, good HF/VHF QTH. 3 bed semi, fitted kitchen inc electric oven and gas hob. 2 reception rooms, utility. Modern storage heater system on Econ 7. Large rear gdn, driveway to carport. In superb decorative order. 40ft lattice tiltover, b/plate mast with planning permission: £66,950. No chain. G0DXC QTHR. (Southampton) 0703 421862.
● BUNGALOW. Detached approx 1/4 acre, secluded gdn, twixt sea and Sussex Downs. 4 beds, pine kitchen, 29ft lounge with south-facing patio access. TA33/2m beams atop 40ft mast, easily lowered for servicing. 150ft l.w.: £125,000. G3LQI QTHR. 0903 754017 or 0860 420082.
● YAESU FC700 ATU suitable for FT707, FT77 etc. 100W with swr meter and dummy load: £100. G4ODD not QTHR. (Tuxford) 0777 871915 after 6pm.
● WW2 German precision VHF meter type 183. Exc.cond but heavy. Free but must be collected. Also Kenpro KR500 elevation rotator. Used one season: £80. G3FPJ QTHR. 0364 52238.
● YAESU FT7B HF 50W tcvr, with 1.8, top band, and FM added: £290. Yaesu FT480R 2m multimode tcvr 1-10W: £260. Manuals etc. Both in fine cond. G1LCI QTHR. (Maidenhead) 0628 22352.
● 100W HF solid state tcvr 1.8-30MHz. Yaesu FT301D with digital readout, AM and narrow CW filters. FP301 mains PSU with spkr, 12V mobile lead, mic, all inst and packaging. Robin, G4IRD QTHR. (Northampton) 0604 644341.
● TRIO TS830S HF TX/RX fitted YK88 CW filter, in mint cond. Basis of superb HF station: £650. £1200 new. Spectrum ZX 48k computer: £48. (Thanet) 0843 294446.
● ICOM IC210 2m basestation, boxed, like new: £160. DX300 digital comm rcvr: £120. Creed 444 teleprinter with stand and terminal unit: £50. G8GIL QTHR. 0525 371307 eve.
● KENWOOD SM220 monitor scope, still under guarantee. As new, boxed: £275. Mark, GI3YDH QTHR. (Belfast) 0232 795783.
● KENWOOD TS440S with 500Hz CW filter fitted. Few months old, little used, mint cond, boxed: £900. Mark, GI3YDH QTHR. (Belfast) 0232 795783.
● 2M tcvr FM 1-25W multi 700EX FDK: £145. ATU SEM Transmatch 160-80-10 Ezitune fitted: £100. Trio TS120S 100W tcvr: £450. Linear amp FL2100B 1200W: £650. (Stafford) 0785 840872.
● DRAKE L4B linear, 50hrs use. Mains transformer s/c to core liner two in good order. Offers on both or separate. G3GJZ QTHR.
● TS930S c/w YK88C, YG455C filters, service manual, h/bk; faulty PSU, not working, for spares or repair, hence £495. Dentron GLA1000 B HF linear, gwo, £295. GW4RYK, 068 686 255.
● KENPRO KR-500 elevation rotator, never used, £100. Chartwell LS3-5a loudspeakers, pair, £150. John, 0743 884822
● ICOM IC-R7000 scanning receiver with remote control and speech modules fitted. D-13ON 25-1300MH Discone Antenna. Offers. G4ZTX QTHR.
● SCOPE, Solatron CD1212, 40MHz single trace, 24MHz dual trace: £75ovno. FRDX500 amateur bands rcvr. All modes, all filters fitted. Also 2m cvtr and preamp: £100ovno. Both items in exc.cond, c/w manuals. Ken, G4WAS QTHR. (Walsall) 0922 475057
● AVO valve characteristic meter Mk4 with valve data manual. GWO, clean cond: £25. Hewlett Packard clip-on ammeter 1mA-10A: £25. Commodore 1526, MPS802 NLQ serial printer 80cps, double stroke, dot matrix: £75. Bremi 200W linear: £50. Icom 1050B, all mods: £40. (Grays, Essex) 0375 378783
● KW1000 linear, new condensers: £270. Kenwood Trio TS780: £510. MM144/50S: £90. MM MML430/20: £75. MM frequency counter to 430MHz: £80. (St. Austell) 0726 843487
● YAESU FL101 TX, FR101 RX separates. Exc.cond: £450 pair. EK150 Katsumi squeeze keyer, variable speed. Hardly used: £55. W.Woollcott, 34 Southlands Grove, Newby, Scarborough, YO12 5PH.
● BBC-B Issue 7 DFS. 80T D/S disk drive. Mannesmann parallel printer, s/ware, leads, manuals: £380. No splits. Alan G0GAR (Stafford) 0785 662879
● YAESU FT790R, nicads, chrgr, soft case, manual, boxed. Tokyo HL30U 70cm linear. All mint cond: £280. G4TDR QTHR. (Wolverhampton) 0902 765374
● FT290R, chrgr, nicads, car-mount 7/8 gutter mount. Tokyo linear 30W. Good cond: £275ono. G8GMT. 0543 75355
● 6M tvtr 144MHz IF with 25W linear, both spectrum. Exc.cond. Little used, hence sale: £90. Mike, G7CHD QTHR. (Northampton) 0604 584933
● FT757GX: £580. FT757 mobile mount: £20. FC902 ATU: £145. Datong FL3 filter: £85. BNOS 25A PSU: £145. Uniden 2830 10m multimode: £240. G4OBS QTHR. (Farley, Wilts) 072272 752
● AMSTRAD portable computer PPC6400. 2x 720k drives, built-in modem. Hardly used, genuinely as new cond: £500ono. G4IDE QTHR. (Boston) 0205 63454
● PROFESSIONAL transistorised Racal comm rcvr RA1217, 500kHz-30MHz. IF filters, 200Hz, 500Hz, 1.2kHz, 3kHz, 8kHz. A lovely rcvr with all technical manuals. Cash needed for other projects: £300. Dave, G4ZAO QTHR. (Taunton) 0823 253904
● ICOM IC2E 2m h/held c/w case, spare batt, chrgr and manual. As new cond: £125. BBC computer with DFS and cased dual 80-track double-sided half height drives with manuals and View WP: £275. Will split. Hewlett Packard equip, HP59400A, RS232C to HPIB cvtr: £100. HP86341B 3.2-6.5GHz YIG oscillator module: £250. HP41CV calculator, new and boxed: £75. Card reader for HP41, new and boxed: £50. HP8443B tracking generator: £500. HP5105A, 5110B direct freq. synth 1/10Hz to 500MHz in 1/10Hz steps with own keyboard and freq standard: £500. HP1815A TDR/sampling plug-in for 180 series: £250. HP1123A FET active probe 220MHz BW: £50. Bryans 25000 A4 XY plotter, new in carrying case: £125. John. (Watford) 01-428 0974

WANTED

● YAESU FV102DM ext digital VFO c/w leads and manual please. Peter, G4XHY QTHR. (Stamford Bridge, York) 0759 71022
● VHF marine band rcvr Daiwa SR9, Belcom AMR-217B or similar, state xtals fitted. G0GKL QTHR. (Hastings) 0424 444376
● HF tcvr base or mobile 80-10. WARC bands not essential. FT7, FT101 or similar. QTHR. (Coventry) 0203 450476
● ICOM AT500 ant tuning unit. Must be in exc.cond. G3SJH QTHR. (Birmingham) 021-427 1115
● H/Book or CCT diag for Minimitter double Superhet. Ham bands only. MR44 Mk2. Outright purchase or photostat please if poss. (Hemel Hempstead) 0442 46910
● HF tcvr, FT101ZD Mk3 or FT707 with PSU, must be mint and no mods. Jim. (Bournemouth) 0202 518828
● CIRCUIT diagram of Heathkit OS1 scope. Also MSM5807 chip or advice on where to obtain. Reimbursement made for photocopies etc and phone calls. Any help most appreciated. Taff. (Doncaster) 0302 789192
● HELP! Can anyone help me with a KR600RC control unit. I need a good second hand one. Johnny. (Gainsborough) 0427 5266
● VARIACS. 2A, 10A plus larger 16A? G3RPD. () 0285 76329
● 2ND VFO, kHz scale, unit for Racal RA17 working or not or will buy scrap RA17 any model for spares if 2nd VFO intact. 2 req'd. (Mansfield, Notts) 0623 2229473 eve-w/e1089
● MEDIUM wave command rcvr, also R1475 RX and T1154 TX. G3VXI QTHR. (Lincs) 05216 382
● ATLAS DD6C digital dial atlas 220-CS/VX AC console atlas MT1 transformer. QTHR. (Chalfont St. Giles) 02404 3926
● DRAKE R7A, RR3, DSR2 or R4245. Cash waiting. G3YFK. () 0743 884858
● BOOKS for African Student. Electronic Devices and Circuits: Bogart. Telecommunication Technician: Smithson, Book 1 and 2. Steve, G4MQX QTHR. (Axbridge) 0934 732655
● RADIO/television leaflets from any period for display in the Wireless Museum. Also wartime/prewar Radio Times, catalogues, magazines, books, etc. BBC and Hi-Fi Year books. Cartridge and wire recorder. Car radios, mics, keys. List amateurs before WW1. G3KPO QTHR. (Ryde, IOW) 0983 67665
● COLLECTOR requires clean SX28 or SX28A rcvr. Data needed for 358X/B34, R107, NC190 RXs. Valves S130P, X81, KT81, 3TF7, 6K6GT. Narrow SSB filter for R7A; CF 5.645MHz, BW 1.8kHz. Photostat of R7A w/shop manual page 2-33. Illuminated S-meter for HROMX. AR88D parts: dial-lock thumbscrew, voltage selector bakelite plug, tuning-gang thumbscrew, IF quartz filter xtal. Stereo pair big spkr pushpull transformers eg for 2x KT88 per channel. WHY? Chris G8JFJ. (Horndean) 0705 596836
● IC781, IC781, IC781. Must be in good cond. Howard, G0HZH QTHR. (Suffolk) 0394 460474
● UNMODIFIED Heathkit RG1 RX. Codar 250/S AC.PU. Send details/prices to Marris, 35 Kingswood House, Farnham Road, Slough, SL2 1DA.
● SP102 spkr for FT102 must be in good cond. G3WHO AMTOR/RTTY s/ware for BBC with Versaterm. Frank, G4YXS QTHR. (Westbury) 0373 88678
● REEL-to-reel tape recorder, 12in spool minimum. Ideally Akai GX635D. Other makes considered. WHY? (Great Yarmouth) 0493 393658
● AP1186D Vol.1 sec.8, chap.5 Power Units 32-35A. Also AP1186E Vol.1, sec.6, chap.4 Power Units 114 and 115. Will pay £20. Am interested in all other APs. M. Gee, 17 Foxley Close, Mountford Est, Ferncliff Rd, Hackney, London E8 2JN. Many thanks. (London) 01-254 9083 or 01-791089
● 1154/55 rotory cvtrs, motor generators, used to supply pwr to 1154/55 aircraft transmitter/rcvr combinations urgently required to get otherwise completed installation airborne. Any info on possible source of supply of these very welcome. Larry, G0HTR QTHR. (Tamworth) 0827 898024
● EDDYSTONE panoramic display unit EP961, unit to be near mint cond, with leads and manual. Will arrange collection. Box 5347, Ras al Khaimah, U.A.E. ()
● CASSETTES for early Minifon dictating machines and for Garrard tape decks. Also early portable tape recorders. Simmons G6CBE. (Chipping Norton) 0608 3377
● PSU type 20309 for Collins TCS12 TX/RX. Also connectors for same. T1154 plus connectors. Type-F morse key. Type-A hot wire ammeter, or Type-D. Thermo couple ammeter. Peter, G0DRT QTHR. (Kent) 0795 876277
● VFO 230 ext VFO for TS830. Must be mint. GW3TMP. () 0244 549563 day 03521089
● HF 3-30MHz element for Bird 43 Thru-line. Also KW E-Zee Match ATU or similar. G3SLI QTHR. (Reading) 0734 474992
● YAESU CW filter type XF30C for FT101E. G4DAU QTHR. (Nailsea) 0272 852304
● CIRCUITS and data Plessey AR1 radar 12in viewing unit type 12600N complete indicator units type 6, 182, 184, 233 etc. Green. G4EZM QTHR. (Blackpool) 0253 47176
● FC902 ATU. Must be in GWO. Tony G0KUL. (Bognor Regis) 0243 865468 after 7pm. ()
● HEATHKIT HW30 144MHz AM tcvr, otherwise known as the Twoer. Good price paid for good working model. G8GZZ QTHR. (Woking) 04862 23506
● LIONEL J38 mechanical bug key. UK cheque paid. All letters answered. DJ0OS. Waldstr. 57, D-4902, Bad Salzullen, Germany.
● EDDYSTONE accs, S.meters, spkrs, morse keys, etc. Also Eddystone manuals and info sheets. Originals only. HF Eddystone valve rcvrs still req'd. Nick. 01-852 4065 leave message.
● MANUAL for Heathkit transistor checker IT-1B to borrow, purchase or copy. G4JBL QTHR. (Shoreham, Sussex) 0273 452617.
● IBM convertible memory modules wanted. Also technical service manuals. G3LBA, 8 Deacon Cl, Downside, Cobham, Surrey, KT11 3NT.
● MAINS pwr unit and spkr mic for Yaesu FT207R. Lowpass filter. RAM expansion for Amiga 500. IC type 8520. 3-way switch box for RS232 plugs. 3-way switch box for Centronics parallel plugs. Hand scanning mic for FTONE. S/ware programs to use Pace Linnet modem and PK232 with Amiga 500. Daisy wheel for HR15 printer. Any of the above can be sent to a UK address. Ken Lee, C30BAB. Casa 12B La-Pleta, Ordino, Andorra. Tel: 36347.
● YAESU FV107 VFO for FT107. Exch heavy duty rotator for good HF or 2m mobile. Preferably Yaesu. G3LPA QTHR. 0536 760336.
● DRAKE R4245, Collins 851S1. Cash waiting. 0743 884858.
● SSB adaptor for Grundig Satellit 2000. Also manual for Racal RA17L RX. G7AFH. (Leyland) 0772 621948.
● DRAKE L7 linear amp, Drake MN2700 matching network, Drake PS7 PSU. Immediate top cash price for mint units! 0602 609345 anytime.
● DRAKE L7 or L75 linear. G4PIP QTHR. 05642 3200.
● EARLY wireless sets wanted. Also horn speakers, xtal sets, unusual shaped radios, early Ham rcvrs. Any cond or incomplete welcome. Also early books, components, catalogues, Wireless Worlds, Drake MS4, Sherwood filters. James G4ERU, 5 Luther Rd, Winton, Bournemouth. 0202 510400.
● ICOM IC202 2m SSB/CW h/held. 045383 3411.
● COLLINS R390A or 51J4 rcvr, near perfect, preferably with all filters and h/book. Other Collins equip considered. G2ADR QTHR. 0904 794680.
● MOBILE bracket for Trio 2300. Ray, G4OQK QTHR. 0842 752748.
● WANTED for G2DAF Mk2 TX, front panel meter reading 0-1mA resistance 600 ohms. Elliot manufacture, body dia 2in. G3GRB QTHR. 0902 20322.
● QUALITY cased computer keyboard with moving keys, compatible with MM4000 RTTY tcvr. G3ZOG QTHR.
● VERSATOWER Strumech 60ft or 40ft mobile lattice tower assembly. Inc base plated post. Rotator. To match trailer already in my possesion. D. Henry, GU0HRY. La Mare Hailla, Saline Road, St. Peters. Guernsey, C.I.
● BOOKS Hyways and Byways of Berkshire, and Hyways and Byways of Hampshire, both by Charles Kingsley. Will trade for cash sum and entire 1988 RadCom or all cash. Paul W3QPP. (Basingstoke) 0256 22795 eve.
● HF rig, anything cond considered. (Thanet) 0843 294446.
● FT101E or B, for mobile and top band. Must be in good order. GM4CHX QTHR. (Aberdeen) 0224 317966.

EXCHANGE

● COMMODORE Amiga 500 computer. 2nd disk drive, printer and loads of s/ware, inc Word Processor, Database and Spreadsheet, for 2m multimode base station. Worth: £600 approx. Kris, G0LOH. (Haywards Heath) 0444 457202 after 6pm

The postman's been staggering down the road to Headquarters with sackfuls of letters for the Helplines staff again this month; they've had to lay on special vans and the Potters Bar Postmaster's been pleading for mercy. Well, not strictly true - but many thanks to all who wrote in with solutions to problems, useful advice and handy hints. We've borrowed some of the latter for future 'In Practice' items, incidentally, so keep an eye on that column as well as this one in case anything you're currently wondering about (or struggling with) appears there.

CUBIC (SWAN) HF ANTENNA MATCHING UNIT

To business, and a quick one first of all. Would the person selling the Cubic (Swan) HF antenna-matching unit on the bring-and-buy at Woburn on 6 August please contact Kris Partridge, G8AUU, on 01-977 7325 or QTHR?

TRIO R300 RECEIVER

Secondly, very many thanks to the three kind souls (Canon John Beaumont, G4JPB; Mr B Rodgers, G1UOR; and Mr J V Phelps, G6DFM) who wrote in with masses of material about how to persuade the Trio R300 receiver to work on the amateur bands. All three have sent the information to Captain Coole, who originally requested it, and we've now got quite a lot on file about the R300 here if anyone needs any more help. Thank you very much, gentlemen - nice to see the true amateur spirit is alive and well.

AKAI 1721L TAPE RECORDER CIRCUIT

On the basis that one good turn deserves another, can anyone now help Mr Rodgers? He asks whether anyone can supply a circuit diagram for an Akai 1721L reel-to-reel tape recorder and says 'All expenses refunded, along with lots of gratitude'. Sounds good - audiophiles, have a look in your philes and see if you have one spare. Mr Rodgers' address is 9 Hillcrest, Tawd Bridge, Up Holland, Lancs WN8 9JZ.

SPERRY MAP DISPLAY

Mr B Sayers, G8IYK, has an interesting problem. He says "I'd like information which would lead to the purchase of a "Sperry Map Display" which I require in order to complete the restoration of a complete Sperry vehicle navigation system. Although likely to be rare, I'm told that a number of these units were sold through outlets in the south of England late last year. They consist of a green box approximately 16" x 16" x 3½" and weigh about 14lb." Mr Sayers promises us an article about the system if he can get it all going - sounds great. From the photocopy of the picture which he sent in, it looks to us like a square box with a map set in the top; there's a Sperry logo in the upper left-hand corner. If you can help, drop Mr Sayers a line at 120 Birmingham Road, Redditch, Worcs B97 6EP.

MAIL232

Someone somewhere must know the answer to the next one. Mr H W Hainsworth, GM0IDT, writes "I am experiencing great difficulty in obtaining any information on the use of MAIL232 for my Amstrad PCW8256 computer. No-one seems to know anything about it, or if they do it is only very vaguely. I would be most grateful if someone could let me have detailed information or let me know of any book or literature on the subject which I may purchase." Write to Mr Hainsworth at 'Broad Acres', 58 Claremont, Alloa FK10 2DH.

MAGNETIC LOOP ANTENNAS

Know anything about magnetic loop antennas? Mr R L S Harrison, G3EPK (who signs himself 'Puzzled') writes "Having constructed a magnetic loop for 14-30MHz, my experience is that it is about two S-points down on my G5RV - apart from the time I contacted a ZS1 who gave me one S-point more on the loop than on the 5RV. I put this down to a null in that direction on the part of the 5RV.

"I would be grateful for any comments from other loop users, since I am greatly puzzled by the strength of EA3DJF's signal to me from the Costa Brava. He is 5 and 9 plus using 15W into a loop! He is operating from a block of flats about 150' above sea level, which I suspect may have some bearing on his results, although the antenna is supposed to work well at around 2 metres above ground level.

"For what it's worth, I get the best SWR with a Faraday loop of about 6" diameter and about 6 turns in feeder of the same diameter acting as a choke."

We've never used one of these antennas so can't really help - if you have and can, drop Mr Harrison a line at The Red House, Staines Green, Hertford SG14 2LN or ring him on Hertford 581476.

HEATHKIT SB230

Now an item sent in by Council member Francis Rose, G2DRT, regarding the Heathkit SB230 linear amplifier. He writes "Parts for the SB230 are no longer held in stock by Heathkit. One item which people seem to need is the high-voltage delay tube for the 8873. I have some; if anyone needs one I am QTHR'. For those who don't have a Callbook (subtle hint - they're only £7.95 from Headquarters if you're an RSGB member) Mr Rose is at 84 Cock Lane, High Wycombe, Bucks HP13 7EA or on 0494 814240.

CUBAN QSLS

Helpline's best DX so far came in this month. In a letter headed "Dear friends! 73 from Ukraine, USSR" Al Kovalyov, UB5ILA, passed on the fact that he is QSL manager for three Cuban stations - CO7HC, CM5VF and CM5JE. Al said that QSLs for these stations were only obtainable directly from him; his address is PO Box 30, 340000 Donetsk, Ukraine, USSR. An SAE plus return postage is required. One IRC is good for surface mail and two IRCs for air mail, although Al said that he preferred $1 for air mail if possible. Helpline's fame is spreading, evidently - it'll be tea in the Kremlin for the Editor next!

TR1986 TRANSCEIVER

From a little nearer home, Mr W A W Lankshear writes "I have recently acquired a Type TR1986 124.5-156MHz transceiver - as used, I believe, in aircraft - and also a Dentsu Seiki electronic keyer, Model DA-1. Both items have been subjected to a certain amount of 'side-cutter surgery' and I should be most grateful to receive any information on either or both items." Nasty; anyone who can help with remedial work can write to Mr Lankshear at 'Cedar Ridge', 57 St George's Road, East Looe, Cornwall PL13 1ED or ring him on Looe 2823.

CONTACT CARDS

"Help - QSL cards" was the heading on the next letter, from Mr E H Turner, G4IRG. He writes "Can anyone tell me how to contact Contact Cards - a printing firm which had a stand at the NRSA Mobile Rally earlier this year at Blackpool? They actually came from Blackpool but, although I have a copy of the literature they handed out at the rally, I can get no response to the telephone number or reply from their address. My particular interest was that they had a full studio with camera, etc, and were doing the latest 'raised' print styles. My recollection was also that they were fairly reasonably priced'. Well, if you know anything about Contact Cards, perhaps you could let Mr Turner know. He's at 9 Wallingford Road, Handforth, Wilmslow, Cheshire SK9 3JT or on 0625 527834.

MARINE HF ANTENNAS

Another DX letter came from Mr M Harris, G0HOC, who is currently exiled in Gibraltar. He's currently researching for a book *A Guide to Small Boat Radio*, which is intended to provide non-technically-inclined readers with an introduction to various uses of radio afloat. He'd like to hear from any regular /MM datacomms users or those who have experimented widely with HF antennas on small boats. You can contact Mike Harris via the UK Maritime Net on 14.303MHz between 0800 and 0900 or 1800 and 1900 - or by writing c/o 96 Poplar Road, North Common, Warmley, Bristol BS15 5JS.

FISHER TUNER-AMPLIFIER MODEL 234

"Looks like you're my last hope' writes Mr G Orange, G0DLQ. He's looking for the circuit diagram and an instruction manual for a Fisher stereo tuner-amplifier Model 234; apparently Sanyo says the model is now defunct and can't help. Anyone who can is asked to write to Mr Orange at 27 The Connery, Hucknall, Nottingham NG15 7AH.

COPIES OF QST

While I think of it, can anyone help HQ? We're still sorting out the library and we'd like to know whether anyone has a spare copy of the April 1982 and November 1986 editions of QST. If you have, please contact Jim Smith, G3HJF, at Headquarters.

AMBIT DORCHESTER

A letter now from BRS 42741, otherwise Mr J W Edghill - nice to see an SWL taking advantage of these pages.Mr Edghill writes "I suppose I'm an old codger, being now 85 years of age. I have picked up in the local market an old set made by Ambit International called the 'Dorchester II'. I have managed to get it going after a fashion, but the output is rather weak and the BFO does not work. Is there anyone who can help me with a circuit for this set? I will, of course, pay any expenses that will help in getting this set working'. We've never heard of the "Dorchester II" ourselves but no doubt one of our readers has - or maybe if anyone from Ambit reads this they could have a look in their files and blow the dust off any information they might have. Write to Mr Edghill at 51 Ernest Drive, Maidstone, Kent ME16 0QS, or telephone him on 0622 761327.

MAC-SHIPS

"Anyone heard of MAC-ships?" writes Peter Jackson, G3ADV, of RAIBC. He says "They were sliced-off tankers with an added flight-deck to make Merchant Aircraft Carriers for convoy escorts across the Atlantic between 1942 and 1945. The ships were re-named Empire MacColl, Empire MacKendrick, Empire MacCabe, etc, and had polyglot crews of RN, FAA, Army and Merchant Service personnel. They carried three Swordfish biplanes each. If you served on one, please get in touch with Peter Jackson, G3ADV, at 32 Brown Avenue, Parkfield, Nantwich, Cheshire CW5 7DH - if only to prove that they really existed." Apparently Mr Jackson's friends don't believe a word of it! We've certainly heard of them, and if I remember rightly some of them even carried Hurricane fighters later in the war.

HISTORY OF MORSE

Now here's an item for Morse addicts. Mr Tony Griggs, G4KLB, writes "I have been asked by a television producer to help him research a programme he wants to make on the history of Morse code. If any members have any information, equipment or anything else of interest to this project, I would be grateful if they could get in touch with me at Dormers, Brent Road, East Brent, Highbridge, Somerset TA9 4JG."

FR-101 HANDBOOK

Now here's a good one. Mr C R Chambers writes from Movements Branch, HQ BGN, Nepal, BFPO 4 where - as he says - 'signal generators, oscilloscopes and qualified radio engineers are a bit thin the ground! He said that his Yaesu FR-101 has just spent seven months (!) with the Yaesu agents in Hong Kong and at the Yaesu factory in Japan being mended. During this time, someone managed to lose the FR-101 operating handbook. Mr Chambers says this is invaluable since it has repair and calibration instructions for all the boards plus detailed information on the fundamental crystal frequencies and a host of other useful facts. He says 'Would you kindly insert in Helplines a plea for anyone who has either a spare copy or who can photocopy an original and would care to help me out?' We certainly would, sir - anyone got a manual for an FR-101 knocking about anywhere? Maybe SMC has a spare one somewhere in their emporium.

BRIDGES TYPE 1863 AND 1852

Space is getting a bit tight, so room for just one more this month. Reaching into the mailbag, it's from Mr Ken Smith, G3JIX, who writes 'Help! Do you think any readers might have information on Cintel test equipment - the Wide Range Capacitance Bridge, Type 1863, and the Mutual & Self-Inductance Bridge, Type 1852? I have been looking out at rallies, etc, for Cintel equipment but I have been unable to locate operating manuals or service information for these items. Any help or technical information would be gratefully received'. Anyone who can help, write to Mr Smith at Staple Farmhouse, Staple, Canterbury, Kent CT3 1JX.

That's it for this month - keep writing!

Helplines is designed to help put people in touch with each other. If you have a problem, it's more likely there's someone out there who has the solution; if you are looking for an old colleague or amateur friend, there could be a reader who has some news of their whereabouts; if you have solved a particular problem, write and tell the rest of us. 'Helplines' is there to help you and to give you the opportunity of helping others. Write to us marking your envelope 'Helplines' and we'll do what we can to get the message out.

CLUB NEWS

DEADLINE - Items for inclusion in the DECEMBER issue must be sent to HQ marked "Club News - DIARY" to be received by 23 OCTOBER latest. If news is received by the published deadline, it will 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.

AVON

- Bath & DARC - Oct 11, talk; 25, constructors competition; Nov 8, HF night on the air.
- Bristol RSGB Group - Oct 30, AGM.
- South Bristol ARC - Oct 4, computer and audio bring & buy evening; 11, ATV activity evening; 18, home brew - bring and display; 25, 20M activity evening.
- Thornbury & DARC - Oct 4, packet update - Ray, GW1FJI; 18, HF activity; Nov 1, amateur radio video.
- Weston Super Mare RS - Oct 2, talk "Around the World in Less than 80 Days" by John Walker, G0JQN; 16, constructors night. Details 0934 514429.

BEDFORDSHIRE

- Bedford & DARS - Oct 17, AGM. Details 0234 266443.
- Dunstable Downs RC - 28, RAE open evening.
- Shefford & DARC - Oct 26, talk "What is NICAM?" by David Moore.

BERKSHIRE

- Maidenhead & DARC - Oct 5, junk sale; 17, talk "Berkshire Downs Repeater Group" by Chris, G4CCC; Nov 2, talk: "Raynet" by Graham, G1CSF. Details Maidenhead 25952.

CAMBRIDGESHIRE

- Cambridge & DARC - Oct 6, visit to the Linear Accelerator, Addenbrooke's Hospital; 13, talk "The Days of Spark" by Wilfred Dunell, G3BYW; 20, evening in the shack. Morse class; 27, junk sale; Nov 3, evening in the shack. Morse class; 10, talk by John Worsnop, G4BAO (TBA).

CENTRAL

- Falkirk & DRC - Meets every Wednesday at 7.30pm in the Guide Hall, Grangemouth. Details 0324 22442.
- Stirling & DARS - Meets every Thursday at 7.30pm in the Club Rooms, Bandeath Industrial Est, Throsk, Nr. Stirling. Details 0324 36235.

CLWYD

- Conwy Valley ARC - Oct 5, junk sale; Nov 2, talk "Satellite Oceanography" by Dr. W. Roberts.
- Delyn RC - Oct 10, RAYNET - what is it? what do they do? can I help? find out in the Daniel Owen Centre at 8pm; 24, First Aid by St. John Ambulance Service; Nov 7, talk and demo "Packet Radio" by Malcolm GW4IEQ. Details 0244 819618.

CHESHIRE

- Chester & DRS - Oct 3, committee meeting; 10, talk "Intruder Watch" by Chris, G3TPY; 17, surplus equipment sale; 24, American video; 31, TBA.

DERBYSHIRE

- Nunsfield House ARG - Oct 1, proposed visit to Personal Computer Show at Earls Court; 6, shack night; 13, quiz night; 20, a night of reminiscences with Les, G3OZ and John, G4ZJO; 27, talk "An Insight into Magic" by Jack Skertchley, G6JPS.

DEVON

- Exeter ARS - 9, AGM.
- Torbay ARS - Oct 6, club night; 13, club night; 20, monthly meeting followed by "Between the Bands"; 27, club night; Nov 3 & 10, club nights.

DORSET

- Plessey Christchurch ARC - 12, talk "Latest Developments in Electricity" by Rob, G6DUN.

EAST SUSSEX

- Hastings E&RC -18, surplus amateur radio equipment auction at West Hill Community Centre, Croft Road, Hastings. Viewing from 7pm, sale 8pm.

ESSEX

- Braintree & DARS - Oct 16, visit by Bob,

G6AKL from Arrow Electronics. Nov 6, TBA.
▶Chelmsford ARS - Oct 3, AGM; Nov 7, talk "Sporadic E" by Jim Bacon.
▶Loughton & DARS - Oct 6, HF night on the air with G4ONP; 20, the Essex Data Group Roadshow. Packet Radio demo by Malcolm Salmon, G3XVV and Dave Castle, G6OQJ; Nov 3, talk "How Not to Write Computer Programs" by John Short, G1DJI.

GLOUCESTERSHIRE
▶Gloucester ARS - 4, TBA.

GREATER LONDON
▶Acton, Brentford & Chiswick ARC - 17, members' holiday reports.
▶Southgate ARC - Oct 26, informal meeting; Nov 9, construction contest judging night for the G6QM trophy.
▶Wimbledon & DARS - Oct 13, AGM; 27, surplus equipment sale; Nov 10, talk "Fibre Optics" by Paul Matthews, G4AWZ.

GREATER MANCHESTER
▶Eccles & DARS - Oct 3, talk "Achromatic Separated Lenses" by G4UOT; Nov 7, talk "MegaStream Data Lines" by G6MEI.
▶Stockport RS - Oct 11, G3FYE Memorial Lecture. TBA; 25, talk "Police Work" by WPC Christine Russell fom the Community Contact Department; Nov 8, talk "QRP" by Rev. George Dobbs, G3RJV.

GWYNEDD
▶Meirion ARS - ***CHANGE*** Now meets 7.30pm 1st Thursday in month at Ship Hotel, Dolgellau. Details from Mr.B.E. Viney, GW4KDP, 10 Heol Merion, Barmouth, LL42 1LA.

HAMPSHIRE
▶Basingstoke ARC - Meets first Monday of month at 7.30pm in Forest Rings Community Centre, Winklebury and additional meetings at Fort Hill Community Centre, Winklebury. Oct 2, AGM; 16, talk "Basic Electronics - Part 2" by Steve G0JSR; Nov 6, constructors' competition. Details 0734 332777.
▶Fareham & DARC - Oct 11, talk and demo "The TONI Tuner" by Brian, G4ITG and Mick, G4ITF; 25, talk "Home Brew VHF Comms Receiver" by Andrew, G4XZL; Nov 8, talk "The Siskin Electronics Nite" by Phil, G6DLJ. Details 0705 321411/2 (Daytime).
▶Farnborough & DARS - Oct 11, annual construction contest; 25, TBA; Nov 8, surplus equipment sale. Details 0252 519773.
▶Three Counties ARC - Oct 11, members activities; 25, talk "Mobile Radio for Order and Safety" by Ron, G3FOP; Nov 8, film night.

HEREFORD & WORCESTER
▶Hereford ARS - 6, talks "Fox Hunting" and "Raynet" by Tony Hartland, G8WOX; 20, talk and slides "Expedition to Steetholm Island" by Grant Cratchley, G8ILI. (Provisional). Both at Three Counties Training - Cattle Market. Nov 3, annual junk sale at Club Headquarters in Gaol Street.

HERTFORDSHIRE
▶Verulam ARC - 24. inter-club contest "Great Erg Race"

LANCASHIRE
▶Fylde ARS - Oct 12, talk "Space Exploration in the 1990's" by Peter Sullivan; 26, informal; Nov 9, equipment sale.
▶Thornton Cleveleys ARS - 2, talk "Winding Coils" by Jack, G4BFH; 9, talk "Electromagnetic Compatibility" by Ian MacDairmid; 16, AGM; 23, talk & demo "Packet Radio" by Ray, G4YVO.

LEICESTERSHIRE
▶Leicester RS - 2, quarterly progress, open meeting; 9, committee meeting, HF/VHF activity night; 16, talk "Amateur Radio Satellites" by David, G4CUO; 23, final preparations for Leicester Amateur Radio Exhibition; 30, RSGB video.

LOTHIAN
▶Lothian RS - Oct 11, call my bluff; 25, talk "Women in Radio" by GM6KAY; Nov 8, junk sale. 7.30pm at "Orwell Lodge" Hotel, Polwarth Terrace, Edinburgh.

MERSEYSIDE
▶Liverpool & DARS - 3, AGM.

NORFOLK
▶Norfolk ARC - Oct 4, talk "Radio Navigation Systems" by Malcolm Prestwood, G3PDH; 11, informal & committee meeting; 18, talk "News Gathering by the RSGB" by John Nelson, GW4FRX; 25, informal; Nov 1, talk "Project YEAR" by Victor Brand, G3JNB; 8, surplus equipment auction/bring & buy. (Doors open 7pm). Details 0508 78258.

NORTHAMPTONSHIRE
▶Nene Valley RC - Oct 4, talk "What Makes an Archivist Tick" by Miss R. Watson; 25, talk "OSCAR" by R. Limebear, G4RWL; Nov 15, home brew contest.

NOTTINGHAMSHIRE
▶ARC of Nottingham - Meets at Sherwood Community Centre, Mansfield Road. Details from Alan, G7DII, tel: Nottingham 390474. 5, forum; 12, talk "My DXing Shacks" by Dave, G3YUT; 19, homebrew evening; 26, junk sale.

ORKNEY
▶Orkney AR Group - Oct 4, talk and slides "Aerials for DX"; Nov 1, video "Melbourne Radio Club".

OXFORDSHIRE
▶Oxford & DARS - Oct 12 & 26, club nights; Nov 9, club night.

SHROPSHIRE
▶Telford & DARS - 4, UHF on the air. Details Telford 770922.

SOMERSET
▶Yeovil ARC - Oct 5, video night; 12, talk "Impedance Changing" by G3MYM; 19, talk "Oscillators" by G3MYM; Nov 2, RSGB video.

SOUTH GLAMORGAN
▶British Telecom (S.Wales District) ARS - 11, visit to British Rail Communications Centre, Westbury, near Bristol.
▶Cardiff RSGB Group - Oct 9, AGM and bring & buy sale; Nov 13, talk "Power Supplies - A to Z" by Roger Alban, GW3SPA. Details 04463 3212.

SOUTH YORKSHIRE
▶Barnsley & DARC - 9, rig check night with G0COA; 23, on the air natter night.

STAFFORDSHIRE
▶Stafford & DARS - Oct 10, night on the air; 17, RSGB videos "Amateur Radio's Newest Frontier" and "Two Pioneers of Radio"; 24, members' construction night; Nov 14, night on the air. Details 0785 662350.

STRATHCLYDE
▶Cunningham & DARC - ***NEW CONTACT*** John McCreight, GM3DJS, 40 Auchen Harvie Road, Saltcoats, Ayrshire, KA21 5RL. Tel: 0294 602464.
▶Greenock & DARC. Now meets 7pm Tuesday and Friday. Details 0475 25075
▶Helensburgh ARC - ***NEW CONTACT*** Barry Spinks, 9 St Andrews Crescent, Mansewood Estate, Dumbarton, G82 3AR.
▶Kilmarnock & Loudoun ARC - ***NEW CONTACT*** John Hemphill, GM3CTG, 31 Dundonald Road, Kilmarnock, Ayrshire, KA1 1RU. Tel: 0563 25312.
▶West of Scotland ARS - ***NEW VENUE*** Now meets at 29 Old Dumbarton Road, Glasgow. Details from Patricia MacKenzie, GM0HNV, PO Box 599, Glasgow, G1 1EW. Oct 6, illustrated talk "Logie Baird - The Continuing Story" by Dr. Peter Waddell; 27, talk "Basics for Home Constructors" by Peter, GM6SHB; Nov 3, talk "Repeater Mystique" by Jon, GM0HYY; 10, talk "COX/W6 & W7" by Jack..

SUFFOLK
▶Felixstowe & DARS - 9, Orwell Park School Special Event planning; 27, (Friday pm/evening) preview of new Club Station (Governor's Day), Orwell Park School, Nacton; 29, official opening of new Club Station, Orwell Park School, Nacton. Details 0473 642595 (daytime).

SURREY
▶Guildford & DRS - 13, talk "My CROW Processor"; 27, the club archives "A Look Back in Time".
▶Sutton & Cheam RS - Oct 20, 'junk' sale.

WARWICKSHIRE
▶Mid-Warwickshire ARS - Oct 10, talk "These Things do Happen!" by Don, G8HRI; 24, talk "The World of Computers" by Andy, G0AJB; Nov 14, RSGB Video Night with Malcolm, G0GLU.
▶Stratford upon Avon & DARS - Oct 9, talk "Ham Radio Around the World" by Les Hickingbotham, G3HZG; 23, Repeater Group talk; Nov 13, practical projects evening.

WEST GLAMORGAN
▶Swansea ARS - 5, talk and demo "Computers in Amateur Radio" by GW4KAW and GW1YSJ; 28, 53-seater coach to Leicester Show: info from Roger Williams, GW4HSH, tel 0792 404422.

WEST MIDLANDS
▶Coventry ARS - Oct 6, AGM; 13, night on the air and Morse tuition; 20, preparation for JOTA/night on the air and Morse tuition; 27, night on the air and Morse tuition; Nov 3, Guy Fawkes supper; 10, night on the air and Morse tuition.
▶Midland ARS - 17, AGM.
▶Solihull ARS - Oct 19, AGM; Nov 16, surplus sale.

WEST SUSSEX
▶Horsham ARC - Oct 5, Autumn junk sale; Nov 2, talk "Antenna Modelling" by G3LDO.

WEST YORKSHIRE
▶Denby Dale RS - 18, visit by Lowe Electronics of Matlock, 8.30pm at Denby Dale Pie Hall, for a demonstration of equipment and discussion. Light refreshments available.
▶Halifax & DARS - 17, Lowes - Club demo.
▶Keighley ARS - Oct 3, planning meeting special event; 31, junk sale; Nov 7, night on the air G0KRS.
▶Northern Heights ARS - Oct 4, talk "Electronics in the Fire Service" by G. Barbour, G8CHN; 18, visit to Fire Service HQ; Nov 1, talk "Fax and Other Data Modes" by Jack Birse, G4ZVD.
▶Otley ARS - Oct 3, talk and demo by Trevor Brown, G8CJS; 10, night on the air; 17, talk "Contest and Fieldwork" by Chris Knight, G0CFK; 31, talk and video "International Maritime Satellite Communications" by Mike Fox, G8EWH. talk "Regulatory Matters of Satellite Communication" by visitor from BT International; Nov 7, night on the air.
▶Todmorden & DARS - Oct 3, junk sale; Nov 6, talk "Sun, Earth and Radio" by Gordon Adams, G3LEQ.

WILTSHIRE
▶Blackmore Vale ARS - Oct 10, junk sale; 24, G4RBV club station on air; Nov 14, talks "Safety in the Shack" by Dave, G0GWC and "Filters" by Steve, G1ZTO.

MOBILE RALLIES

This is a list of all rallies, 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'.

1 OCTOBER
▶Blackwood Amateur Radio Rally - Oakdale Community College, Blackwood, Gwent. Doors open 10.30am. Dealers stalls, raffle, refreshments, talk-in etc. Details Brian, GW0JWF QTHR.
▶Great Lumley ARES Rally - Great Lumley Community Centre, Chester-le-Street, Co.Durham. Doors open 11am (10.30 for disabled visitors). Trade stands, book stands, bring & buy; refreshments, etc. Entrance fee 50p. Details Barry, G1JDP tel 091-388 5936.

8 OCTOBER
▶Armagh Rally - Drumsill House Hotel. Details J A Murphy, 18 Ogle Street, Armagh City, Co.Armagh, tel 0861 522153, after 5.30pm.

15 OCTOBER
▶Bishop Auckland Radio Rally - Leisure Centre, Shildon, Bishop Auckland. Bring & buy, refreshments etc. Admission 11am (10.45 for disabled visitors). Details Ernie, G4TYF, tel: 0388 607500.
▶Hornsea ARC ELOEX 1989 Rally. Doors open 11am (10.30 for disabled visitors). Details Jeff, G4IGY, tel: 0964 532874.
▶Milton Keynes & DARS 3rd Amateur Radio Car Boot Sale at Cranfield Airfield, Beds. Admission 10am. Bar & refreshments. Talk in on S22. Details Mike, G0FMC, tel: 0908 566796 or Tony, G6WXM, tel: 0908 316435.

4 NOVEMBER
▶9th North Devon Radio Rally - Bradworthy Memorial Hall (near Holsworthy). Admission 10.30am. Bring & buy stand etc. Tal in on 2 metres (S22). Details G8MXI (QTHR).

4/5 NOVEMBER
▶North Wales Amateur Radio & Electronics Rally - Aberconwy Centre, Llandudno.Opens 11am both days with talk in on S22 and 70cm. Details Siggy, GW0DYH, tel 0492 517875 (evenings/weekends).

19 NOVEMBER
▶West Manchester RC Winter Rally - Bolton Sports & Exhibition Centre. Details Dave, G1IOO tel 0204 24104 evenings.
▶Midland ARS - Birmingham Mini-Mobile Rally - (Venue to be advised) Details Norman, G8BHE, tel 021-422 9787.
▶Bridgend & DARC Radio Rally - Bridgend Recreation Centre, Angel Street, Bridgend, Mid-Glamorgan. Doors open 11am. Details GW4YKL, tel 0443 226198 or GW1OUP, tel: 0656 723508.

26 NOVEMBER
▶Verulam ARC Christmas Rally - St.Albans. Details Hilary G4JKS tel 0727 59318. Trade bookings, tel Watford 52959. (Date changed from 3 December).

10 DECEMBER
▶Leeds & DARS Christmas Rally - Pudsey Civic Centre, Dawsons Corner, Pudsey, nr Leeds. Details G Stubbs, tel 0532 585801.

25 FEBRUARY 1990
▶The 3rd TAW & Torridge Rally - BAAC Hall, Bideford, Devon. Doors open 10.30am. Trade stands, bring & buy, bar, refreshments, talk-in S22. Details: G0GFK 02372 76402.

4 MARCH 1990
▶The Great Northern Rally (Trafford Rally) - G-MEX Centre, Manchester. Morse Tests. Details Graham, G1IJK tel 061-748 9804.

9/10 MARCH 1990
▶London AR Show - Picketts Lock Centre, Picketts Lock Lane, Edmonton, Lo don N9. Details and advance ticket sales 0923 678770.

11 MARCH 1990
▶Welsh Mobile Rally - Barry Leisure Centre, off Horton Road, Barry, South Glamorgan. Details GW6RCK.

1 APRIL 1990
▶Pontefract & DARS Component Fair 1990 at Carleton Community Centre, Carleton, Pontefract.
▶White Rose Rally - Leeds University. Details G4DXA, PO Box 73, Leeds LS1 5AR.

8 APRIL 1990
▶Cambridgeshire Repeater Group Rally and Junk Sale/Auction. Details G0HEM (QTHR).
▶Launceston ARS Rally at Launceston College. Details from Maggie on 040921 219 or Rodney & Joy on 0566-5167.

13 MAY 1990
▶Southend & DARS Mobile Rally at Roachway Youth Centre, Rochford, Essex. Details from John Stone, G0DFE on 0702 202216.
▶Yeovil ARC 6th QRP Convention. Details G1MNM (QTHR).

10 JUNE 1990
▶21st Elvaston Castle Mobile Radio Rally, Elvaston Castle Country Park near Derby. Details from John, G4PZY on 0332 767994.

24 JUNE 1990
▶City of Bristol Group 33rd Longleat Amateur Radio Rally, Longleat Park, Warminster, Wilts. Details Shaun O'Sullivan, G8VPG, tel: 0225 873098.

OTHER EVENTS

1 OCTOBER
▶RSGB HF Convention - Belfry Hotel, Milton Common, Oxford. Doors open 9.30am. Admission £3.50. All the usual RSGB Committee stands, presentation of trophies. Young Amateur of the Year Award, full lecture programme. Details: Martin Atherton, 0223 424714.
▶Flight Refuelling ARS - DF hunt in the Purbeck Hills.

21/22 OCTOBER
▶Jamboree on the Air

22 OCTOBER
▶Nunsfield ARG - DF Hunt (Round Two).

27-28 OCTOBER
▶Leicester Show - Granby Halls, Leicester. Doors open 1000 (0930 for disabled visitors) until 1800 each day. Admission £1. This is the biggest show ever held at Granby Halls. RSGB stand. Details Frank Elliott, G4PDZ. 0533 553293.

10 DECEMBER
▶Coulsdon ATS Annual Bazaar at 4th Purley Scout HQ, Lion Green Road, Coulsdon. Bookings for flea market tables must be received by Wednesday 15 Nov. Details 01-684-0610.

1 APRIL 1990
▶IARU Region 1 Conference starts - Torremolinos, Spain. Details G3FKM.

GB CALLS

The list below shows all special event stations licensed for operation during this month (as at press date). It is taken direct from the GB Calls file on the HQ computer. These callsigns are valid for use from the date given but the period of operation may vary from 1 to 28 days. The callsign in parentheses is the source for further information.

1 OCTOBER

GB0CDZ	COASTAL DEFENCE STATION Z G3LXW
GB0EWC	EAST WICKHAM CUBS G0AHI
GB0RRA	RED ROSE AWARD G0JBR
GB0RRR	RED ROSE RALLY G0JWU
GB1SFW	FIRE SAFETY WEEK G1YIY
GB2BUS	BUS MUSEUM G0FOI
GB2NCC	NORTHUMBERLAND COUNTY COUNCIL G0ACR
GB4RRA	RED ROSE AWARD G0FRL
GB4RRS	RED ROSE SILVER G0IZR
GB6JST	JUBILEE SAILING TRUST G0JSC
GB6HEY	KNOWSLEY HEY SCHOOL G6IMJ
GB8RRG	RED ROSE GOLD G1IOO

2 OCTOBER

GB0CSR	CIVIL SERVICE RADIO G3XWK
GB4CPU	CENTRAL PROCESSING UNIT G0CDB

3 OCTOBER

GB4XXX	'X' NETT DXPEDITION G4LPX

4 OCTOBER

GB0JST	JUBILEE SAILING TRUST G0JSC

5 OCTOBER

GB0THS	TIMOTHY HACKWORTH SOCIETY G3LUC
GB2LBP	LORD BADEN POWELL G3YBO
GB2USJ	UNIVERSITY SILVER JUBILEE G0JHG
GB8XXV	25TH ANNIVERSARY BRISTOL ARC G3ZKI

6 OCTOBER

GB0FOH	FRIENDS OF HIGHFIELDS GW0GHC
GB0HAH	HEWETT COMPREHENSIVE SCHOOL G0KWP
GB0SBW	SAW BRIDGE WORTH G3UEG
GB1GJ	GOLDEN JUBILEE G6YAL
GB2MCW	METHODIST CHILDRENS WEEKEND G3MNL
GB4QRS	QUAINTON ROAD RAILWAY STATION G4PSH
GB6HF	HOUGHTON FEAST G0ABF
GB8OBC	OPEN BIRTHDAY CAMP G7ELC

7 OCTOBER

GB0CDL	COASTAL DEFENCE G0DHZ
GB0CEL	COSSOR ELECTRONICS LTD G0BXL
GB0ERH	EAST RIDDLESDEN HALL G0BBE
GB2APC	ALMONDBURY PARISH CHURCH G0GOJ
GB4EKG	ESSEX KITE GROUP G4YTG
GB4LB	ROYAL NATIONAL LIFEBOAT INST. G4PIJ

8 OCTOBER

GB0JDC	JAGUAR DRIVER'S CLUB G0GOF

10 OCTOBER

GB0NWR	N. WALES RALLY GW0DSJ

12 OCTOBER

GB2SBS	SEVENTH BRACKNELL SCOUTS G4RNU

13 OCTOBER

GB2RCC	RADIO CARAVAN CAMPING G4EPN

14 OCTOBER

GB0IOI	R 101 AIRSHIP G0GBI

15 OCTOBER

GB1CDX	COASTAL DEFENCE 'X' G0JBU
GB2WF	WALTON FIRS G4ZPV
GB6CDY	COASTAL DEFENCE 'Y' G0JBU

20 OCTOBER

GB0PGS	PENKRIDGE SCOUT GROUP G0AQJ
GB2JAM	JAMBOREE G4UDR
GB4FCS	FIRST COULSDON SCOUTS G6HC
GB8SMG	ST MARTIN'S GROUP GW1LOR

21 OCTOBER

GB4HMS	HER MAJESTIES SHIP G0ERS
GB8BS	BICNACRE SCOUTS G4ZPE
GB8OO	800 YEARS NORTHAMPTON CHARTER G4SVX

25 OCTOBER

GB0CDD	COASTAL DEFENCE 'D' G0HCZ
GB2OPS	ORWELL PARK SCHOOL G4YQC
GB6CDV	COASTAL DEFENCE VENTNOR G0HCZ

27 OCTOBER

GB4SPC	SCOTTISH POLICE COLLEGE GM3MTH

1 NOVEMBER

GB4BTS	BRITISH TELECOM STONE G4JKF
GB4RRG	RED ROSE GOLD G0FRL
GB6RRA	RED ROSE AWARD G1TAR
GB6RRG	RED ROSE GOLD G1AKN

3 NOVEMBER

GB2RCC	RADIO CARAVAN CAMPING G4EPN
GB4RSL	ROYAL SIGNALS LLAN-DUDNO GW4XKE

4 NOVEMBER

GB2CDQ	COASTAL DEFENCE'Q' G0DHZ
GB2CSB	CLEEVE SCHOOL BIZARRE G0LRI

6 NOVEMBER

GB2PPC	PRIOR PARK COLLEGE G3LYW
GB4RSL	ROYAL SIGNALS LLAN-DUDNO GW4XKE

8 NOVEMBER

GB0TAC	TRANS-ATLANTIC CABLE G0KBT

9 NOVEMBER

GB0XXV	25TH ANNIVERSARY BRISTOL ARC G3ZKI

10 NOVEMBER

GB4WMF	WEEKE METHODIST FESTIVAL G4BKE

18 NOVEMBER

GB4HMS	HER MAJESTIES SHIP G0ERS

the last...

G-PLATES - A WHILE YET

I do not normally bother the Society with letters, being one of the majority of members who are very content and grateful for the work you all do for us. But I must write and say how much I would appreciate it if you can arrange for us to be able to have 'G' licence plates for our cars. In my opinion the vast majority of members will be very glad to have this facility, though of course there a school who will decline on the grounds that it advises potential burglars of one's absence from home. A very valid point I am sure - but that, of course, is up to the individual member's judgement.

Reading the press on the topic of the cost of specialised number plates it is horrifying to see the prices asked by the specialist dealers in the Sunday papers. Hopefully, as there is no competition for a callsign plate, which is only saleable to one person, the DOT will charge a reasonable price. I would consider something in the order of £50-£100 as reasonable and such a price would I am sure, bring a massive response from members. It goes without saying that I would expect the RSGB to collect a commission on each sale!

I wish you good luck with the DoT and look forward to hearing of a positive result in the near future.

Once again, thank you for all you do for RSGB and us members.

D Roberts, G3FKH

Following a visit by the Secretary, David Evans, to the DVLC at Swansea, we are now able to give a clear indication of whether and when "G" callsign number-plates will be available.

In short, the 'bad news' is that, owing to the time needed by the Government to implement the necessary legislation, there is no likelihood of such a facility being available during the currency of the 'G' series of number plates. Radio amateurs are not the only ones affected; several other organisations are keen to see the promised 'liberalisation' of number plates get under way and are similarly frustrated.

The 'good news', however, is that things are not liberal enough yet for single numbers to be included on registration plates so you won't see anyone else with your callsign on his or her car, nor will you have to buy someone else's Rolls Royce in order to slap his plates on your moped.

Once the legislation is in place, which may take a year or two, the DVLC is likely to run a number of pilot schemes to test the effects of liberalisation. Ours could well be one of these and, on the face of it, there is no reason why 'G' plates could not be transferred to any car manufactured after 1.8.89. Note that, although you can make a car look older by using an old registration, you are not permitted to make it look newer.

There are no indications of the cost of such a scheme or exactly how it would work but we are continuing to press for it and will be continuing to liaise with the DVLC. - Ed.

CLASS B v NOVICE LICENCE

Congratulations on the series of articles in September's issue under the heading *In Practice*. I believe this kind of material will be of great value to the home constructor who, all too often, even after consulting textbooks, finds himself unable to solve a particular problem.

I am glad that the Society's proposals for a Novice Licence have now reached the stage of direct negotiation with the DTI. Correct me if I am wrong, but may not a certain anomaly arise with regard to the future position of the Class B licence holder who, at the end of the day, would appear to have less access to the radio spectrum than the Novice. I refer in particular, of course, to the fact that the Novice will almost certainly have access, albeit limited, to the HF bands. Considering that the Class B Licensee has already completed a full-blown RAE course in theory and practice and the Novice Licence is, among other things, a stepping stone to a full A or B licence, then surely the Class B licensee may have a legitimate complaint?

I should like to know if the RSGB have considered this matter.

Mr H Gilchrist, GM0EWK

At a recent meeting with the DTI, we proposed that holders of the Class B licence be granted a Novice Licence on passing the 5wpm morse test. A formal response is awaited - Ed.

DX LIKES TO WORK DX

I noted with considerable interest the article by G3SXW about his recent DXpedition with G3TXF to the Gambia. I particularly like the paragraph about "cracking the pile-ups" - this is sound advice to anyone wishing to work DX, particularly the expedition stations operating from really rare locations. May I add the following, written from the point of view of a resident DX operator?

Hong Kong isn't all that rare these days but the appearance of a VS6 on the bands can spark off a pile-up given reasonable conditions such as we have been experiencing recently. For those of us who are 'resident DX' this can be a pain at times - even the DX likes to work DX occasionally, so please listen carefully and if the DX station is looking for a specific area, and you're not in it, then do not call him. Wait and keep listening - you'll probably get your chance sooner or later.

When I'm working a pile-up I quite often use a wide CW filter, so calling a little off my frequency is likely to achieve results when everybody else is spot on zero beat. I've worked stations at S3 who used this tactic when I was being called by others at S9++. These weak signals could never have made it on SSB - would-be DXers please note. OK, I admit I'm biased as I never use SSB, but I've found a mode that could better CW for weak signal work and that includes the SITOR I used during my time as a radio officer in the Merchant Navy.

There has been some discussion of the QSL situation recently following G3DRN's article a couple of months ago. My policy is to wait until I receive a QSL before I send mine, so it you don't collect cards just don't send me one. I think most of us active from VS6 work this way since sending out a card for every QSO gets expensive after a while.

Finally, for 18 and 24MHz fans, VS6 operators now have access to both bands, but our power output is limited to 10dB, CW only, and antennas must be horizontal and have no gain over a dipole, ie the same restrictions that used to apply in the UK. I've worked into Europe quite easily on 24kHz and have worked several G, GM and GW stations, but where have all the GU, GJ and GD and GI stations got to?

Mr B C Kates, VS6WU

MY FIRST WARC RTTY QSO

Resulting from your special feature article in July 1989 *RadCom* - Working the

WARC Bands by Bob Whelan, G3PJT - I was indeed inspired to 'get going' on 18 and 24MHz.

Fortunately my full size G5RV antenna tunes up very nicely on 18 and 24MHz and I very soon got going as encouraged. However, I feel it worth a mention that a 'special' for me was my first RTTY contact on 18 and the unqualified mutual pleasure in RTTY QSO with Feliz, CT1HB on 22 July will be long remembered. We were both so excited that a few keys were undoubtedly hit in error!

I enclose my valued QSL card from CT1HB for you to see.

Mr S G Casperd, G3XON

HELPLINE GRATITUDE

I had a wonderful uplift in receiving quite a number of very helpful replies to my recent plea for help regarding a micro-dot terminal unit programme. Thanks again.

Mr L S Gumbrill, G2BAH.

W6HPH L-METER

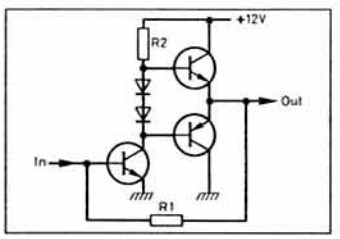
I read with interest G3FDG's modification of my L-meter circuit in the June 1989 *RadCom*.

It is standard practice to use two silicon diodes to tie together the bases of a complementary output stage such as shown below. The two emitter to base junctions in series require a forward bias equivalent to two diode drops. If only one silicon diode is used the two series transistors will not be turned on, quiescent current will be zero, and cross-over distortion will result. Furthermore, temperature compensation will be incomplete with only one diode.

If collector current is excessive as G3FDG found it to be, it can be reduced by increasing R1 in the diagram below. This will unbalance the output stage but balance can be restored by increasing the value of R2 to make the DC output voltage exactly half the supply voltage.

G3FDG also had trouble getting full oscillator output on the highest frequency range. This will not be a problem if a high *Q* coil is used for the 500 microhenry inductance. A high *Q* coil is required because of the high L to C ratio.

Mr F Brown, W6HPH



GREY EXPORTS

Having read the article by Bob Treacher in the last *RadCom* concerning taking radio equipment abroad I would like to clarify two significant aspects of his article.

Having travelled for many years into highly sensitive areas carrying radios, recording equipment and computers, I am reasonably familiar with the problems to be encountered at airports and felt that the article was slightly misleading in that 'Customs' was confused with 'security'.

Generally speaking Customs only become involved *after* landing, and do not care too much whether or not your box of shiny knobs will go bang (as long as it happens outside the Customs Hall) - they are only interested in whether you bought your box of tricks on your holiday/business trip or in the UK and have paid VAT and duty. In this case it is always advisable to either obtain a carnet before leaving or at least, carry the UK receipt with you to prove the point, especially if it is a large new-looking radio, or whatever, and can save untold frustration, especially if you encounter an official with an ulcer or a nagging wife! Computers pose a different problem and professional advice should be sought before taking that expensive lap-top out of the country.

Security is another matter entirely. They will be very interested to find out whether the grey box will play a tune or emit smoke, before allowing you onto the plane, so removing the batteries is not a good idea. I have frequently been asked to turn on my radio to prove that it is what it purports to be. Scrabbling for batteries in the shadowy depths of your holdall, with a resentful crowd behind you, is not an enviable situation to be in.

Mr J W Thexton, G3URE

THE SHRINKING WORLD

In recent years we have read much about the decline in amateur radio in the United Kingdom and lack of enthusiasm from the younger generation to join our hobby.

As an expatriate amateur I would like to air my views on what I perceive to be a much more serious problem and indeed one which will help to aggravate the already serious problem of attracting 'new blood' into amateur radio. It is the ever shrinking world of amateur radio, primarily caused by bureaucratic red tape and more often or not a complete lack of understanding of our hobby by many governments around the world. As an expatriate amateur I find that it is often virtually impossible to obtain a licence indeed in many countries, and even indigenous would be amateurs are unable to obtain the necessary permission to operate.

As I sit here in Sudan listening to the HF bands how I wish that I could load up and send CW de ST???, but alas I am unable to and the same goes for the last two countries which I have lived in - Greece and the United Arab Emirates. In fact it has not been since 1976 when I proudly signed as 9G1GE that I have been able to operate without any bureaucratic hindrance. Sadly you won't even hear a 9G1 these days as amateur radio is no longer allowed in Ghana. I therefore hold on to my CW only DXCC from that country with great pride as the ARRL recently confirmed to me that it is the first and only CS DXCC issued to a 9G1 station - maybe there will never be another one!

The point that I am trying to make, and throw out for comments by members, is that unless country societies such as RSGB and ARRL and, more particularly the IARU, make proper representation of our hobby to such countries then the list of workable countries will go into a steady decline. Don't be fooled by any DXCC lists - if you erase the Countries which do not issue licences it will reduce in length by a considerable amount.

Given the above and referring to the opening paragraph, how can we possibly expect our own young people to become interested in our much heralded 'World Wide' hobby, when unfortunately it is not!

D S Radley, G4ABI

WATERPROOFING COMPOUNDS

I submit another contender for the ultimacy in waterproofing materials propounded by Arthur Tait (GM4LBE) in The Last Word earlier this year. It is 'Denso tape' which is a petroleum mastic compound carried on an open-weave nylon fabric. In the same wild environment that GM4LBE inhabits I have used this material with complete satisfaction for many years for the weatherproofing of ordinary connectors such as the PL259 type, and of other outdoor electrical furniture. 'Denso tape' protective covering on exposure to the weather gradually assumes a stiff and durable texture. It is easily removed when it is necessary to open the joint. 'Denso tapes' are commonly stocked in 10m rolls in widths up to 300mm by builders merchants.

J A Young, GM4DQD

GETTING YOUTH INVOLVED

I am writing to support the comments and suggestions put forward in the February issue of 'Last Word?' by G4NZK and G1ZIH.

In order to involve your people more in Amateur Radio surely we as amateurs must get more involved with them? Schools would present the largest and easiest point of contact and this should be done on a personal basis rather than just writing to the school. It is not always known within a school if there is a member of staff interested in amateur radio and where any mail should be directed. A good place to start might be the Head of Science, although not all teachers interested in radio teach Physics or Technology (I teach Mathematics). If, however, no-one within the Science Department is interested the letter may be discarded. Has anyone thought about contact with the Modern Language or Geography Departments?

Have other radio clubs put on displays at their local school during their Summer Fairs/Christmas Bazaars or set up a station for the scouts/guides, or has G1ZIH and his friend visited or contacted every pack, troop or company in their area? It should be noted that both scouts and guides have badges associated with amateur radio, ie Communicator and Radio Communications respectively. Many leaders would welcome such a contact.

I appreciate that Amateur Radio is an insular hobby with much of the equipment static, but the use of mobile and handheld equipment must make going to meet these young people easier? What would be better than getting the youngsters involved with rigging up a temporary aerial and then going on the air? Our enjoyment of our hobby must be demonstrated and made obvious if anyone is to be equally enthused.

My local club, Yeovil ARC, put on a display every year at my schools Summer Fete and then leave the equipment for us to use the next week when pupils are encouraged to get involved with any activity/hobby that the school can offer. This is further supported by some of the club members giving practical and theoretical help during the week and organising the special licence, videos and tapes. All pupils enjoy and remember the experiences gained. It is not only my school that benefits by this type of contact but others in the area as well. Perhaps we are lucky having such a friendly and helpful local club?

Yeovil ARC also offer a small prize for the best coursework in the local area which has an electronics/radio content. This is organised through the local Heads of Science.

We have to go out and attract the young people to our hobby which can only be done in a practical manner.

G Middleton, G6EER

MANNERS MAKETH HAM

I have now become sickened/disgusted by the manners or lack of manners shown by European stations when trying to work DX. Over the past few years the problem has grown out of all proportion. As an ex 9J2 I had my share of 'pile ups' on CW and SSB. In those days 1968-1975 only a few guys caused a problem, mainly LZ, HA and YU calling me while in QSO with another station. The disease is now spreading rapidly. It is now impossible to give a directional call to, say, G or USA without getting half of Europe replying and being insulting if you do not reply. Working a JA or USA pile up presents no problems. If someone steps out of line, he is quickly told by his own country to QRT. Europe - NO! They argue and fight on the air, until the DX station quits. Recently a group of ZS hams put 7P8 on the DX map for a few days. One operator a YL, eventually took off the 'cans' threw them across the room and refused to operate. I myself have been called "ZS5LID" and "ZS5FU" when trying to QSO a station purely because I did not acknowledge some clown with 2kW and a lousy signal who smashed up the QSO. It would be interesting to get the views of a few regular DX operators on their views of the worst operators. My own list would be LZ, YU, Italy and HA. This letter was finally prompted by a "G0" who called me incessantly tonight while I was in QSO with another "G". When I did not reply he turned up, waved his carrier about and then made insulting remarks. Sorry chaps! but maybe this is why it takes so long for you guys to get DXCC. The DX stations do not want to know.

D Sargent, G3SXZ.

...word

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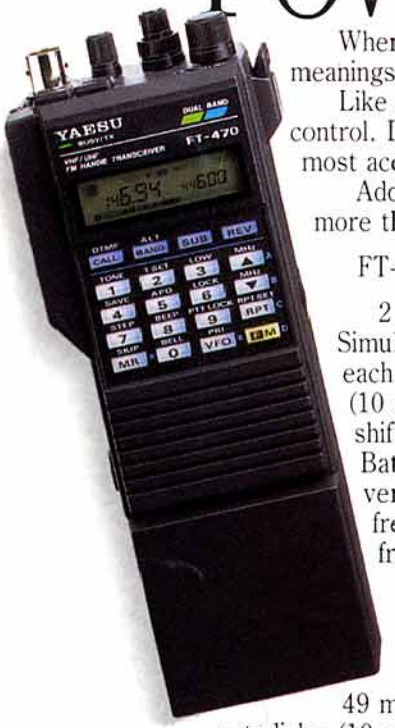

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