SOR

1.35p

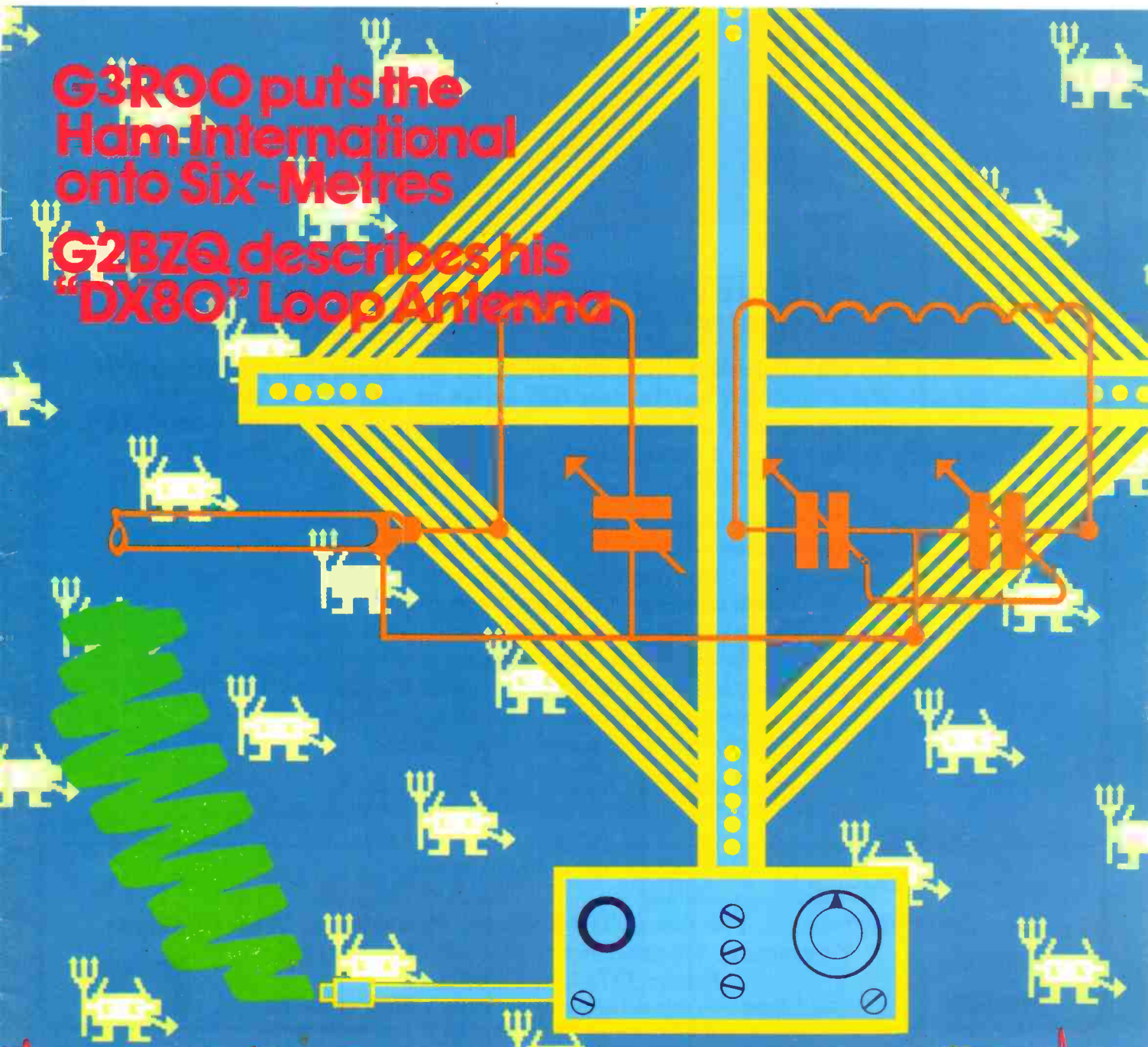
The SHORT WAVE Magazine

April 1986

Volume 44 Number 2

G3ROO puts the Ham International onto Six-Metres

G2BZQ describes his "DX80" Loop Antenna



for the radio amateur and amateur radio

SHORT WAVE MAGAZINE

(GB3SWM)

ISSN: 0037-4261

VOL. 44 APRIL, 1986 No. 510

ADVERTISERS' INDEX

COVER DESIGN:
Allan & Co. Ltd., Welwyn

CONTENTS

Editor: **PAUL ESSERY, G3KFE/G3SWM**
Advertising: **Charles Forsyth**

Published at 34 High Street, Welwyn, Herts. AL6 9EQ, on the last Friday of the month, dated the month following. *Telephone: 04-3871 5206 & 5207*

Annual Subscription: *Home: £16.00, 12 issues, post free*
Overseas: £16.00 ($21.00 U.S.), post free surface mail

Editorial Address: **Short Wave Magazine, 34 High Street, Welwyn, Herts. AL6 9EQ, England.**

Prices shown in advertising in this issue do not necessarily constitute a contract and may be subject to change.

AUTHOR'S MSS

Articles submitted for Editorial consideration must be typed double-spaced with wide margins on one side only of A4 sheets. Photographs should be lightly identified in pencil on the back with details on a separate sheet. All drawings and diagrams should also be shown separately, and tables of values prepared in accordance with our normal setting convention — see any issue. Payment is made at a competitive rate for all material used, and it is a condition of acceptance that full copyright passes to the Short Wave Magazine, Ltd., on publication.

E. & O. E. VAT Reg. No. 239 4864 25

FOR THE RADIO AMATEUR AND AMATEUR RADIO

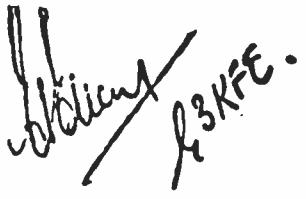
The SHORT WAVE Magazine

EDITORIAL

Operating Standards

While it has been obvious for a long time that in the metropolitan areas at least, operating on VHF and UHF has declined drastically in quality — the abuse of the repeater network being a particularly disgraceful instance — there has also been of late a considerable decline in the quality of HF operating, both on CW and Phone. Here, two areas spring to mind: the contester giving 59 reports no-matter-what and asking for a repeat, and the practice of so many stations in pile-up situations to cut out the use of callsigns except at long intervals. In contests this latter habit can, and does, result in many incorrectly logged contacts with consequent loss of points; and in general operation leads to confusion, in particular among the well orientated newcomers. In any case, it contravenes the international law under which we all hold our licences — no matter which country may have granted them.

It is still as true as it ever was that a *good* operator stands out because of his or her signal and operating practice.



WORLD-WIDE COMMUNICATION

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

FIRSTLY, our thanks to all those who sympathised with us over the missing mail for this piece last month. In fact it has not yet shown up, and probably never will now; we also still await an official explanation/apology from the Post Office — and our money back!

Conditions

Everything this time has been shadowed by the enormous solar event centred around February 7 — the biggest solar storm since 1976 according to Boulder, and the highest A and K values noted in 25 years of watching according to KH6BZF. On the Saturday, we gather GB3SIX was heard in Massachusetts, and there is word of an SM hearing a station in Maine on 50 MHz . . . implying that 14, 21 and 28 MHz were running wild at the same time, which does indeed seem to be true. But, of course such things can't last, and for the rest of the month there has been precious little to crow about; adding, as did the RSGB News last week, the note that the ionospheric minimum of conditions to come would be lower and more unsettled than at the bottom of the sunspot cycle back around 1976 — which is just rubbing salt into the wound, true though it may be!

Events

Back in 1979, *West Coast DX Bulletin* gave up, and *The DX Bulletin* took up the story, albeit we have to admit without the delightful humour that was the trademark of WA6AUD. K1TN, Jim Cain, did a good job with *TDXB,* but as of the current issue, number 325, he has dropped out and *The DX Bulletin* is to be published in California again; it will be interesting to see how it shapes. One sympathises with K1TN who has gone through the pains of producing a weekly issue for seven years, on top of a regular day-time job and activity on the bands; he must be worn out and ready for a long holiday!

Top Band

There can be no doubt that this band is a MESS at the moment. Basically, while the decline in manners and skills has something to do with it, the gut of the problem is the lack of 'system' in the allocation of Top Band by the various national authorities. What we call Top Band means something different in each country, each of which has chosen a segment within the permissible area, and has allocated that bit without any serious consideration of the overall picture. In addition, we suspect that those countries whose national societies have been fighting for even a splinter of Top Band, have been only too pleased to get anything — even if their efforts turn out in practice to be counter-productive. As a 'for instance' the German allocation of a single channel (1832 – 1835 kHz) for SSB operation, noted by DA1PE (though CW is allowable over the range 1815 – 1890 kHz). Just what piece of dottiness inspired that choice? If only a three kHz channel is to be allocated for SSB, why not go up to 1875 or higher? Surely IARU should be co-ordinating the allocations on Top Band to try and get some slight sense amid the disorganisation. Again, the quite daft idea of dropping the 'DX Window' concept is, in the writer's humble opinion, the direct result of the fragmentation of the band. On the other hand there is the idea, which DA1PE offers, that Top Band is only populated by DX operators: while it is largely true (the local natterers have migrated to VHF FM) it is also no bad thing — were the DX activity not still about, one doubts whether we would still have the band.

Anyway, enough of this. DA1PE has a more interesting idea to debate under the '14 MHz' section of the piece.

Our next stop is with the VE3INQ *Canadian Top Band News* — doubly valuable since W1BB's invaluable efforts of a few years ago had to stop. We were a bit saddened to note that KL7Y has been receiving QSL cards from EU, in which all the QSO information was inserted *except* the date and time . . . considering KL7Y has never worked into Europe and has only heard GI3OQR and possibly G3SZA, this suggests that there is some very bad practice creeping into Top Band. On the other hand there is some very interesting information from that same KL7Y on the effects he noted while attempting to shunt-feed a tower by means of a gamma-match.

G3BDQ (Hastings) comments that the Aurora knocked out almost everything, including Top Band, but as a compensation, John managed a brace of GMs on Six! An odd incident during the CQ WW SSB contest was to hear his own voice on the air working DL7MAE — someone in DL had recorded the QSO and the idiot was playing it over the air, but we gather that DL7MAE attended to the offender. G3BDQ worked, on SSB and outside the contest, RQ2GQC, UQ2GEF, UR2RDL, UV9UWW (Kemerovo, near Mongolia) and RA9ZAE (Gorno-Altaysk, near the Chinese border); on CW there was UM8MLA, UH8EC, UA9FIU, UF6VBC, RF6QAI, 4U1ITU, EA8QO, W2ZZ/CT3, and a ten-minute spell at the end of the ARRL CW contest which yielded QSOs with K8MFO, N4SU, VE1ZZ, W3YOZ, W2KFG/3, W3GM and K2UVV in succession.

G2HKU (Sheppey) comments that he feels sad at the way Top Band has gone of late; the CQ WW SSB contest was, Ted says, not just a mess but a disgrace, and if we lose the band we will only have ourselves to blame. When the signal from GNF is being over-ridden by the signals from GI, GM and GW stations — (and GNF, North Foreland, is only a few miles from G2HKU of course) then that seems to imply the widespread use of excess power; and the quality of some of the signals left something to be desired too. Of course, the over-driving of the rig is the worst of the two evils in *practice* — a clean KW is better than a dirty and over-driven legal-limit signal. On the other hand, the ethic of running over-power (which as far as the writer is concerned classifies as instant piracy) is open to grave doubt by anyone with any morality. However, to be QRO *and* splattering is the Utter End — shades of Arabackle Oblifork! On SSB G2HKU settled for PA0AUV and PA0PN, while CW yielded EA6KZ, I2UIY, GW3VFL, DJ5MZ, SM5IZ, and LA2UA. Out in the garden, Ted found the snow a bit trying; he went base-over-apex when trying to save a conifer at the end of the garden which was keeling over from the weight of snow, and contrived to receive a smack on the nose from a fence-post and three damaged fingers for his pains.

"CDXN" deadlines for the next three months:

May issue—April 3rd
June issue—May 8th
July issue—June 5th

please be sure to note these dates

Ten Metres

As we have already hinted there was quite a lot of interest in the early part of the month (and it follows that things are probably humming again as I write —

Shown here is the new Trio TS-440S HF transceiver with general coverage receiver. Features include 13.8 volt operation, 250 watts input power on all modes (except 110w. on AM), full output for up to one hour when used with the PS-50, all modes including FM as standard, optional internal auto ATU (80-10m.), all-mode squelch, auto bandwidth selection, two VFO's, one hundred memory channels, frequency search, keypad frequency entry, RIT and XIT, speech processor, notch filter and IF shift, and computer interface available as an option. The TS-440S costs £950 inc. VAT, and is available from *Lowe Electronics Ltd.*, Chesterfield Road, Matlock, Derbys. DE4 5LE. (Tel: 0629-2817/2430/4057/4995).

what a pity I haven't finished the aerial erection party!), so we will look at the reports on 28 MHz next.

DA1PE (Hannover) is of course G3JFS at home; Peter has finally got around to modifying an Icom CB rig he bought a couple of years ago, but his few contacts were not made with it — in fact they were mainly CW in mid-January in support of a local contest. DA1PE dismisses the big event on February 7 as "a brief sporadic-E(?) opening around 1700" when Scandinavians were heard working into U.K., and the G stations too, but at marginal strength. We bet DA1PE is wondering just what he missed out on!

A rather different story emerges from G4HZW (Knutsford) who uses a two-element Quad and a TS-820. First hint of something was receiving UA6AVI back to a CQ on an empty band at 59+ . . . something about to happen? At 2126 another listen round yielded LA5TEN, SM0AWX and G4BWP all with Auroral signals. Next day conditions were noted as pretty good, albeit Tony was not about being otherwise occupied bird-watching in Mid-Wales. On return, at 2043 GI4SNA was noted — RS23 beaming north-east, but up to RS54 when beaming straight at him — a little odd; 2213, and SM5KWN, OZ1HVL, LA7CO and LA5CBA were all raised with typically Auroral signals. At 2256 GB3RAL was heard with Auroral characteristics, and LA5TEN likewise; then at 2313, G4ZZY, G3UMU, and PI4WFL were worked, followed by G4RPM, only thirty miles away but fully Auroral when both stations beamed N.E. On February 9, 0010 was the start with signals swopped with G0DOO, G4SED, GW4DFQ, G4VPD, G3COJ, G0ACK, PI4VLA, G4DIS, PA3CRM, GW4YJE, G4STD, G0DDG, G4LRS, and ON8HP by 0146; and then on March 3 G4HZW noted the ZS beacons ZS1LA and ZS6PW, at 1245z.

G4ZZG (Warrington) made it his business to put out a CQ call or two around lunchtime; SSB on 28.6 and 28.5 MHz, CW on 28111, 28060 and 28025 kHz. The result of all this effort was to work G4UDR, G4OXN, and G4THF, all of whom are local ground-wave signals, plus hearing of G3NOF working CU2AX — so Charles bought a 70cm. rig, but a month with that netted just three contacts. Then, of course, G4ZZG got fed up and went to 21 MHz, to overhear G6ZO working TA2G . . . prepared to call the TA, who promptly went QRT! We reckon someone is sticking pins into little wax effigies of G4ZZG to get results like that.

G3ZPF (Kingswinford) seems to have turned his TS-520 out to grass, and gone in for a TS-930S — he then had a near heart-attack when he switched to Ten and found distorted signals, and nothing on 80/40, only to realise that it was the Aurora 'doing its thing.'

February 9 was noted by G6QQ (Hoveton); David doesn't rate the 'rusty signals' of an Aurora signal on SSB, so he went off the air after finding 14 and 21 MHz were dead.

G3NOF (Yeovil) found nothing on the band except for the February 7 opening; for Don it started at 1430, when stations from UB5, UA6, 4X, 9Y, SV9, ZS6, EA8, 3B8 and HC were all logged; then at 1530 HB9, DL, G, F, ON and K4 were noted till fade-out at 1634; but at 1705 it opened up again, and EI, GW, G, LA were all noted with strong Auroral flutter. Don made his SSB signals go out to CU2AX, HC4MG, J37AH, KD4T, TI2EPG, 3B8FP and 9Y4BA.

Eighty

This is the band where the QRP-ers hang out, and on the Phone end there are the pundits, who can Make Statements on any subject in the world, and the Netters, and the Natterers, and the Nutters . . .and quietly getting on with it, the good operators with good signals are as lights in the darkness.

G2NJ (Peterborough) notes that G3KPO is wanting to obtain a list of the calls issued to British amateurs in the pre W.W.I. days — for example G2DX, Ken Alford, was TXK in those far-off days. For a start, we would think that many of the calls can be gleaned from a study of the G6CL "World at their Fingertips" and maybe a rout around the RAOTA members and their memories — though your scribe wouldn't reckon his own memories go quite that far back! If anyone can help — there *was* a listing about at the time — please get in touch with G3KPO at the Wireless Museum in the Isle of Wight. Back to Eighty, and G2NJ notes hearing G3NKS, Derek, regularly on in the last week of February with a half-watt 'Oxo' rig. G0ATS, Elaine, has joined the TOPS CW Club nets on 3508 kHz, running an HW-8 rig. On a different tack, Nick notes that the effects of the solar storm were manifest on the band on February 9, when the TOPS CW club net which started at 1400z started to fade at 1430z and was gone (along with all the other signals on the band) by 1500z. "Things were bad" also notes the net controller, GW6AQ, on February 12 and 16, but by February 19th's net, conditions were more or less back to normal.

G3ZPF says he isn't sure whether he mentioned it before, but his eighty-metre aerial lost its end — trial by cutters? — and now functions on Forty. It was going to be a clever multi-band loop, but the cold was just too much, so it was a quick snip and back to the warmth!

G8PG (Greasby) writes to note the results of the QRP Tests done by some of the OK QRP types led by OK1DKW, over the path into the U.K. Looking at the results, which were to cover 1.8, 3.5, 7, 10, 14, and 21 MHz, we find that OK1DKW

provided the time schedule, and G8PG raised a team at this end of the link, comprising G3DFR, G3DNF, G3XJS, G4EBO, G4FAI, G4FJN, G8PG, GM3KPD, GM3OXX, GM3RKO, GM4HBG and GM4YLN. In the end some 45 QSOs were made between the two countries, with between 1 and 4 watts output. 21 MHz wasn't a lot of use as the skip on this band wasn't short enough, but the star turn was 10 MHz, followed by 14 MHz and the 80 and 40 metre segments. No QSOs were reported on Top Band, but this seems to have been due to the lack of Top Band gear at the U.K. end more than anything else. Eighty would have been more of a success but for local noise in the U.K. — the colour-TV line timebase problem! An interesting point is that all but six of the contacts were made with stations in U.K. located south of a line between the Mersey eastwards (roughly, this equates to 53°N latitude). Four of the GMs made no contact at all (GM3OXX and GM4HBG, two of the best operators around included in the four). This tends to confirm the observations over the years that from OK (roughly 50°N latitude) it becomes quite hard to make a QSO if the U.K. end is far to the north of that line. The OKs taking part included OK1AMJ, OK1DAV, OK1DCP, OK1DKW, OK1DKK and OK2BMA, with OK1DAV and OK2BMA having the most success. G8PG ends the report by wondering if the OKs would like to run another such test next year, in which case Top Band will be included and gear made available.

G2HLU (Earley) says that the main activity at his end has been QRP CW on Eighty with the little rig, and waving the soldering-iron at the G3WPO Micron kit. When it was all completed Harold tried it out and is very pleased with the results. The receive side, which is where the design shows its worth in any transceiver, is considered very good, especially with the audio filter (*a la* W3NQN) used outboard. Above all it provided, with the fifth QSO, a contact with old pal G8RF, lost sight of since pre-war days. Other activities include having a bash at all the RSGB cumulatives in those two-hour stints, although the PACC affair was severely sat upon by the Aurora. So far the Micron has managed to net three continents for G2HLU and doubtless next time we shall hear they have all been knocked off.

Forty

Just a single report this time, that of G3ZPF. David found Forty uncannily quiet on the TS-930S after the old rig, in between the BC stations of course. It added up to CW contacts with JH1UAH, ZL3GQ, W2MEL, K4EWG, PA0FM/P4, J34LTA, W1OO, K1NY, N2DT, W2XL, N2MM, KA1X, W8JGU, and N2ME.

Twenty

This is always said to be "where it all happens" so perhaps we'd better see just what really *is* happening.

First G3NOF's report. Don found nothing at all from the Pacific all month, but the band has been opening, long-path around 0830, first to JA and then ZL, with the VKs peaking about 0930 and staying in to 1100; the VKs were also noted on the short path around 1130z. Africa was heard between 1700 – 2000z, and the North Americans have been noted between 1130 and as late as 2200z, but little heard from the West Coast. SSB contacts were made with AH2BE, C35EK, CP1GP, FM5CB, FM5DX, HV1CN, J28DS, J34LTA, JA4KFA, KB0NL (N. Dakota), KC4AAC, S79CW, TR8RAL, TU1BQ, TZ6FS, V47K, VK2AGA, VK2ALM, VK2ANO, VK2DYW, VK4AI, VK5MH, VP8JC, VS6CT, VS6DO, XX9CT, W1GWN/MM (Antarctica), W6QL/Z2, ZL2AMP, ZL3TB, ZS5CJ, ZS6AK, ZS6CEO, ZS6TB, 3D6BW, 5N0JCR, 5R8AL, 5T5SL and 6T2BA.

DA1PE next. Peter says he found nothing exciting, mainly because he was finding the band closed at times when he was able to get on. The main activity was in the ARRL DX Contest, when a lot of east-coast Ws and some VEs were worked; 3V8PS (QSL *via* I1FOU) was worked on February 19 and heard several times — but Peter notes that after working the chap and getting 599, he had to wait for ten minutes to find out the call of the station he had worked! As a result, DA1PE suggests an award — "Worked All Unidentified Signals"!

On to G2HKU; Ted used Phone for his contacts with ZL3FV, but turned to the key to hook JH7DXZ.

G2HLU says he finds that in work terms the garden gets bigger each year, but in aerial terms it stays the same . . .the thought was provoked by Harold dropping the old trapped dipole which had given good service for years, in favour of the G5RV arrangement — both in the inverted-V configuration. The G5RV is fed from open-wire line right to the ATU. Although there is no noticeable difference in performance, there is a small penalty in that while the old arrangement could at a pinch be tuned over on any band without any ATU tweaking, the G5RV needs the help of the ATU if a serious listen is contemplated, and certainly on transmit. *Not* a serious hardship to an OT! But, of course, finding out how a new skywire works on the bands is really a matter of just that, rather than any DX worked. Harold's QRP rig has been tried out on the band at the three watts level, and Twenty gave reports on CW from eleven U.S. States. VE1 and VO1, all with the three watts, and also 3V8PS.

G6QQ wrote just before rushing off to V2-land for a holiday; K2IZZ on CW, plus W3FIJ and KA2ELW was about the size of it, as more attention was paid to 21 MHz.

G3ZPF would have been on Twenty — and indeed 21/28 MHz too — he says, but for the fact that it was too darned cold to do much when he went out to do the aerial mods we mentioned earlier — the *plan* and the *result* didn't agree, as he beat a hasty retreat back indoors, and we don't blame David for that, it was BITTER!

Fifteen

The Auroral manifestation upset the band badly, says G3NOF, and it had only begun to recover in the last few days before he wrote. Nothing at all was heard — let alone worked, from the Pacific, VK/ZL long path, or West Coast U.S.A. There were a few short-path openings to VK around 1100 – 1200, along with P29 and YC. Africans were noted between 1430 and 1630 on most days, North Americans were noted on some days, and South Americans were around from 1600z. Side-band contacts were made with A4XYQ, A92EM, CE3ERS, CE3JED, EA8BS, HK6GBJ, J28DS, K1CLN/VP2M, KP4AAQ, LUs, OK4AWQ/MM (N. Atlantic), P29NCR, PY1RF, PY3DK, PY6WT, TA3B, TR8SA, VP8LP, VQ9SK, VU2RX VU2WC, VU2ZAP, VY1CC/VP2M, stations in W1-2-3-4-5-8-9, W6QL/Z2, WB4PRX/KP2, XT2BR, YB3JO, YC2CTW, Z21CS, Z21GN, ZD7CW, ZD9BV, ZP5ZR, ZS1RL, ZS1S/M, ZS2MC, ZS6BXU, ZS6CAY, ZS6XS, ZS6YG, 5N3RTF, 6T2MG, and 7P8CM. Not a bad bag at this time of the cycle.

On 21 MHz, an unusual visitor was G3ZPF; David was trying out the new machine and worked LU9DJD, UB5MJ, LA9AEA, and G4JCP, but HP1XOL eluded his grasp — ouch!

21 MHz for G6QQ was SSB to HK3GXI, KP4IH, WB4PRX/KP2, VY1CC/P/VP2M; and the CW sorted him out W3FX, K1MA, KA1RW, W3ARK, KD8CW, KA1NWY, W2GNX, VE3CUI, N4IJM, WA2DDO, LU2BC, PA0UDV/PJ2, LU7EDO, WB4VKW, LU1AO, and OE3EMN/YK.

During the last week prior to his writing, DA1PE reckoned conditions picked up somewhat, with a few EU QSOs around 1800, and the odd ZS noted at good strength. The star turn was OE3EMN/YK, worked one day at 1230.

Here & There

Top Band operators may like to look out for the Top Band Net with 4X4NJ, around 14.337 at 1400z on Saturdays.

At the time of writing the Colvins were on as A25/W6KG; that leaves 7Q, S8, ZE, 9J and CR8 possibilities between now and conclusion of this exercise in April. The QSLs as ever are routed to YASME.

It has been reported that Chagos is possible on 7 MHz, as VQ9LD. Those athirst for a China contact on SSB could

note that both BY1QH and BY1SK are active in that mode at the time of writing. As for the Kermadecs, it sounds as if this *spot will be available for a while yet as* ZL8OY is staying until August or September.

Bonaire is mooted; as PJ4/HB9TL between April 11 and 25, and by the time this reaches you it is likely that ZL1AMO will have been to Tokelaus, and signing ZK3RW.

That 3V2TL recently reported as being active and asking for cards *via* the Bureau, is almost certainly a phoney, our spies tell us — and others in that line might include DJ1US/ST3, 6T1YP and 6T2MG, while a question mark hangs also over the head of ST4BCB — this one has sent a hand-written card to LZ1HA direct from Box 2817 Khartoum; but Jurgen's address is Beida in West Sudan . . . what gives?

New Bands

Left till last this time for a change. Our first report comes from G0AQT, who was G8DWC; Vincent tried some activity on CW on 10 MHz, and found W1IKB, W2FJ, ZL1BXZ, W2FJ again, FG5AM, N4SU; plus for the catch of the month, VK5BJF on 18 MHz. Sounds as if the lad shapes well — hope to hear more from you, OM.

G4FLK writes from Dorset; on 10 MHz he found himself in contact with I1UST, DK9NC, GM5TU, FD5JDG, G4SKJ/MM, GW3BKE, SM3PZG, I6SF, DL9IQ, G3JZT, OZ1EXR, DL8YS, G4IUD/MM, OZ5MAY, G4UZE, DL6MDP/OE, OY3H, EA3CTI; on 18 MHz it was F6IIS, DJ3HW, F9OQ, G8ZZ? who dropped out in QSB, and on 24 MHz — *blackout! All this was on* March 1, and another session on 2nd was equally productive; it was noted that while 10 MHz was quite good the frequencies above this were poor or awful. Activity has been inhibited by the bedroom shack — nearly freezing to death despite the central heating!

A rare visitor to 10 MHz was G3ZPF. David was in fact trying out his TS-930S and worked FE6ARN, HB9CLN, and DL1SN. As David says, "activity otherwise, zilch — where are the signals, then?"

Damnation by faint praise from G2HLU. Harold says he keeps half an eye on the new bands, and works the odd one on 10 MHz, the latest being VK2DUY on the morning of his letter — nothing on 18 or 24 MHz.

On the other hand, the QRP tests between OK and the G-QRP club mentioned earlier showed 10 MHz as the best band, providing some half of all the contacts reported. We must add that while the OK boys aren't getting any support at all from their own national society, we feel they are doing a useful and interesting experiment; we as individuals know plenty about which bands do best in our own locations, but this is an effort to try and correlate individual observations into something of use systematically, and it is deserving of support — we hope they can repeat the exercise.

From VK

We had a most interesting letter on various matters from VK6NUJ; he is sixty six and has just lashed out some 3000 dollars for a Yaesu FT-757 set-up, plus the transverters for 6, 2 and 70cm. and scanning mic. This, he reckons "will see him out" but he bewails the cost of getting going for a newcomer. True enough, if you want the super stuff. On the other hand what about, say, a CW station using a home-brew rig, or something like the Panda or Heathkit DX-100 along with a reasonable receiver? There must be lots of these about in shacks, gathering dust — but still useful rigs for all that. The VHF/UHF gear has been bought so that the satellites can be worked; they wouldn't serve much purpose otherwise from Scarborough, Western Australia. On a different note, VK6NUJ contrasts their hot and unpleasant Christmas with the weather in U.K.; but then, on the day before he wrote they had torrential rain, right out of season and *unexpected.* We like that term — we expect rain to fall as soon as the Clerk of the Weather notices your conductor putting his outdoor clothes on!

Finale

That's it for another month. The deadline for the arrival of your letters (and lets have *lots* of 'em!) for next time is in the 'box' and they should be addressed, as always, to your scribe, "CDXN", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.

The "DX80 Loop Antenna"

Reduce 80-Metre QRM/QRN

R. Q. MARRIS, G2BZQ

THE regular early morning battle working on the CW section of the 80-metre band has become a nightmare!

Usually, at that time, it can only be described as a dreadful racket. QRM/QRN of every conceivable, and inconceivable, type prevails; with the additional 'joys' of interference from general electrical noise as the writer lives in an apartment.

The final straw came recently, on about 3562 kHz (the QRP area), and in the middle of a weakish QSO, when everything was blotted out by an HB9 endlessly calling CQ DX, on CW, and which finally killed the QSO. The home receiver was just about jumping off the table! He was eventually answered by another HB9 (DX?). Listening to the opening rounds of their subsequent QSO, it transpired that both lived in Zurich (DX?): No. 1 HB9 stated that he was using 1 kilowatt, and his pal said he was using 200 watts. The writer was using 10 watts. No. 1 HB9 found it necessary to send all words twice, and "my QTH Zurich" was actually repeated four times! Well, enough is enough! There and then it was decided that something would have to be done about the 80-metre early morning QRM/QRN racket.

Sometime ago a shielded loop, for 80-metres receiving, had been used with great success, but due to its largish size it had to be relegated to hanging on the garage wall. It was decided to take another look at 80-metre directional receiving loops and a specification for a new design was drawn up, as follows:—

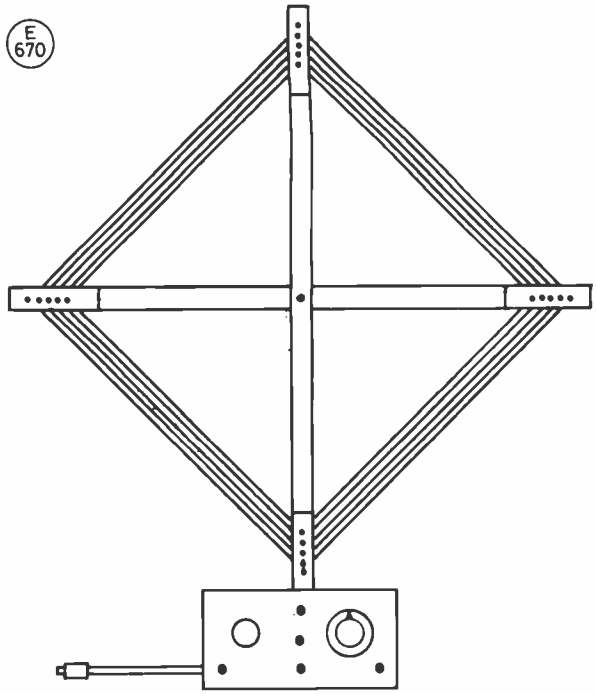


Fig.1 THE "DX 80 LOOP" - GENERAL ILLUSTRATION

1. It must cover 3500 to 4000 kHz with some edge overlap.
2. It must have excellent selectivity.
3. It must have excellent sensitivity.
4. It must have good 'nulling' (directional characteristics) to eliminate, or reduce, QRM/QRN.
5. The polar diagram, of the loop, should be as Fig. 3, with maximum signals at the ends, and the maximum nulling (minimum signals) off the 'long side'.
6. It must assist in reducing noise from local electrical wiring, etc.
7. It must be physically small in size.
8. It must be neat and tidy.

The "DX80 Loop Antenna" was designed, constructed, and meets the above requirements. It is believed that it will be of interest, and use, to both the TX-er and the SWL.

Many experiments, over a period of time, were made using various configurations. To get quick comparisons several temporary structures were made using cardboard frames. The main final decisions to be made soon became apparent:—

1. Should it be the conventional box shaped loop?
2. Should it be a spiral loop as used in the earlier days of "wireless"?
3. What were the smallest practical and effective loop dimensions?

None of the answers were quite what had been expected. The spiral loop, though more difficult, and tedious, to construct appeared to give the best nulling on 80-metres; plus the best selectivity and the best signals strength. The dimensions, also, could be made far smaller than expected . . . Which all goes to prove that you cannot believe everything you read!

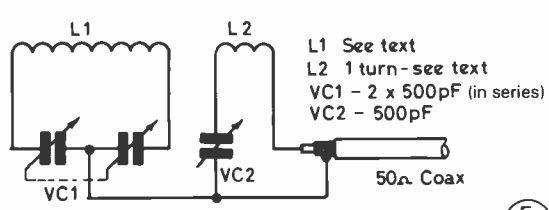


Fig. 2 THE CIRCUIT

Description

Fig. 1 gives a general frontal illustration of the final spiral DX80 Loop Antenna. It had an overall width of 21" and an overall height of 25", which is quite small enough to put on a table near the receiver.

The circuit of the Loop is shown in Fig. 2. It consists of L1, which is a four-turn loop winding, tuned by VC1, which is a two-gang, 500 pF per section, variable capacitor. The coupling turn, to the receiver *via* coaxial cable, is L2. Here one section of a two-gang 500 pF per section variable capacitor is used. (A single air-spaced 500 pF capacitor could be used, of course, if you can find one.) VC2 is used to adjust the coupling. The variable capacitors are of good quality air-spaced receiving types, and can either be salvaged from old valve receivers (make certain there is no dust between the vanes!), or purchased at about £1.60 each from *J. Birkett,* who advertises in these pages. 50-ohm coaxial cable is used to match the receiver input impedance; but there seems to be no obvious reason why 70-ohm cable should not be used, if that is the input impedance of the receiver.

The object of VC2, in series with the coupling turn L2, is to adjust the coupling between the Loop and the receiver. Bandwidth depends on the 'Q' of the loop winding L1 when loaded. The 'Q' can be adjusted by use of VC2. The lower the capacity of VC2, then the smaller the coupling, and the higher the 'Q' of the loaded Loop, and therefore the narrower the bandwidth . . . and *vice versa.* If VC2 is not used, and L2 is connected directly to the receiver, *via* coaxial cable, it will be found that the bandwidth is very wide. In practice it was found that there is a point of adjustment with VC2 where bandwidth is the narrowest, and the sensitivity of the Loop is the greatest. This is the spot! Especially for CW reception; *see* later.

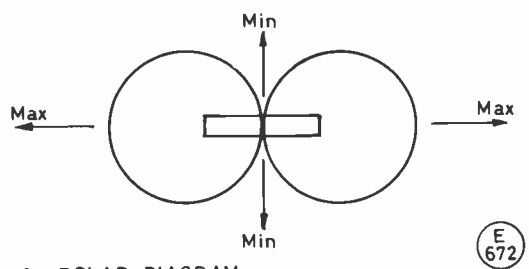


Fig. 3 POLAR DIAGRAM

Construction

The DX80 Loop Antenna consists of two main parts:—

1. The chassis/panel assembly — *see* Figs. 1, 4 and 5.
2. The frame unit — *see* Figs. 1, 6 and 7.

Construction of the chassis/panel assembly is quite simple — *see* Fig. 4. The baseboard chassis is a piece of timber 6 13/16" wide x 6" deep x 1" thick. This thickness is necessary to stop the unit tipping over, due to the height of the frame. The panel is a piece of plywood 6 13/16" wide x 4" high x 3/16" thick. A piece of hardboard, or circuit board, would also be suitable. Stain the two pieces with a spirit quick drying stain. The writer used Rustins WoodDye (*Light Teak*), *applied with a piece of soft cloth.*

The panel is screwed to the baseboard chassis with three countersunk woodscrews, as shown in Fig. 4. Holes are also drilled, in the panel, to accommodate the two variable capacitors, and these will have to be drilled to suit the particular type of capacitor used. These can be seen in Figs. 4 and 5. Two holes are also drilled and countersunk to take the bolts which will hold the frame unit in position. *See* Figs. 1, 4 and 5. Assemble the variable capacitors onto the panel, as shown, and also fit a small terminal block on the chassis for anchoring the end of the coaxial cable and connections from L2/VC2.

The frame unit is constructed of ¾" x ½" wood, cut into two lengths — 21" and 24". These are dovetailed and bolted together,

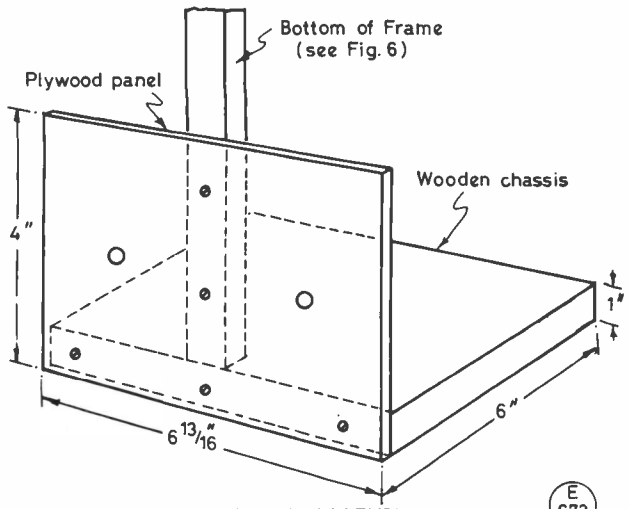


Fig. 4 CHASSIS AND PANEL ASSEMBLY

as shown in Fig. 6, to form a cross. The final assembly is stained with wood dye. The staining, of all wooden parts, gives a most clean and professional look to the whole Antenna.

Polythene terminal blocks are used to support the wiring of the spiral loop — *see* Figs 1, 7 and 8. Two 12-way terminal blocks are required, with dimensions 4" long x ¾" wide. These are readily obtainable at local DIY or electrical stores. Each terminal block should be bisected, with a sharp blade, to produce four 6-way blocks.

Blocks B, C and D are screwed onto the ends of the vertical and two horizontal arms of the frame — *see* Fig. 7. The lower block A is screwed to the lower vertical member at exactly the same distance, from the centre ('X' piece) as the one at the top, *i.e.* C.

It is as well to 'wind' the loop before assembling the frame onto the chassis/panel unit.

For the main winding L1, the writer used PVC covered multi-strand flex of overall diameter of 2mm. The total length was 18' 9", so a length of six metres should more than suffice. The next tedious job is to loosen all the grub screws, in the brass inserts, of the terminal blocks.

Winding details are shown in Figs. 7 and 8. Start the winding at the bottom terminal block A, at the inside hole — *see* Fig. 8. Thread the end of the wire through the insert, leaving a tail of at least 6", and tighten the two grub screws so that they just bite into the PVC cover of the wire. Take the other end of the wire, and clockwise thread it through the other terminal blocks B, C and D for 2½ turns finishing at the top (C). Pull the wire tight, every half turn, as you go along, and tighten the grub screws at the same time. Now complete the next ¼-turn, finishing up at the third insert on the right hand terminal block D, and again tighten the grub screw. This now completes 2¾ turns. Now thread the wire through the fifth hole from the inside, of the bottom block (A) and tighten the screws. This means that at the bottom block, hole No. 4 has been left vacant for L2. Now complete the winding by threading the wire through hole No. 5 (counted from the inside) of terminal blocks B, C and D and tighten the screws as you go along, making certain that the wire is tight. The last ¼-turn from block D to the bottom of block A is taken through the outer hole of block A, and again secured with the screws. Leave a tail of at least 6" before cutting off the surplus wire.

The above sounds a little complicated, but if Figs. 7 and 8 are studied and the operation is carried out step by step it will be found that it can easily, but not quickly, be completed. It is best to have the original 6 metres of wire stretched out, in a clear space around the floor to prevent snagging. Also, the actual 'winding' operation can best be carried out by laying the frame flat on a table top and gradually rotating it, as each operation is carried out.

Counting from the *inside* of the terminal blocks, it will be seen that hole No. 4 is vacant in all cases. These are used for coupling loop L2.

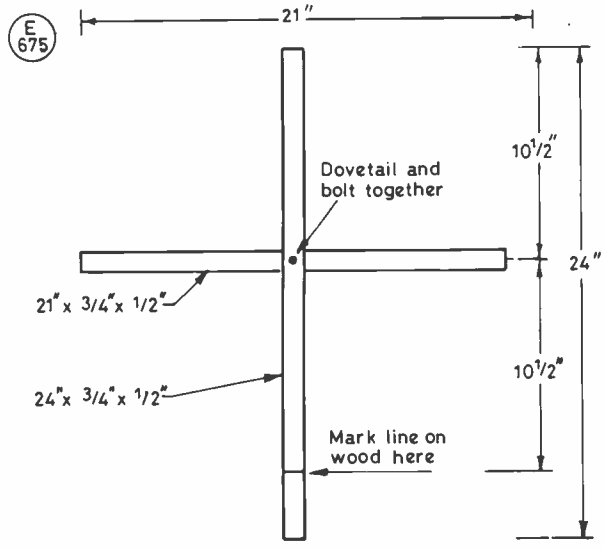


Fig. 6 BASIC WOOD FRAME CONSTRUCTION

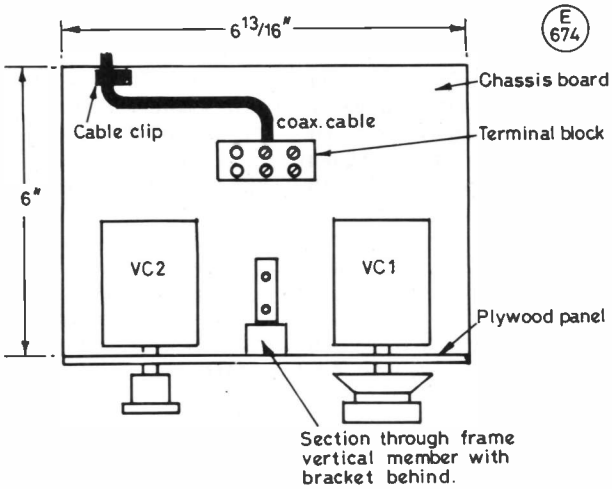


Fig. 5 TOP VIEW OF CHASSIS ASSEMBLY WITH MAJOR COMPONENTS MOUNTED.

For L2 one turn of very thin PVC covered flex is used. Start winding L2 at bottom block A going clockwise around the blocks B, C and D, through hole No. 4 in each case; tightening the screws, in each case, and coming back to the original hole No. 4 on bottom block A. Thread the wire end through this hole, alongside the other wire end, and adjust so that 6" tails are left at either end. Then gently tighten the screws to stop the ends slipping — *see* block A, Fig. 8.

The next step is to fit the loop frame to the chassis/panel assembly — *see* Figs. 1, 4 and 5. Hold the frame vertically behind the panel, in dead centre, and mark through the two pre-drilled front panel fixing holes with a sharp pencil on the vertical member of the frame. Drill two holes through the pencil marks and bolt the frame vertical member to the panel, with washers behind the nuts, at the rear. The bolt size is not critical, and the writer used a couple of handy 2BA bolts, nuts and washers. To finalise, screw on a small bracket, behind the vertical frame member, to brace the chassis base. *See* Fig. 5.

Solder the ends of L1 and L2 and coaxial cable, to VC1 and VC2 as shown in Fig. 2. Secure the coaxial cable to the rear edge of

the chassis with a cable cleat — *see* Fig. 5. The writer uses 36" of coaxial cable.

Testing, Operation and Results

Connect the DX80 Loop to the receiver AE input coaxial socket. Adjust VC2 so that the moving plates are about 5° less than half meshed.

To test the DX80 Loop it is a good idea to have some sort of 'captive' signal source. The writer used a BC221, with a short piece of wire attached to the output terminal. The BC221 was set to 3500 kHz, and VC1 resonated for maximum signal. This was repeated at 4000 kHz. A check at 3700 kHz was made, and the moving plates of VC1 were found to be about ⅗-meshed at this point.

Next, with the 'captive' signal switched off, tune in a suitable signal resonated with VC1; then adjust VC2 slightly plus/minus, and keep readjusting VC1 slightly for maximum signal strength. A spot will be found where adjustment of VC2 will give maximum selectivity, and maximum signal strength. VC2 will not then need any further adjustment inside the 80-metre band, though a tiny readjustment might assist when trying to interpret that very weak important signal.

On the prototype, and also on the final model, it was found that the above projected meshing of VC1 and VC2 were the same within a few degrees. If a reader building this antenna gets wildly differing (or zero) results then he should re-check that all wiring connections are correct; and, check that the loop has been wound to specification. A possible cause of variation could be that a different type of wire has been used for L1, or 70-ohm coaxial cable has been used instead of 50-ohm, but in these cases the difference in readings should only be marginal.

The first thing that was noticed, after connecting the DX80 Loop to the Rx, and resonating VC1 and VC2, was the great reduction in general and local QRN, including that from electrical equipment, and wiring, in the apartment block.

The second point of importance was that when comparing the Loop with the normal antenna, it was found that the signal strength, on a particular signal, was just noticeably down, but the noise level, from QRN/QRM, was way down and therefore very weak signals were usually much more intelligible on the Loop, even though a little less in signal strength.

The third point was that the receiver selectivity was very much improved, and this is especially useful on CW giving a 'sharpened' signal.

The fourth point was that rotation of the Loop up to 90°, after resonating VC1, either eliminated or greatly reduced the QRM, to a level at which the interfering signal level was way down on the required signal. *See* polar diagram Fig. 3.

In fact, the specification, as outlined earlier, had been met to a degree far beyond that expected.

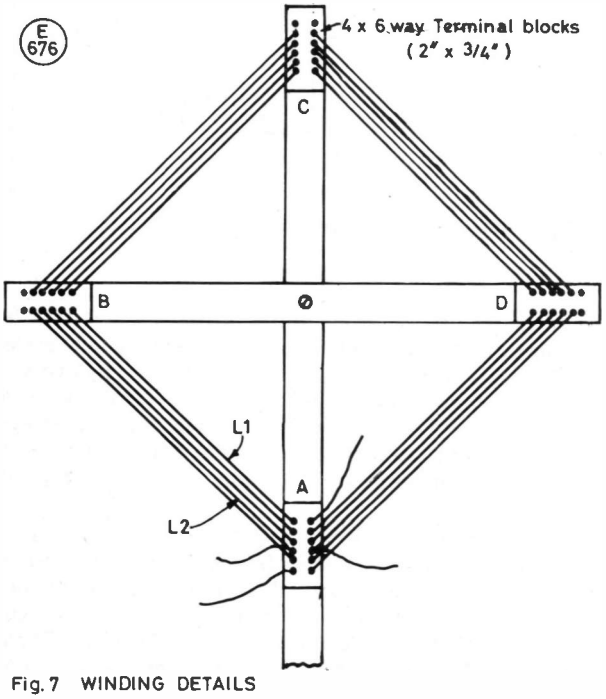


Fig. 7 WINDING DETAILS

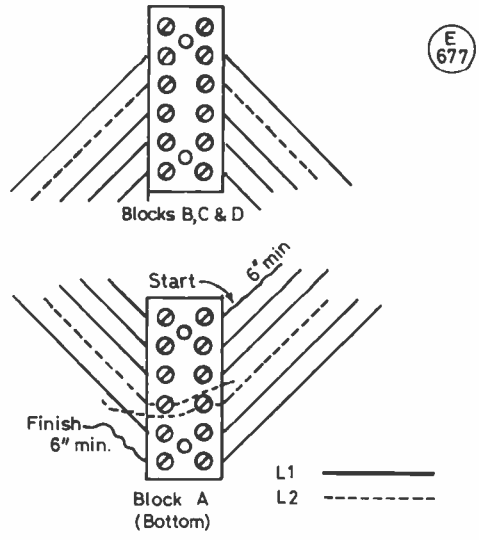


Fig. 8 TERMINAL BLOCK DETAIL

Some 'Signing-Off' Thoughts

1. At the home QTH the DX80 Loop Antenna is used with a receiver with more than adequate RF amplification and adjustable RF/IF gain control. If a receiver is used with mediocre, or poor, RF amplification, then it is suggested that a suitable external amplifier (RF) should be used between the Loop and the receiver input. This could be a tuned RF amplifier, or a wide-band amplifier. The latter would be preferable as there would be one less knob to twiddle, and should, if possible, be built inside the Rx, for the reasons outlined below under (2).
2. If the DX80 Loop is used by the TX-er it has to be remembered that *the transmitter is connected to its normal antenna, and the receiver to the Loop. Therefore, on transmit, the full transmitted "blast" arrives at the receiver input stage(s) with disastrous results!* Therefore *it is essential that the Loop is disconnected or shorted out, on transmit!* This can either be done, with a manual switch or relay. A suitable RF protection device would be ideal. The *SWL user* of the DX80 Loop antenna can of course ignore these remarks.

   At this time a RF protection circuit is being worked on to protect the receiver, automatically, on 'transmit'. It is proposed to employ valves as they can, in general, be abused to a greater extent than semi-conductor devices.
3. For the SWL enthusiast, with a general coverage receiver, it may be of interest, that the DX80 Loop covers approximately 2.3 MHz to 6 MHz, with maximum efficiency centred on the 80-metre band between 3.5 and 4 MHz.

Next month, G3ISD completes his Low-Cost Linear Amplifier

The "TX80" 80-Metre CW Transmitter, Part 2

Completing the Project

REV. G. C. DOBBS, G3RJV

PART One of this article described the heart of the TX80: the Transmit, VFO and Changeover Boards. Is all the hard work really over? Well — in terms of sheer circuitry, those boards do form the bulk of the transmitter but the story is by no means over. The control circuitry is an important part of any project and constructors should not assume that once the main boards are built and bench tested that the remaining work is minor. Experience has taught me that making a housing for a project, mounting it into the case and then the interboard connections and testing always take up far more time than I had planned. Sometimes the finishing touches seem to go on for ever.

The SWR Circuit

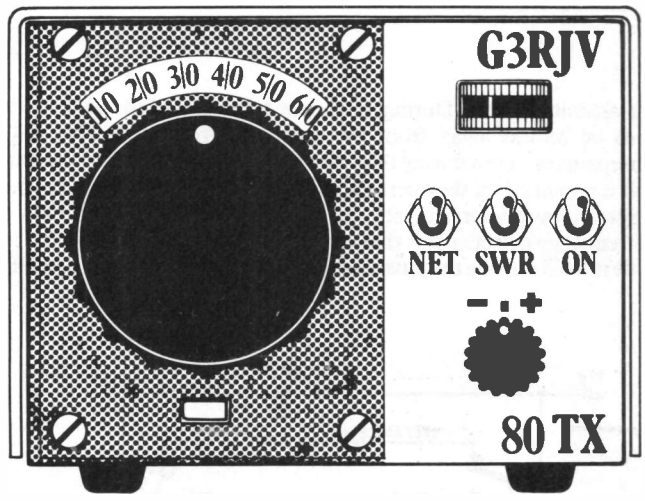
Not many of us are fortunate enough to have a dipole for 80 metres running down our back yard with a nice standard 50 ohm termination. We have to feed our antenna through an ATU (antenna tuning unit) to match the output impedence of the transmitter and antenna. The standard way to do this is using some form of standing wave bridge. Some amateurs have these built into their ATU systems but I decided to add a simple SWR measuring circuit within the TX80 case.

The circuit, shown in Fig. 8, is one I have described in *Short Wave Magazine* before and is ideal for small output transmitters. It takes the form of a resistive bridge to match the antenna, through the ATU, to 50 ohms. It is really a form of Wheatstone Bridge based upon a standard 51 ohms (the nearest preferred value to 50 ohms). The bridge circuit considers the impedance offered by the ATU (on the output terminals) against fixed values of 51 ohms. The ATU is then adjusted until the meter nulls (shows the lowest reading) indicating that the bridge is seeing a 50 ohm impedance across the input to the ATU at the frequency in question.

There is a disadvantage in this system in that the SWR bridge loads the output of the transmitter and has to be switched out once the ATU has been set. If it is not removed from the circuit, it dissipates some of the output power from the transmitter. A switch SW2 has been added to the circuit so that the SWR bridge can be in or out of the output line from the transmitter. The more conventional SWR meters sample RF from a trough or an inductor and may be left in the circuit during the operation of the transmitter. So why not use this type of circuit? The circuit in Fig. 8 has two considerable advantages. First of all it is very simple and inexpensive, it contains few components and is easy to fit into any little corner of a case. The other, perhaps more important, advantage is that this form of circuit maintains some load on the output of the transmitter throughout the adjustments of the ATU. Whatever the impedance of the ATU input, R1 and R2 give the transmitter output some loading. This can be vital with simple little RF power amplifier circuits; such circuits tend to like to see a reasonably matched load on their output. A severe mismatch can occur on some settings of an ATU while the tuning up is in progress which might be enough to cause the power amplifier transistor to curl up its toes and die. So this little circuit has a built-in safety factor.

The components are cheap items, even the meter should not cost very much. An ideal choice of meter is one of the little ex-tape recorder meters that seem so readily available at radio rallies; these have a full scale deflection of around 200μA but any moving coil meter with a full scale deflection of 1mA or less would be suitable for the circuit. The preset VR1 acts as a sensitivity control to suit the meter in use. The 51-ohm resistors should be capable of a little power dissipation; they are not in use for long and 1 watt resistors will serve the purpose. A couple of 100-ohm, half-watt, resistors in parallel could also be used.

No layout is shown for the metering circuit because it was built directly onto the reverse of the front panel of the transmitter. All the bridge components were directly wired onto the contacts of SW2, and VR1 was soldered directly onto the back of the meter. It is essential that screen leads be used into and out of this circuit. The transmitter output, from the changeover relay, is taken to the input of the circuit and the output is taken, *via* a screened lead, to the output socket on the back of the case.



The Switching Circuit

The Changeover and Keying circuit, Fig. 6, enables the transmitter to be keyed and also operates a relay to change the antenna from the transmitter to the receiver. The wiring of the contacts on this relay is shown in Fig. 9. When the key is up the relay contacts are in the normal position and the antenna socket and the receiver socket are joined by the normally closed (NC) contacts. Once the key is depressed the relay energises and the relay contacts change over, connecting the antenna socket to the transmitter output *via* the normally open (NO) contacts. The antenna has thus changed from receive to transmit.

The relay has a second set of change-over contacts which provide a 12 volt line for the transmit and receive positions. These 12 volt receive and transmit lines are used to operate the

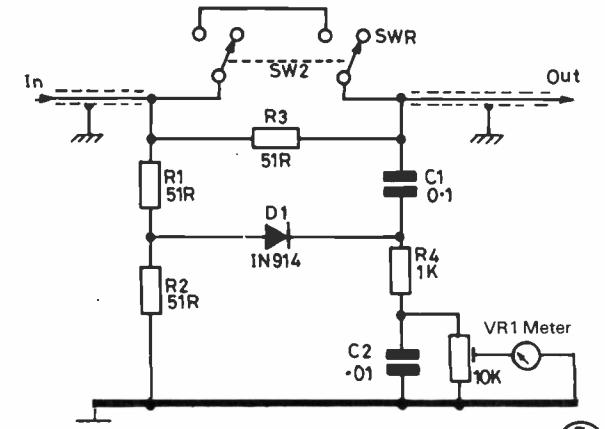
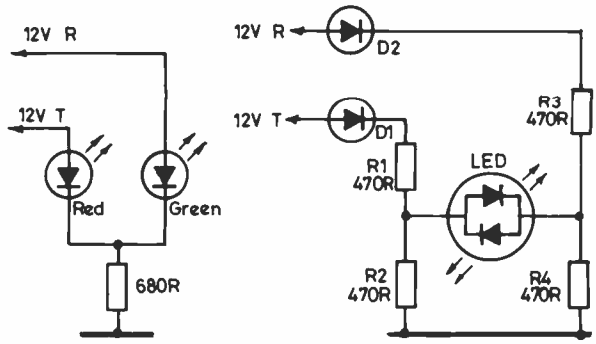


Fig. 8 SWR CIRCUIT

E 704



(a) Conventional LED circuit (b) Bi-colour LED circuit

Fig. 10 INDICATOR CIRCUITS

E 706

Tables of Values

Fig. 8

R1, R2, R3 = 51R, 1W (*see* text)
R4 = 1K
VR1 = 10K preset
C1 = 0.1 μF ceramic
C2 = 0.01 μF ceramic
SW2 = 2-pole changeover miniature toggle switch
Meter = about 200 μA moving coil (*see* text)

Fig. 9

VR 1 = 10K linear variable
VR2 = 100K preset
D1, D2 = 1N914
Relay (muting option) = 12 volt (about 185-ohm) coil

Fig. 10

R1 to R4 = 470R
D1, D2 = 1N914
LED = bi-colour LED

transmitter offset. During receive the frequency of the VFO needs to be moved away from the operating frequency. The VFO remains on, even during the receive periods, to aid stability — but if it remained on the operating frequency it would be heard in the receiver and interfere with the required signals. The VFO has a frequency offset circuit that enables the frequency of the VFO to be moved outside the passband of the receiver during the receiving periods. This circuit is shown as an inset on the VFO circuit, Fig. 1. 12 volts are switched to a silver mica 47pF capacitor (C10) and a diode (D2) increasing the capacitance of the VFO tuned circuit. The 12 volt line has two ferrite beads close to C10 and D2 to reduce stray RF.

In theory a simple little circuit idea and in practice too because there is so little to it. Having said that, frequency offset circuits are notoriously difficult to reproduce. Lots of designs in the amateur radio literature, including mine, have cheerfully included frequency off-set circuits. The problems usually come when the circuit is copied onto the individual VFO. Tuned circuits in VFOs are fussy things and do not take kindly to being messed about. Often the amount of offset claimed for a particular circuit cannot be achieved or the VFO becomes unstable when the extra components are added. The trouble lies (I think) in the fact that the copies do not faithfully reproduce the prototype in exact layout and construction. All I can say for the values here is that they achieved some 5kHz of offset which was ample to shift the frequency of the VFO outside the range of the receiver tuned to the operating frequency. It may be that the individual constructor may have to vary the value of C10 to achieve the required amount of offset for the particular VFO built from the circuit in Fig. 1. Not a difficult task, just build it as shown and fiddle around with the circuit and the value of C10 until the desired offset is achieved.

In this particular circuit an offset control (VR1) has been provided, together with a preset control (VR2) for transmit. VR1 was included as a front panel control in case I decided to build a receive board to match the TX80 and make it into a full transceiver — in which case it would allow receiver incremental tuning (RIT) control. When setting up the offset circuit, VR2 is placed at about the centre of its travel to give the operating frequency on transmit; on receive VR1 comes into play and can give an offset either side of the operating frequency. This is a conventional RIT control. But when using the transmitter with another receiver, the amount of offset from VR1 is unlikely to take the signal out of the receiver passband with VR2 set at the centre of the track. For this type of operation (all I have done with this transmitter so far) VR2 is set at one end of the track and VR1 rotated towards the other

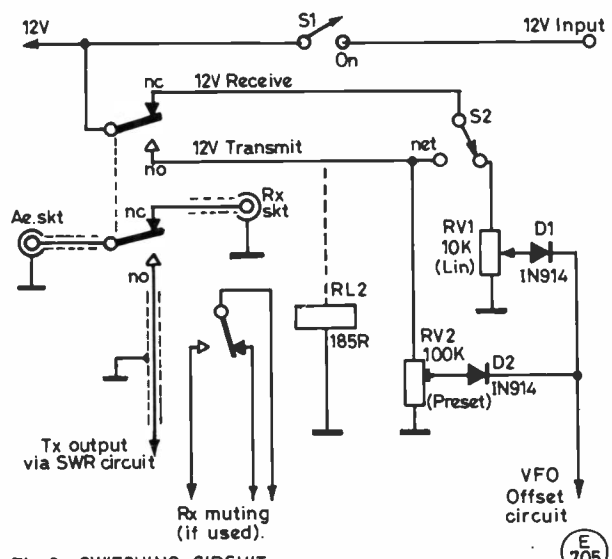


Fig. 9 SWITCHING CIRCUIT

E 705

E 707

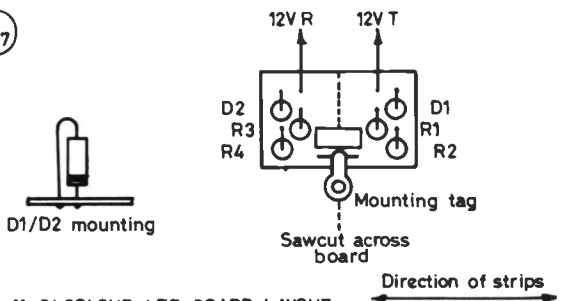
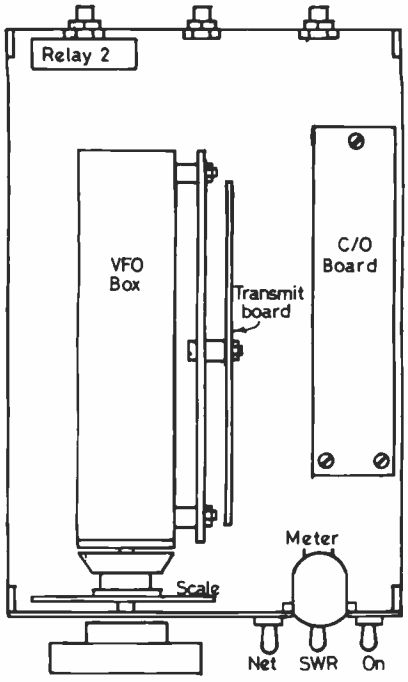
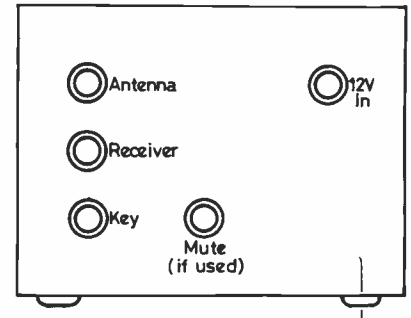


Fig.11 BI-COLOUR LED BOARD LAYOUT.



(a) Top layout



(b) Back view of case

Fig. 12 TX80 CASE LAYOUT (Minffordds A72)

end of its track until the offset is sufficient to lose the signal on receive. Not only does the offset need to be great enough to take the frequency out of the receiver passband during the receive period when using the transmitter with a separate receiver, but the transmitter has to be netted with the receiver before transmitting can occur. The procedure is to identify a station to be called or a clear frequency to be used and then to listen for the transmitter VFO on the receiver so that the transmitted signal will occur on that frequency. The offset circuit is arranged so that on receive the VFO is *not* on the operating frequency of the transmission so a 'netting' switch has to be added. This is to cancel out the receive offset so that the VFO can be put onto the transmit frequency during receive periods. This switch is SW2 on Fig. 9; a single-pole change-over switch. It takes the 12 volt receive line off the offset control and put the 12 volt transmit line into circuit during the receive period. The VFO is now at the transmit frequency and can be adjusted until it is zero beated with the required station or frequency. The net position must be removed before the transmission begins. It might not be a bad idea to use a push switch or a spring loaded (biased) switch for this position.

RL2 shown in Fig. 9 is an addition which I used in my TX80 to switch the receiver muting circuit on the Drake 2B receiver. It could be added to mute other receivers which have a muting switch facility. If not, the output from the TX80 is such that it will present no problems to the average communications receiver without muting. The gain controls may have to be turned down on transmit but the receiver can be used to monitor the transmission.

Pretty Lights

Fig. 10 shows a final touch added to the TX80. It is useful to have an indicator light to show that the transmitter is on. A single lamp or light emitting diode (LED) would do this job. A better arrangement is to have two LEDs: one to indicate the transmit state and one for the receive state. A simple circuit for this is shown in Fig. 10(a). The two LEDs are connected to the appropriate 12 volt transmit and receive lines from the relay. A little more sophisticated are the newer LED devices which can light up red *or* green. Some have three wires but the ones I obtained cheaply have only two and display red or green depending upon which way around they are connected. To use these the series limiting resistors are divided into two sections and fed from a couple of diodes as shown in Fig. 10(b). This need not take up a lot of room inside the TX80 case. I used a simple layout (shown in Fig. 11) on a small offcut of 0.1 inch spacing Veroboard. The diodes are mounted vertically as shown. A little fussy but it does add a nice touch to the completed transmitter.

Layout of the TX80

The method of mounting the TX80 into a case is shown in Fig 12. The case used is the *Minfford Engineering* A72. A single stout aluminium panel runs down the centre of the case. This is used to mount the VFO case and the transmit board; they are mounted vertically on opposite sides of this panel. The Changeover Board is mounted on the bottom of the case alongside the transmit board. All of these boards are held in place by 6BA nuts and bolts with standoff pillars. The back of the case is also shown in Fig. 12. The main connections are the 'Antenna', 'Receiver', 'Key" and '12 Volts In' sockets with perhaps the mute switching socket. In my TX80 all of these were phono sockets — I use them for all my terminations. The wisdom of using the same socket for the power supply input and the other functions is doubtful. It is placed well away from the others so the 12 volt supply should not be plugged into another socket in error but the more cautious may prefer to use a differing termination. A 12 volt, 1 amp, stabilised supply or one of the cheap CB 12 volt supplies will more than cover the requirements of the TX80.

The TX80 has been used on and around the QRP operating frequency of 3560 kHz for several weeks and has gained some good QSOs throughout the U.K. and into Europe. Eighty metres is a lively band these days and QRP operation is very common on the band. The TX80 provides a convenient way of sharing in this form of "radio fun".

Sources

Case: Type A72 all-aluminium box from *Minffordd Engineering,* Sun Street, Ffestiniog, Gwynedd LL41 4NE (076676 – 2572).

★ ★ ★ ★ OBLAST CORNER ★ ★ ★ ★

NIGEL CAWTHORNE, G3TXF

"Victory-40" Awards Roll In

SEVERAL readers reported receiving their "Victory-40" awards at the end of February *via* the RSGB. The award was for working 40 special stations during the first few months of 1985. Mike, G4AYO, who received award no. 1441 says that the award looks nice and is on good quality paper.

The large bundle of "Victory-40" awards for the U.K. was received from Box 88 by RSGB HQ, from where they have been distributed.

Contest News

The annual CQ-M Contest is a good opportunity to make a large number of USSR QSOs and to increase your oblast score. This year's event runs from 2100z on Saturday, May 10 to 2100z on Sunday, May 11, 1986; 2100z is equivalent to "midnight in Moscow".

Although the CQ-M (M standing for "mir": Russian for "peace"), is an "everyone works everyone" type of contest on both CW and SSB, the majority of stations active are from the USSR and hence the CQ-M is a good opportunity to boost your 1986 oblast score.

Non-USSR stations send a signal report followed by a serial number, *e.g.* the first QSO on CW send 599001, or on SSB 59001. Count one point for QSOs within your own continent and three for QSOs with stations outside your own continent. Contacts with your own country count for the multiplier only.

CQ-M Multipliers

Multipliers are "countries" on each band (irrespective of mode) and satellite QSOs count as a separate band. The countries list is the same as the ARRL DXCC list except that UA2 does not count as a separate country. It is considered as being part of European USSR.

There are also 22 oblasts that count as multipliers (in addition to DXCC countries) during the CQ-M contest: these are listed in Table 2.

The Tashkent award received by Mike, G4OII, during his 1984 visit to UI8-land.

CQ-M Contest final score is the total QSO points multiplied by the sum of the country and special oblast multipliers worked per band. Entries should be posted by July 1st to "CQ-M Contest", Box 88, Moscow, USSR.

DX Reports

Two good catches for John, G4WSX, were UA0QHT (14 MHz) and UA9ALU (3.7 MHz). Mike, G4AYO, has received QSL's from UI8TAE and 'TAF. Thanks to a land-line QSP from Mike, G3TXF was able to work his last remaining European oblast UA6I (089).

Paul, G4PWA, has recevied a small flood of USSR QSLs including RJ6R, UI8CAJ, UK6KAB, UM8NBB and UM9TWA. Box 88 also produced QSLs for Paul from J5WAD and 4K1GDW (S.Shetlands).

These last two being instances of USSR operators working from "overseas"; J5WAD was active from Guinea Bissau and 4K is the prefix used by USSR stations in Antarctica.

Brad, BRS1066, has got off to a good start for 1986 with 131 oblasts heard in the first two months. Interesting ones heard

OBLASTS 'WORKED' TABLE

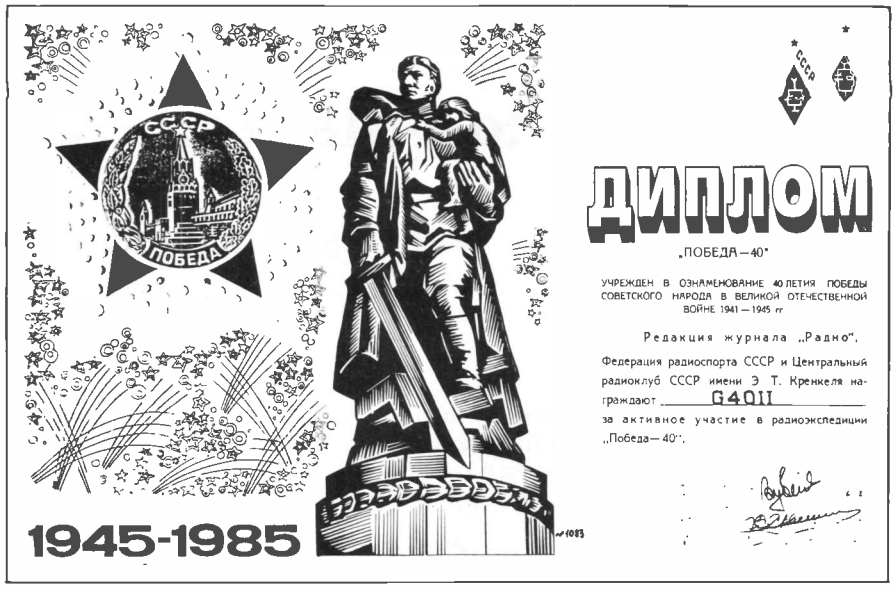
Station	*1986 (max 184)*	*All-Time (max 184)*
G4AYO	107	172
G4WSX	60	119
G4OBK	54	148
G4ZFE	50	75
G4OII	34	137
G3PMR	30	108
G3TXF	15	172
G4UNH	14	124
G4LZZ	6	76
G4TWX	5	112
G4VFG	4	64
G4PWA	0	171

OBLASTS 'HEARD' TABLE

Station	*1986 (max 184)*	*All-Time (max 184)*
Brad BRS-1066	131	175
SWL Frank Dunn	105	174
Eddie 9H1-15357	63	125
SWL Philip Davies	63	106
Tony BRS-87156	52	119
Norman BRS-28198	42	91
Maurice BRS-32601	30	148
Luciano BRS-86766	4	76
SWL Angela Sitton	4	4

Table 1. Send your entries for the new '1986 in-year' and 'All-time' tables to reach G3TXF by *April 30th* for the June issue. The 'All-time' table is based on current oblasts only (max 184).

"Victory-40" awards have been received by U.K. claimants. Mike, G4OII, received award number 1083 in February.



include UA6IA and UA6IB (both in 089), UA9ZAA (100), RZ1OWA on FJL, UD7KWB (003) on 3.5 MHz. On 1.8 Brad reports RT5UL/UI with a query on the oblast number.

Tony, BRS87156, also reports a good start to the year with 7 all-time new oblasts heard, all on 80m. Tony reminds oblast chasers that on 80m., USSR SSB stations are not allowed full use of the band. To hear USSR stations on 80m. SSB, you need to search around 3650 kHz.

SWL Frank Dunn heard the Franz Josef Land station UV100 on 80m. There have been reports of FJL activity on 160m. too. During the mid-winter 160m. DX season UZ1OWA and UA1OT, both on FJL, worked several G stations—including G4OBK.

Notes from "Radio"

The November '85 issue of *Radio,* includes a descriptive write-up and photograph (just like *S.W.M.'s* "Beyond the Call"!) of the station belonging to well-known DXer and contester UL7QF, from Alma Ata. UL7QF's contest activity, including high scoring entries in the WAE-DX, CQ-M and the JARL's All-Asia Contests are mentioned.

The article says that UL7QF first got started in amateur radio as a 12-year-old in 1957 when he joined the local radio club. His first call UL7AQX was issued in 1962.

"On the Amateur Bands"

The Russian weekly newspaper "Soviet Patriot" carries an occasional column on amateur radio under the heading "On the Amateur Bands" written by Boris, UW3AX.

USSR oblasts that also count as "country" multipliers in the CQ-M Contest

002 UD-N	088 UA1N	096 UA6P
013 UF-V	089 UA6I	097 UA4Y
014 UF-Q	090 UA9X	098 UA0Q
056 UI-Z	091 UA4S	114 UA1P
084 UA9W	092 UA4U	128 UA0Z
085 UA0O	093 UA6J	159 UA0Y
086 UA6W	094 UA4P	
087 UA6X	095 UA4W	

Table 2. The "multiplier" used in calculating the score in the USSR CQ-M Contest to be held from 2100z on May 10th to 2100z on May 11th, 1986 is DXCC countries (less UA2) and the 22 oblasts listed.

The 20 November '85 issue contained an item on the results of the RSGB's First and Summer 1.8 MHz CW contests. These short four-hour contests (of which there are three a year) appear to be keenly followed by 160m. contest operators in the USSR.

In a December issue of the same publication, under the heading "Club News", the operation by UC2LAS under the call RA0JB (Oblast 112, Zone 19) is noted. Although the item does not say how long RA0JB will be QRV, it does note that he is keen to make skeds on 3.5 MHz with European stations, at his sunrise (when conditions on 80m. peak).

RA0JB complains that many operators in Europe do not listen carefully enough and carry on working each other while UA0's are calling them. However, if a UA0 does succeed in breaking through (usually with the help of a UA9), the European often gives him 59!

Tables and QSLs

SWL Angela Sitton asks whether QSLs are needed to enter the "Oblast Tables". No. The tables are for "worked" or "heard", which means that QSLs are not needed in order to make an entry. However, the identity of some oblasts may be in doubt until the QSL card is received. But in most cases the oblast can be identified directly from the callsign.

SWL Eddie from Malta has a few query callsigns which include UO5PA, UP2NS and UR2DL. These two letter calls are Oblasts 039, 038 and 083 respectively. For most of the others on Eddie's list, he'll have to wait and see what the QSL says!

SWL Philip Davies is puzzled by references to the USSR "R" prefixes being for VHF-only licences. At one time (before the last major callsign reshuffle in the USSR), R-prefixes were for novice licences and were only heard on VHF or 160m. But since the restructuring of the USSR call-signs two years ago, there have been many stations with "R" prefixes on HF, both as special calls, such as RJ6R or as normal calls such as RB5DX.

Table Entries

Send your entries for the "All Time" and the "1986 In-Year" oblast heard/worked tables to reach G3TXF at Holt Cottage, Kingston Hill, Kingston-upon-Thames, Surrey, KT2 7JH by **April 30th** to appear in the June issue.

Many thanks to Tom K1KI (USSR *Tidbits*), RSGB *DX Newsheet,* IARU/ARRL and Dex, W4KM, for items extracted. Good hunting es DSW!

Converting the Ham International Multimode to 6-Metre Operation

IAN KEYSER, G3ROO

HAVING had a Ham International Multimode lying on the bench and getting in the way for some time, I decided that something must be done with it to make it useful. First ideas were towards 160m. for mobile use and that was discussed with others at some length but no decision taken.

On the way back from one of the many rallies we attend, Dick, G0BPS, made a comment to the effect that it was time someone thought about a mobile rig for the 50 MHz band when it arrived. This prompted ideas for a possible design until Alan, G4HXE, suggested that an American CB with SSB and FM would make a very good basis. This triggered me thinking again about the Ham International and this article is the result.

The Ham International

The PLL used in this set is an old favourite, the PLL02A. This is a very useful device indeed with nine-bit binary channel select lines. This makes it very flexible and can be used in a variety of modes.

In my usual manner I dived in without any information on the set apart from a very small circuit diagram. Luckily it was a very good print indeed and with the aid of a hand magnifier I was able to get an idea of what was going on. The VCO block is just the tuned circuit and varicap voltage control circuit. The oscillator uses part of the mixer IC a TA7310P – very common in CB sets. The oscillator runs between 17.555 and 17.995 MHz (Ch. 1 to 40) and this signal is mixed with the second harmonic of a 10.05 MHz crystal oscillator to produce the required local oscillator injection signal on 37 MHz; this mixes with the incoming 27 MHz signals to produce the IF frequency.

To generate signals in the 50.0 to 50.5 MHz part of the spectrum it is necessary to have the PLL running between 39.305 (which, when mixed with the 10.695 IF transmit signal, generates 50.0 MHz) and 39.805 (generating 50.5 MHz when mixed with the IF). This is the same local oscillator frequency that is required if the set is to be used in the 10-metre band between 28.61 and 29.11 MHz. This could be done just by changing the crystal and retuning the VCO circuit, but there is a problem with this: the American bandswitch misses every fourth channel so that the CB service will not interfere with the model control radios. By changing the switch it would be possible to overcome this problem, though a more complex way than really necessary. The way this can best be overcome is to use an EPROM to change the information supplied by the switch to that which is required by the PLL.

To carry out the conversion we have to decide what we require. First ideas make us think of the local oscillator running at the signal frequency plus the IF frequency. In this case a new VCO block to generate a local oscillator to step between 60.695 and 61.895 MHz would be required; this would mix with input signals between 50.0 and 51.2 to produce the set's IF of 10.695 MHz. If however we consider the other way round and use the signal frequency minus the IF frequency we end up with the local oscillator requirement between 39.305 and 40.505 MHz . . . Makes one think! (the same range of frequencies used for 29 MHz FM). Can we make it dual band? Think of the switching problems involved with the input tuned circuits and transmitter section! Varicap diodes could be used to tune the 50 MHz circuits to 29 MHz – not very elegant, but possible without too much loss of sensitivity . . . think I will leave that to someone else!

There were two tests that I had to do before diving into the conversion proper: one to check that the transmitter PA circuitry could handle the frequency and the other to establish that the receiver front end would work. Firstly I disconnected and

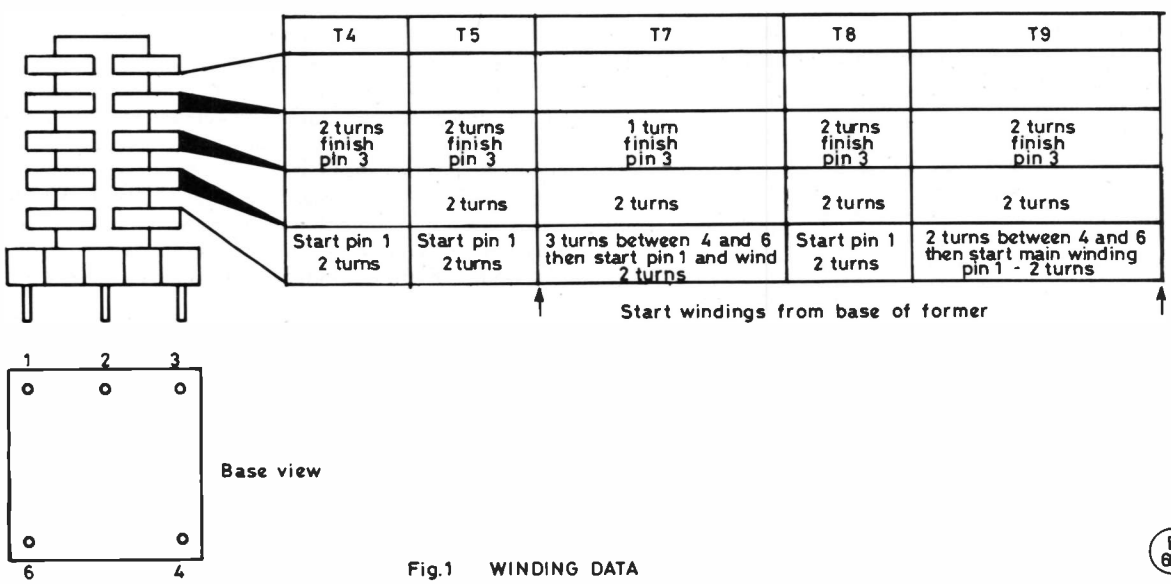


Fig.1 WINDING DATA

E 696

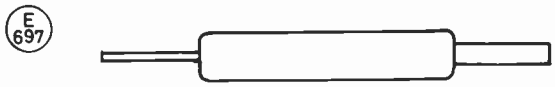


Fig. 2 The ONLY type of trimming tool to use with 10K formers.

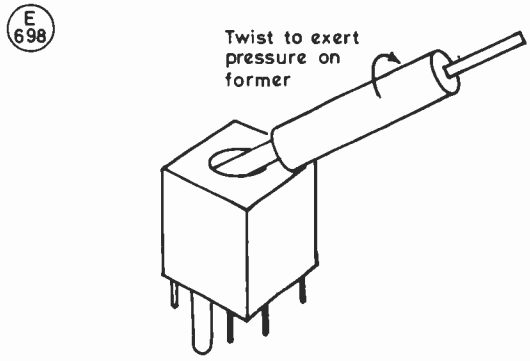


Fig. 3 Method used to ease out former of 10K coils from metal screening can.

removed the VCO block and fed the signal generator into the terminal "S" of the PLL board, then I carefully removed the receiver input tuned circuit T7, 8, and 9 and labelled them to ensure that I knew where they went if I had to abandon the project. Rough coils were wound on surplus 10K coil formers to suit the design and then the receiver tuned up on 49 MHz (the set was still unmodified for 28/29 MHz) . . . success! A little trimming of the coils and the set proved be fairly lively. To check the transmitter, I removed L11, L7 and C49 and fed in the signal generator tuned to 50 MHz; the supply current rose from 400mA to 1.4 amps and a small 24 volt lamp connected to the PA collector *via* a 100pF capacitor lit to about half brilliance!

The decision was then taken that the project was a possibility – not a "cert", but worth the risk.

The Conversion

The first job is to get the PLL running on the correct frequency, and to do this we use an EPROM programmed for the job. There was little point in my doing my own EPROM as the work had already been done by Roger Alban and published in the January 1986 issue of *Ham Radio Today*. Following Roger's instructions the EPROM was inserted and the VCO tuned up. To check that things were functioning the set was tested on 28 MHz using the signal generator and then the output increased to maximum and checked on the image frequency of 50 MHz.

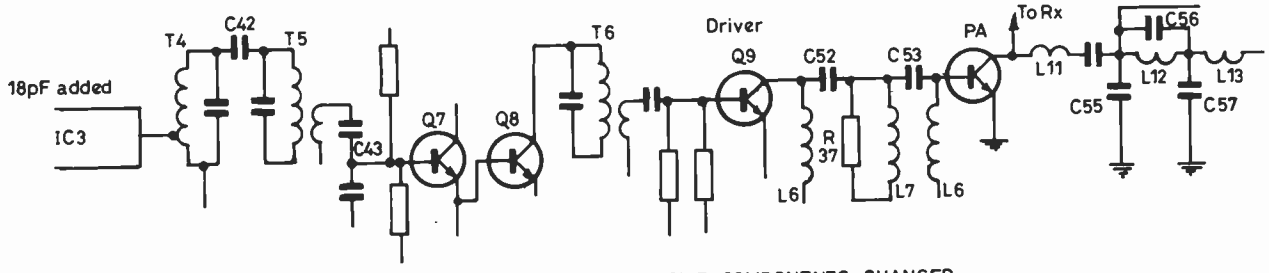
Now we have to start rewinding the receiver tuned circuits. There are three tuned circuits in the receiver section, T7, 8 and 9, and the winding details are given in Fig. 1. Fit 18pF ceramic capacitors across the main windings of T8 and 9 on the underside of the PCB. Having done this it is necessary to change the low pass filter elements in the transmitter section as the receiver aerial is taken from the PA collector. There are five capacitors to change here, namely C54, 55, 56, 57 and C184; these are replaced directly by C54 to 80pF, C55 to 260pF, C56 to 25pF, C57 to 250pF, and C184 to 150pF. The inductors L11, 12, 13 are modified by removing one turn from each of L11 and L13, and by removing two turns from the air spaced coil L12. It was not possible to retain these coils but it is a simple matter to rewind them if necessary. (When doing modifications always keep notes of any information that may be needed later, coil turns, links removed, etc., as it can save a lot of time when things go wrong.)

Component Change Information and Coil Data

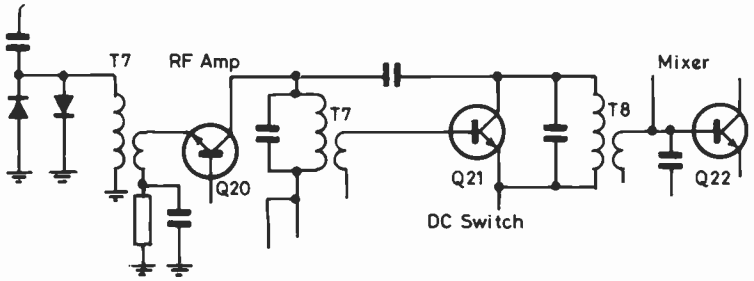
C37 (82pF) = 45pF
C38 (56pF) = 33pF
C52 (82pF) = 45pF
C53 (220pF) = 120pF
C54 (150pF) = 80pF
C55 (540pF) = 270pF
C56 (47pF) = 25pF
C57 (470pF) = 220pF
C184 (270pF) = 150pF

L3 = 20 turns 36swg on 100K ¼W resistor; **T4** = Toko 10K coil former, 6 turns centre tapped between pins 1 and 3; **T5** = Toko 10K coil former, 6 turns between pins 1 and 3; **T6** = remove existing coil former, remove two windings from top of main winding and reposition link winding touching top of main winding; **T7** = Toko 10K coil former, link winding 3 turns between pins 4 and 6, main winding 5 turns between pins 1 and 3; **T8** = Toko 10K coil former, 6 turns between pins 1 and 3; **T9** = Toko 10K coil former, link 2 turns between pins 4 and 6, main winding 6 turns between pins 1 and 3; **L7, L11, L13** = remove former from circuit, remove 1 turn from winding and replace in PCB; **L12** = remove former from circuit, remove 2 turns from winding and replace in PCB.

Note: capacitor values shown in brackets are the original values of the components.



(a) SKELETON OF HAM INTERNATIONAL PA CIRCUIT SHOWING CIRCUIT COMPONENTS CHANGED



(b) SKELETON OF HAM INTERNATIONAL RF INPUT CIRCUIT OF RECEIVER

Fig. 4

Having done this power up the set and feed in the signal generator and on a high level output sweep about 50 MHz until it is heard from the loudspeaker. If it is not heard sweep a wider range in case the loop is not locked. If it is still not found then either the loop is not locked or there has been an error in the coil winding. When any faults have been cleared peak the cores of T7, T8, and T9 but do not worry about the low pass filter windings yet, these will be covered in the transmitter section.

Now we have to peak up the PLL board. This is done using the received signal. The cores to peak are T2 and T3, the PLL mixer output, and T1, the oscillator doubler. This, as mentioned before, is very flat in tuning and very little difference will be noted.

Even with the low pass filter untuned it should be possible to hear a 1μV signal on SSB with little problem.

The Transmitter Section

There are only five more coils to wind to finish the conversion. Start by removing L3, this is wound on a 560-ohm resistor but we will rewind it on a 100K resistor with 20 turns close wound of 36 s.w.g. enamelled wire. There are two reasons for this, firstly the frequency is higher and we are therefore looking for greater stage gains due to the loss of gain in the transistors; also the "Q" can be made higher because the frequency is higher and the bandwidth the transmitter is required to cover is less (our 50 MHz band is only 500 kHz wide). We next change the values of C37 to 45pF ceramic, and C38 to 33pF ceramic.

T6 is modified by carefully removing two turns from the top of the main winding and then sliding the link winding down the former to come back into contact with the top of the main winding again. This is then replaced back in circuit. T4 and 5 are rewound as from the coil winding data in Fig. 1 and the main windings resonated using 18pF capacitors. Finally remove one turn from L7 and change C52 to 45pF ceramic and C53 to 120pF ceramic.

Power up the set, switch to FM or AM and push the PTT button on the microphone. With an SWR bridge on the output something should be seen on the bridge and this should be peaked by tuning all the transmitter coils in sequence. These include the low pass filter coils L11, 12, and 13. L12 is peaked by stretching the windings apart using an insulated trimming tool. The output obtained should be at least 2 watts if not a little more. A check with the signal generator on the receiver should show some improvement on the receiver sensitivity, and the receiver input tuned circuit T7 should be repeaked as, although a very flat tuned circuit, it will have altered slightly with the tuning of the low pass filter.

On doing more tests on the transmitter circuit it was found that the main cause of lack of output was insufficient drive from the PLL PCB. There is little that can be done about this and so the power of 2 watts was accepted. At this level it would still be possible to exceed the maximum legal ERP using a small rhombic aerial!

10K Coil Formers

Whenever I do modifications I try not to destroy the old coils until the set is working otherwise it is very difficult to backtrack; this means that I have a supply of Toko 10K coil formers. These have also been removed over the years from BC transistor radios or purchased when any surplus stock has been found. Without this supply of coils my construction would have been severely curtailed.

Removal of the outer screening can is the most difficult part of the operation, but by using the trimming tool designed for the former, *see* Fig. 2, it is possible to do this without visibly damaging the can.

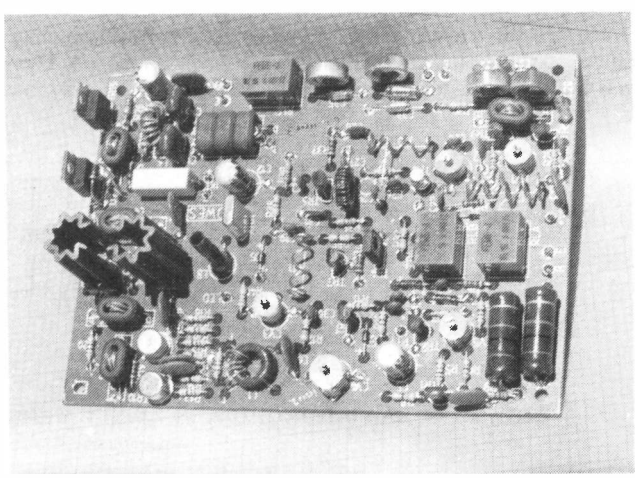
The difficulty of removing the can is due to the very effective method of holding the can in place. This is done by four indents in the side of the can which are so placed so that they align with four indents in the coil former base. To remove the can it is necessary to flatten these indents somewhat so that the former can be eased out. Taking great care not to slip with the tool, ease the larger of the two blades between the coil base and the can directly beneath the lugs. This will flatten the lugs and when all four have been 'doctored' turn the coil former over and insert the blade through the large tuning hole between the top of the coil former and the metal can (*see* Fig. 3) then with a slight twisting motion the former will pop out.

It is now necessary to remove the original winding and clean the pins. For this a hot iron with a fine bit is necessary and an Antex 17-watt type is ideal; temperature controlled irons are not so good unless the temperature can be adjusted. When rewinding distribute the windings evenly on the former. In the case of this modification only three of the four winding bays are used due to the small number of turns used.

Conclusion

At the time of writing this article the release of the band is still awaited and so no air tests have been carried out as there are no special permit holders in my area. Three sets have been converted, two Ham Internationals and one Superstar. The only difference between these two models is the component numbering and at a guess there are several other models with the same circuit. Fig. 4 gives the circuit and component numbering of the Ham International; for other sets it is only necessary to check the diagram and make the necessary component number changes to carry out this conversion.

Suitable coil formers are available for rewinding from I. H. Keyser, "Rosemount", Church Whitfield, Dover, Kent CT16 3HZ, for 20 pence each plus 50 pence postage and packing. A source for the EPROM is as given in the text.



A new product from *C.M. Howes Communications* is their HC220 2m. to 20m. transverter. The HC220 module, shown above, enables a 2m. SSB/CW or multimode transceiver to be used on the 20m. band, producing 10 watts of RF output from mis-match-proof transistors when operating from a 13.8V DC supply. As well as main station use, the module makes HF mobile operating a practical possibility for anyone who can squeeze a 2m. fig under the dashboard. The HC220 is available in kit form for £48.90, or as ready built and tested module for £79.90; post/packing in either case is 80p. Full, clear instructions, parts list and circuit diagram are included. More information from C.M. Howes Communications, 139 High View, Vigo, Meopham, Kent AD13 0UT. (0732-823129)

G3RJV's WORKSHOP NOTEBOOK

POWER ON THE CHEAP

THE CB boom has in its time produced many useful spin-offs for the radio amateur. I have spoken of the SWR bridges which can often be obtained so cheaply that they are worth buying for the meter alone. One of the other bargains to be had from the world of good buddies are the various 12-volt stabilised power supplies which have appeared cheaply on the market from time to time. I have a neat 12-volt supply bought for £7.50 which is rated at 5 amps. I have grave doubts about this rating and am certain that the 5 amps cannot refer to the continuous rating of the supply: it does not weigh enough. Transformers capable of yeilding 12-volts at 5 amps are quite beefy items. There are those who say that a simple test of the current rating of a 12-volt supply is to drop it on your foot. The current capability in amps being equal to the number of toes it will break. Perhaps not an advised test but it is wise to be wary of some of the stated ratings on such power supplies.

Stabilised power supplies are also natural items for home construction; the simpler types of supply contain few components and the circuitry is easy to build. The problem is often the cost of the transformer. Full price, well rated, transformers are not cheap, neither is the postage if they are obtained by mail order. Even the main smoothing capacitor can be relatively expensive. Sometimes it seems hardly worth the trouble when the total cost of components and labour, to say nothing of an expensive smart case, are all added up.

Recently I noticed again that *John Birkett* of Lincoln has come up with a useful little rally bargain. He is offering two types of power supply at prices that do make a homemade supply inexpensive. One of these is a ready-built supply designed originally to give a nominal 12 volts at 1 amp which is easy to modify to an adjustable voltage supply. The other choice is a package deal in components for a 12-volt, 1 amp, stabilised power supply. The prices on both of these items seemed so reasonable that I thought them worthy of sharing with *Short Wave Magazine* readers.

6 to 22-Volt Adjustable Power Supply

Fig. 1 shows the circuit diagram of the Adjustable Power Supply option. The unit is sold complete as a transformer and built-up printed circuit board. The transformer is conservatively rated, judging from its size, and is complete with a mains voltage selector panel. This panel could be removed and the appropriate connections made to the correct transformer leads. It is easier to leave the voltage selector intact; it also forms a useful anchor point for the mains input leads. The rest of the circuit is contained on a compact printed circuit board.

The board contains four diodes arranged in a bridge, a smoothing capacitor and the regulation circuitry. The regulator is the LM317K three-terminal regulator integrated circuit. The LM317K is a variable voltage regulator device capable of 1.5 amps maximum output current and a voltage range of 1.2 to 37 volts; it is housed in the convenient TO3 package. It also has internal current limiting and thermal shutdown to prevent overheating. When used in the range of 1 amp output a heatsink should be provided. The potential divider circuit provided by R201, R202 and R203 control the output voltage. In the original form this unit has values for these resistances to allow a little adjustment around 12 volts; this arrangement only allows the regulator to be used over a very small portion of its voltage range. The variable control, R202, is a preset control mounted on the board.

Fig. 1(b) shows the simple modification required to allow a more useful range of voltage output. R201, R202, and R203 are all removed from the printed circuit board. Take care because this board appears to have very thin copper on the underside and could easily be damaged by overheating. It is also wise to check all

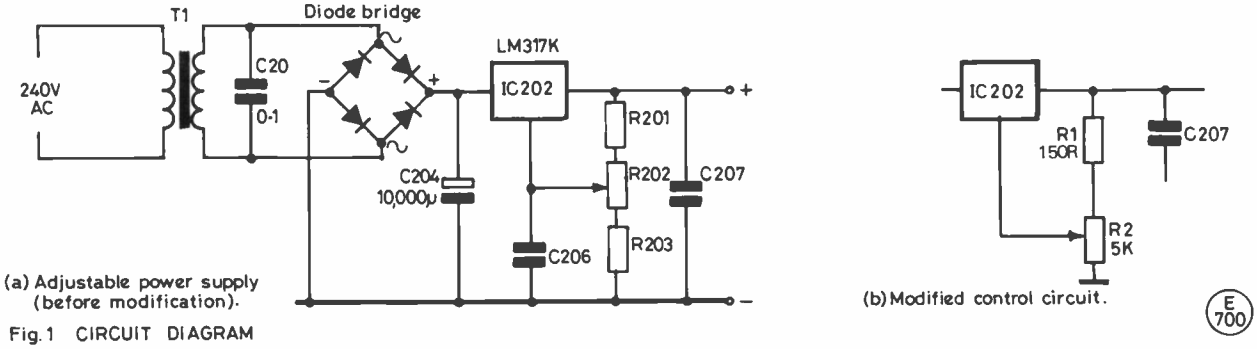


Fig. 1 CIRCUIT DIAGRAM

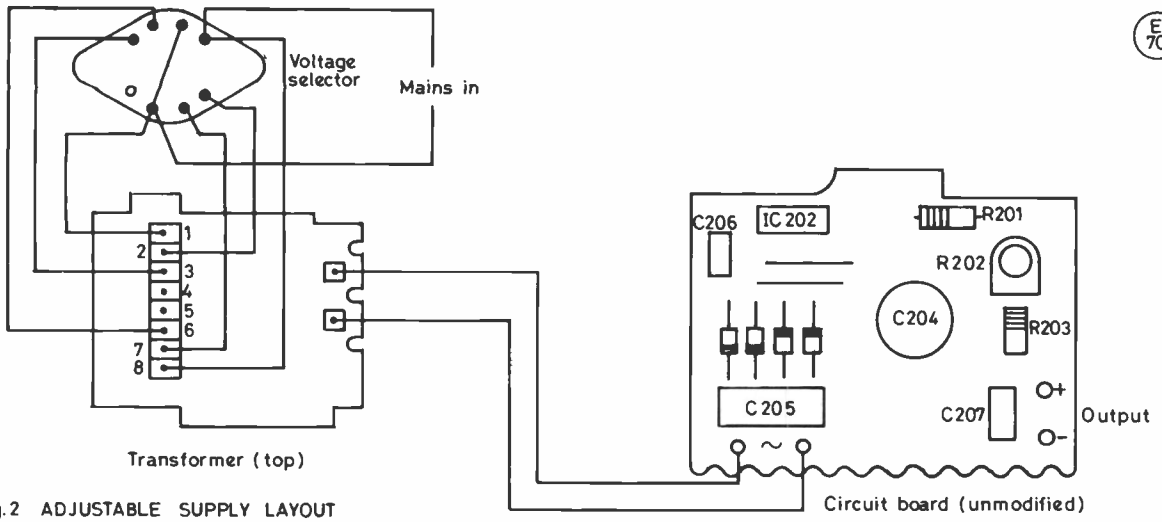


Fig. 2 ADJUSTABLE SUPPLY LAYOUT

the copper tracks and connections on the underside of the board after the modification is completed. Mine had a poorly soldered joint from the original manufacture of the board.

These three resistors are replaced as shown in Fig. 1(b). R201 is replaced by a value of 150 ohms. This resistor should be capable of dissipating at least half a watt — a one watt resistor would not come amiss. R203 is replaced by a link wire which shorts out the position in the board formerly occupied by the resistor. R202 is replaced by a 5k ohms linear potentiometer. This is to be a front panel control so leads are soldered into the holes left by R202 and taken to a front panel control position. So referring to both circuits in Fig. 1: R1 replaces R201, R2 replaces R202 and a shorting link replaces R203. This modification should give a range that is easily within 6 to 22 volts, it may go a little lower and a little higher.

The result of this modification is a very useful bench power supply worth mounting into a reasonable box. I chose a *Minffordd Engineering* equipment case Type J15, which is 6″ wide, 4″ high and 6″ deep. Cases are expensive but the Minffordd types are the most reasonable I know. Even so the case costs half as much as the internal circuitry. I added a mains switch, a fuse in the mains lead (1 amp) and choices of output termination. I found a couple of attractive red and black screw terminals but also added a phono socket output for the supply; this is a personal quirk of mine in that most of my terminations around the shack are phono. It is also useful to have an indication that the supply is on. Connecting a lamp or LED across the output would be pointless as this varies with the setting or R2. I used a 24 volt lamp wired across C204. It would also be possible to use an LED in this position in the circuit with an appropriate series limiting resistor.

The finishing front panel touch is a meter which reads the voltage across the output terminals. I happened to have a surplus meter that read 0 – 25 volts. Very convenient, because if bought new, it would probably cost more than the whole supply. It would not be difficult to use any surplus moving coil meter of, say 5mA or less, and add a series resistor and recalibrate the scale in

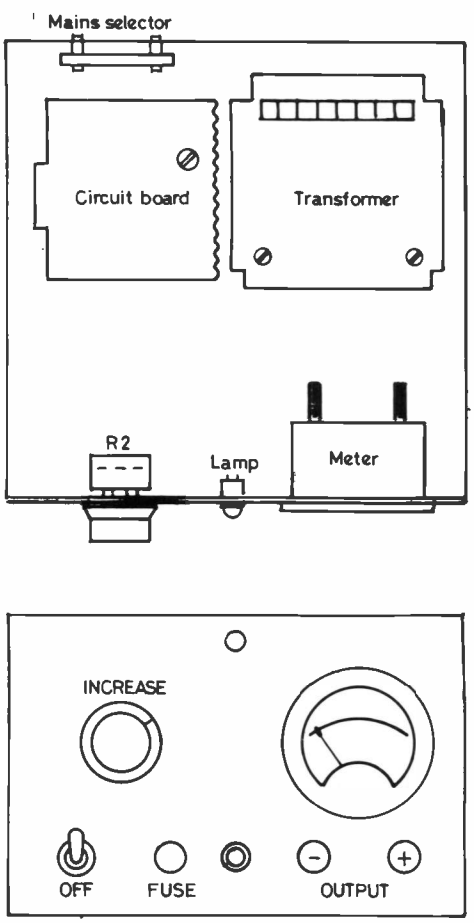
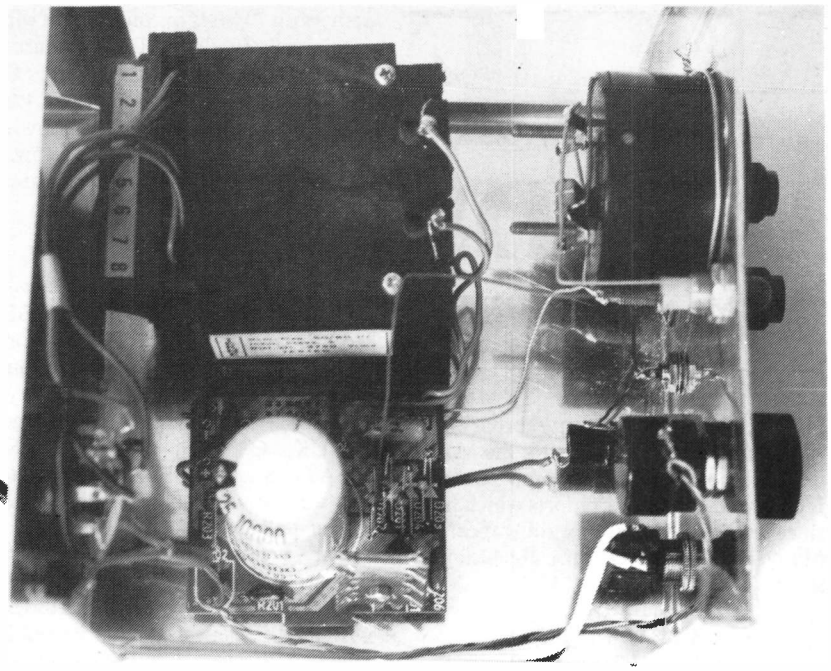


Fig. 3 ADJUSTABLE SUPPLY CASE LAYOUT

Front view of the adjustable power supply.



Inside the 6-to-22 volt adjustable power supply.

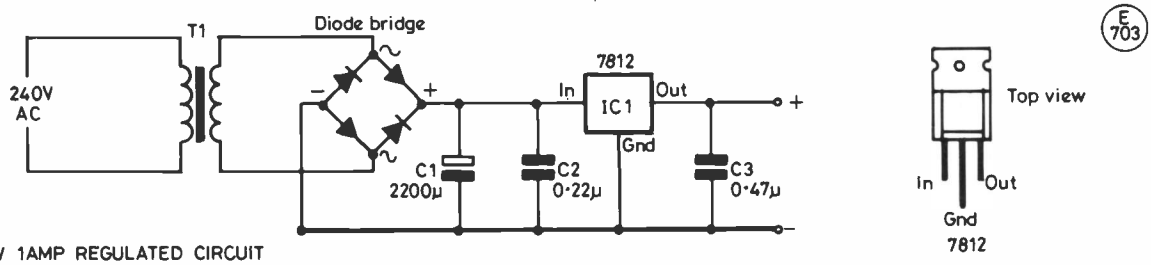


Fig. 4 12V 1AMP REGULATED CIRCUIT

voltage. It is not much of a problem to use a multimeter connected across the output and not have an internal meter.

The mounting of the unit within the case is shown in Fig. 3 and the photograph. It all fits into the case rather well. The only problem was fitting a heatsink onto the LM317K. In the original form it is mounted horizontally on the board — hanging off one edge. I carefully bent the leads upwards to make it vertical and added a small TO3 heatsink. A heatsink could be made from a piece of metal, say thick gauge aluminium. The completed power supply is attractive and a useful small bench supply.

12-Volt, 1 amp, Power Supply

The other offer by *J. Birkett* is a set of components to build a fixed 12-volt, 1 amp, Power Supply. The circuit for this supply is shown in Fig. 4. A quick glance at the circuit shows it to be a conventional arrangement with a 12-volt regulator IC, the 7812. The 7812 is the 12-volt positive version of the 78 series of regulators. This series offers 1 amp output with internal overload, thermal and short-circuit protection. All the components shown in the diagram are offered at a total cost of £2.85 which is about a quarter of the total cost of these items when I checked them out in the catalogue of a major mail order company. The components can also be bought individually as listed below.

I offer no layout for this power supply as that will depend upon the housing. The cost is so small that this little kit of parts can be used to build up individual power supplies for items around the shack. It would power many of the projects I have described in *Short Wave Magazine* or a QRP transceiver or transmitter, or some of the lower powered 2-metre mobile transceivers if these are brought into the shack for base station use. An ideal little kit of parts for that extra 12-volt supply.

Sources:

Available from *J. Birkett,* 13 The Strait, Lincoln, LN2 1JF (Lincoln 20767). Adjustable 1 amp Power Supply, £4.95 (postage 75p). 12 volt, 1 amp Power Supply Kit: transformer £1.20 (postage 75p), diode bridge 20p, 7812 regulator 65p, 2200μF 25v capacitor 60p, 0.22μF capacitor 5p, 0.47μF capacitor 5p.

The total cost of the components is £2.85 + 75p postage. (If the transformer is not included, add the usual postage rate of 60p for items under £5.)

Case: Type J15 equipment case from *Minffordd Engineering,* Sun Street, Ffestiniog, Gwynedd, LL41 4NE (076676 – 2572).

May issue due to appear on Friday, April 25th

VHF BANDS

NORMAN FITCH, G3FPK

THE major *auroras* on February 7, 8 and 9 occurred well after the March deadline, so much of this month's column is compiled from your reports which have since arrived. The events did repeat on March 6 and 7 but were rather feeble in the south.

Awards News

Vaughan Reynolds, G4MVR, member number 33 of the 144 MHz QTH Squares Century Club, has submitted some more confirmations and was awarded his "125" sticker on Feb. 18. His 21 new QSLs comprised 14 on SSB and seven on CW; 17 on tropo. mode and two each *via Es* and *Ar* propagation. An unusual square was CO, provided by LA0DT/MM aboard the *Sies Mariner* on May 30, 1985. Also included were cards for tropo. CW contacts with SP6FUN (IL), SP1AAY (IO) and SP2LU (JN) in the October 1983 lift.

Alessandro Della Casa, I4YNO, member no. 60, sent in another 26 QSLs and now has exactly 150 confirmed. His "125" and "150" stickers were dated Feb. 19. Three QSOs were on CW, the rest on SSB, 11 being on tropo. seven on MS, five *via Es* and three *via* FAI mode, which latter denotes Field Aligned Irregularity, for the uninitiated. The FAI ones were with F6DRO (AD) on June 28, 1985; F6FHP (AE) on July 24, 1984 and EA1CYE (YD) on June 18, 1985.

Tony Prior, G4UWW, from Mistley in Essex, is member no. 380 of the 144 MHz VHF Century Club, his certificate being issud on Feb. 19. His amateur radio career began in Sept. 1980 with the call G8XML. Thanks to the efforts of some of the Colchester radio amateurs, he passed the Morse test and G4UWW was launched in Sept. 1983. The present station consists of a *Kenwood* TR-9130, a *Microwave Modules* 100w amplifier with Rx preamp, the antenna being a 9-ele. *Yagi* by *Tonna,* temporarily in the roof space. He uses CW, SSB, FM and RTTY modes for which latter a *Commodore* VIC-20 computer, *AEA* Micropatch and black-and-white TV monitor are added. An outdoor long *Yagi* antenna is planned.

Jerry Russell, G4SEU, has sent the details of the *Great Britain Four Metre Award* the purpose of which is to promote activity on 70 MHz in conjunction with the special callsign, GB4MTR. There are three categories; Basic, Silver and Gold, requiring the accumulation of 100, 125 and 150 points respectively. For a copy of the rules and method of scoring, send an *s.a.e.* to either G4SEU or G4WND who are both QTHR.

Contests

The results of the 144 MHz Contest held on Dec. 1 were broadcast over GB2RS recently and in which G0BUK won the Single-op. section with 3,080 pts. from 327 QSOs. G3NNG was second with 3,023/402. The Zonal Awards go to G0BUK, G3NNG, G4ASR, G4SHC, GI6ATZ and GM8FFX. The Multi-op, part was won by G4ANT with 4,273/422, runner-up being G4NXO, 3,588/404. The Zonal Certificate winners were G3KFT, G4ANT, G4NXO, GD4IOM, GM0CQV and GW2OP. This event included an Affiliated Societies category in which the *Sheppey Western Contest Group* came first with 13,158 pts. The *Harwell ARS "A-team"* were second with 6,819. Zonal Award went to the *South Lakeland ARS,* the *Sheppey Western CG,* the *Colchester Radio Amateurs' "A-team,"* the *Pembroke and District ARC* and the *Aberdeen ARC.*

Two contests are scheduled for April 6, both from 1300 to 1700 GMT, and incidentally, all times mentioned in VHFB are always in GMT. These are the 432 MHz CW and the *Barking R and Es's* event, details of which were mentioned on page 7 last month. The 70 MHz and SWL Contest is on Apr. 20 but no rules divulged yet; last year it was from 0900 – 1500.

The first of the year's 10 GHz and Microwave *Cumulatives* legs are on Apr. 13 and all are 0900 – 2000. On 10 GHz, there are two sections, wideband and narrow band, scored separately, and the same stations may be worked on each mode. One point *per* kilometre is the way to score QSOs with half points for cross-band contacts. QTH can be changed once *per* session within a five miles radius of a fixed point. Entries from non-RSGB members will be accepted from outside the U.K.

The microwave band for the Apr. 13 session will be 3.4 GHz. Only one class for everyone and again a QTH change can be made as in the 10 GHz affairs. One pt./km. scoring with half points for crossband QSOs. The May date for the next leg of both *Cumulatives* is the 11th. On May 3/4 there is the 432 MHz to 24 GHz Contest, 1400 – 1400 with two sections — Single-op. and Mulit-op. In the "M" section, simultaneous operation on several bands with different callsigns is allowed. Radial ring scoring on 432 and 1,296 MHz, and one pt/km. on other bands with half points for crossband QSOs.

While it was logical to exclude the QTH information from international contests some years ago, county hunters cannot readily deduce where most of the stations are. In the 144 MHz and SWL event next month, the county code, as *per* January RadCom, has to be exchanged as counties and countries are added together to give a multiplier. Fuller details next month.

DX-Pedition

John Lemay, G4ZTR, has sent details of proposed activity from XN square between May 27 and June 4, covering 4m., 2m., 70cm., 23cm., 13cm., 10 GHz and 24 GHz. The QTH will be near Amlwch on Anglesey and the list of equipment suggests this will be a reliable expedition. The group comprises G4VIX, G4YUZ, G4ZTR, G6CMS, G8HGN, G8URI and GW4ZVQ. Skeds will be welcomed for 4m., 23cm. and 13cm. and for random MS on 2m., and for the former, contact Dave Bartlett, G4VIX *(QTHR)* or 04024 55870. MS skeds can be arranged *via* Ian Parker, G4YUZ *(QTHR)* or 0992 463478. All other information from G4ZTR, *(QTHR).*

"VHF Bands" deadlines for the next three months:—

May issue—April 2nd
June issue—May 7th
July issue—June 4th

Please be sure to note these dates.

Mike Newell, G1HGD, has requested publicity for the St. John's Middle School "Mayfair" on May 18 in Kenilworth, Warks. (ZM53h). from about 0900. AR activity on 2m. and 70cm. is contemplated. For WAB fans, the square is SP27. Further details from G1HGB who is *QTHR.*

Space News

It seems that the launch of Soviet satellites *RS-9* and *RS-10* has been delayed until late May. Telemetry thought to have been from *RS-9* was more likely from the ageing *RS-1* orbiter. However, a very large space station called *Mir,* which is the Russian word for peace, was launched on Feb. 19. This will be a manned station and several Cosmonauts are radio amateurs, as is the case with the U.S. space programme. So it is likely there may be some AR activity from *Mir* in the future.

The *AMSAT Phase 3-C* satellite's likely launch date is being quoted as Oct. 24th; but January 1987 now seems more realistic. Two weeks of thermal vacuum testing is scheduled to commence on May 23. Any components which fail this will be replaced and then the whole lot will be "potted," sent back to Germany from Colorado for shake testing, thence on to Kourou in French Guiana for integration with the launch vehicle.

AMSAT and *AMSAT-DL* have jointly announced the currently planned *3-C* operating frequencies;- Mode B uplink 435.425 – 435.575 MHz with downlink 145.975 – 145.825 MHz. General beacon on 145.8125 MHz and Engineering one on 145.975 MHz. Mode JL will enable either 24cm. or 2m. uplink transmissions to be transponded back on 70 cm. The Mode L uplink is 1,269.575 – 1,269.325 MHz and the corresponding downlink will be 435.725 – 435.975 MHz with a General beacon on 435.650 MHz. The Mode J uplink will be 145.82 – 145.86 MHz and its downlink on 435.93 – 435.97 MHz.

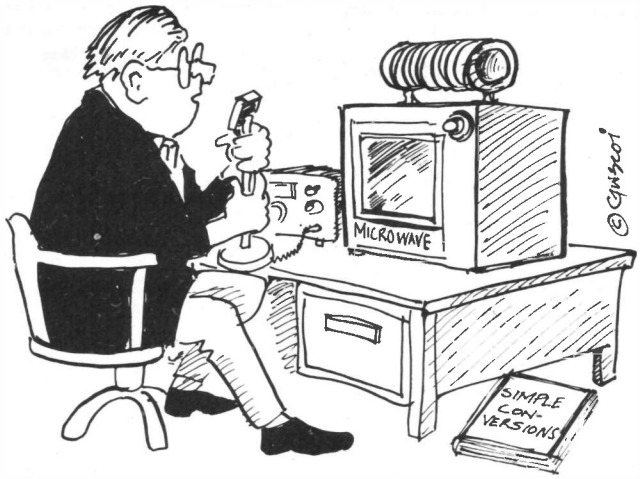
Digital Mode L (RUDAK), a digital-only transponder, will use 2,400 *Baud* uplink on 1,269.675 MHz and a 435.675 MHz downlink. Lastly there is a Mode S, a soft-limited FM transponder which can also accommodate up to four SSB signals with 435.627 MHz uplink and a downlink on 2,401.337 MHz. The S beacon will be on 2,401.267 MHz. These plans may be amended in a minor way.

Now to *Oscar-10* which passed its maximum southerly extent on March 1, 26.33° south, equal to its orbital inclination. Its *apogee* is now moving towards the equator which it will be over in January next year. By early 1988 its *apogee* will again be at its maximum northerly latitude, 26.33° thus giving us over ten hours continuous sight of it like we enjoyed a couple of years ago.

Something of a milestone now; the receipt of a report from a reader who actually uses *O-10,* Bob Geddes, G8GGI, from New Malden. His other interest is packet radio so he is keen to try this through the bird. On Feb. 15 and 16, he just managed to copy his carrier on Mode B, although the beacon on 145.81 MHz and several SSB QSOs were S6. Bob reckons his 70cm. antenna is suspect as reception performance is unimpressive, too.

Recently, the Mode L transponder has been on between *Mean Anomaly* 200 and 216, so providing the opportunity to use this mode when the satellite is quite close to us while the *perigee* is over the northern hemisphere. This means that the path loss is much less which is why Mode L signals are much stronger. Consequently, those who cannot run much power on 1,269 MHz stand a good chance of "getting in." This also means that Mode B users should use much less power such that their signal is no stronger than the beacon levels. If excessive power goes unchecked, the Mode B operating time could be reduced.

UoSAT Oscar-9 Bulletin no. 167, dated Feb. 27, carried a proposed six month plan for *O-10* from Ian Ashley, ZL1AOX, the current primary control station. This deals with the attitude of the spacecraft and users with any comments should contact Ian directly. Your scribe offered to edit an operating feature for *Oscar News,* the letter being published in the February edition. A check with secretary Ron Broadbent, G3AAJ, revealed not one *AMSAT* member having written to support the idea, nor even to oppose it.



"Well, it works O.K. on Top Band but it'll only do sausages . . ."

The Annual General Meeting of the *AMSAT-UK* will be held at 1330 on Saturday, April 12 in the Churchill Room of London House, in Doughty Street, London, W.C.1. This is the same venue as in previous years. *AMSAT-UK* has planned a Colloquium and Social Evening at the *University of Surrey* in Guildford for July 5/6. Details and suggested costs were given in *O.N.* No. 57. All enquiries to *AMSAT-UK* at 94 Herongate Road, London, E12 5EQ and *not* to the UoS.

Six Metres

Ken Ellis, G5KW, (KNT) has forwarded some news about the big February *Aurora* as heard from North America. A letter from K2MUB reports that K1JRW heard a G3Z station in the early hours of Feb. 9. (Roy Reed, G3ZIG, was operating on 6m. from 0010 — see later). K1TOL heard the Anglesey beacon GB3SIX at S5 and SM6PU heard K1TOL. K2MUB reckons it was the best *Ar* since that on Sept. 4, 1960. These distances are quite phenomenal, around 5,000 kms., and it should be recalled that, of the 504 entries in the 144 MHz *DUBUS Top List,* only six operators claim *Ar* QSOs in excess of 2,000 kms., the best being 2,160 kms. Obviously, in the biggest *Ar* events, we must look to the west and northwest.

Brian Bower, G3COJ, (BKS) made a number of QSOs in the *Ar* using about 25w *e.r.p.* on CW and SSB. Crossband contacts with stations on 10m. were being made, such as SM6PU. Dave Sellars, G3PBV, (DVN) is only able to get on at weekends and has been exclusively on 6m. lately. Up to Mar. 3, he had worked 60 new stations since the band was generally released. On Feb. 7, he heard GM3WOJ at 1758 and worked GM4YPZ (YQ) on SSB at 1821. On the 8th, Dave noted *Ar* signals at 1330 and opened his innings at 1352 with GM4NFC (XP), the last one worked being PA0XMA (DM) at 1544. 12 stations were worked on SSB with GM3JIJ (WS) heard. Even those running half-a-watt produced good reflexions. Dave received a T9 signal from GM3JIJ suggesting *Auroral Es* mode perhaps. At 2140 assorted TV carriers were noticed *via Ar Es,* but the first QSO this phase was not until 2322. 28 QSOs were completed up to 0141 when it faded. The station comprises a *Kenwood* TS-660, *BNOS* amplifier running 30w to a 3-ele. *Yagi* at 25ft. G3PBV has skeds with GJ3RAX and GJ3YHU on Sunday afternoons on 50.165 MHz just after 1 p.m. local time.

G3ZIG (NOR) could only spend a very limited amount of time on the band on Feb. 8 and worked GM3DOD (SCD) at 1434, GM4YPZ (GRN) and many Gs. On the 9th, from 10, Roy worked some more Gs, plus PA0XMA, GW4HBK (GWT), LA9DL (FT), LA1K and LA3TQ. Pat Billingham, G4AGQ, (SRY) suggests he might buy one of the 49 MHz transceivers which are being sold for under £10, and modify it with a VXO to operate around 50.15 MHz, to explore the possibilities of QRP CW to a dipole.

David Butler, G4ASR, (HWR) used 7w to a 5-ele. *Yagi* in the Feb, *Ar* and got GM4YPZ on SSB and GM3ZBE (YR) on CW. Tony Collett, G4NBS, (CBE) has nothing to report yet, due to QRM on reception. Also, just one watt of RF makes his TV set turn to black-and-white. Rod Burman, G4RSN, (BRK) notes a marked fall-off in activity after the novelty of the first couple of weeks. Nevertheless, he finds 6m. a fascinating band and notes the very large variations in signal strength of up to 20 dB on a flat band. He missed the *Ar* on Feb. 7, even though he was aware of the high solar noise on the 5th. At 1511 on the 8th, he found things in full swing, the best QTE being 20°. Rod worked GI3ZTL (LDR) and GM4YPZ, plus many Gs all over England. He was on again from 0010

on the 9th and worked G4IJM (CVE) again and PA0XMA.

Jerry Russell, G4SEU, (WKS) heard GI3ZTL at S9-plus for over an hour in the *Ar* but failed to crack the pile-up. So far, he has worked 25 counties. Martyn Jones, G4TIF, (WKS) has built a "Meon" transverter and his first QSO at 0.4w to an indoor dipole was with G4ROA. Adrian replied to his "CQ" call at 0001 on Feb. 1. Plans are in hand for more power and a 3-ele. *Yagi* in the summer. John Jennings, G4VOZ, (LEC) has a 3-ele. beam and maximum *e.r.p.* capability. He, too, reports the band quieter than when it was released. He records *Ar* QSOs with six stations in the Feb. 8/9 *Ar,* including LA9DL and GJ3YHU. He mentions a lot of activity in local counties.

John Lemay, G4ZTR, (ESX) built a transverter from *Spectrum Electronics* but examination of the output on 6m. revealed an unstable PA, an unbalancable balanced mixer and far too high local oscillator injection on receive. This firm is unknown to your scribe and neither *RadCom* nor this Magazine carry their advertisements. There was a repeat of sorts of the Feb. *Ar* and G5KW found one manifestation on Mar. 6 from 1900 – 2005 by beaming due north. Ken copied a QSO between GM3ZBE and G4OBK, 55A/35A on CW; GM4YPZ was heard on CW at 1905, and GM3ZBE was worked at 1945, 55A/57A. Several SSB signals were heard but were too distorted to understand.

Mike Johnson, G6AJE, (LEC) listens on 6m. both from his home QTH and his -/A one in London, S.W.14. He enquires if we can incorporate crossband operation in the tables but your scribe feels this would complicate matters too much. In any case, as mentioned before, it seems sensible not to encourage any overt competition on 6m., at least for this year. Mike reports some 6m./70cm. crossband operation using FM channel SU16, this being encouraged by Jack Hum, G5UM, in the Leicester area.

Dave Lewis, GW4HBK, (GWT) had a 6m./10m. crossband *Ar* QSO with SM6PU at 2210 on Feb. 8. This was an *Ar Es* contact, starting out with an RS22A report, improving to RST579 over a ten minute period. Dave was running 14 dBw *e.r.p.* Your scribe has just completed a 6m. transverter kit from *Cirkit Holdings* and has aligned it. It needs a mimimum of one milliwatt drive at 28 MHz, but the low power output from the *IC-730* is a miserable 0.45mw. It is hoped to have the station on the air, albeit QRP, shortly, and to boost the power to the legal maximum thereafter. A write-up of the kit will be published soon, too.

QTH LOCATOR SQUARES TABLE

Station	23cm.	70cm.	2m.	Total
G8TFI	79	141	126	346
G3JXN	77	119	172	368
G3XDY	70	123	176	369
G3UVR	61	106	213	380
G4NQC	61	90	211	362
GJ4ICD	59	117	239	415
G4FRE	56	124	78	258
G6DER	53	95	164	312
G8PNN	53	91	126	270
GW4LXO	45	91	230	366
G6MGL	45	83	133	261
G4MAW	45	106	52	203
G3COJ	43	99	174	316
G3PBV	41	106	200	347
GW4TTU	37	87	227	351
G8ULU	36	91	127	254
G4ZTR	35	57	82	174
G8KBQ	34	99	214	347
G1EZF	32	85	182	299
G4RGK	28	86	203	317
G4NBS	26	64	62	152
G4DCV	25	71	248	344
G4MCU	25	82	201	308
G8HHI	23	96	135	254
G6YLO	20	59	67	146
G6CMV	18	53	144	215
GW3CBY	18	46	107	171
G4MUT	16	85	130	231
G8WPL	16	70	105	191
G6CSY	16	39	34	89
G3BW	15	38	269	322
GM8BDX	13	31	41	85
G8GXP	9	133	290	432
G6XVV	5	40	172	217
G4NRG	5	47	132	184
G1KDF	5	64	112	181
G6JNS	5	53	119	177
G4RSN	2	34	92	128
G1LSB	1	72	70	143
G8ROU	1	43	88	132
GW6OFI	1	—	75	76
G3IMV	—	108	383	491
G3POI	—	—	448	448
G4IJE	—	—	338	338
G4KUX	—	36	301	337
G8XVJ	—	86	211	297
G4ERG	—	16	278	294
G4TIF	—	104	173	277
9H1CG	—	—	276	276
G4DHF	—	—	272	272
GM4IPK	—	—	245	245
G4DEZ	—	—	242	242
G4OAE	—	46	195	241
G6HKS	—	58	180	238
G4BWG	—	68	160	228
G6HKM	—	88	136	224
G3FPK	—	—	212	212
G6DZH	—	78	128	206
G4SFY	—	—	203	203
G6ECM	—	—	194	194
G4HFO	—	70	120	190
G8LFB	—	—	189	189
G4MEJ	—	—	187	187
G4IGO	—	—	181	181
G8TGM	—	—	181	181
G4MJC	—	18	160	178
G4YUZ	—	—	168	168
G4FRX	—	66	99	165
G4VPM	—	46	117	163
G4TJX	—	60	100	160
GM0BPY	—	50	110	160
G8MKD	—	45	112	157
G4DOL	—	—	148	148
GJ6TMM	—	22	125	147
G6YIN	—	58	87	145
GW8VHI	—	48	96	144
G4XEK	—	—	143	143
G4CQM	—	52	87	139
G6XLL	—	33	95	128
G6AJE	—	36	85	121
EI5FK	—	—	118	118
G8RWG	—	12	103	115
G0CAS	—	—	115	115
G1EGC	—	—	107	107
G6XRK	—	—	100	100
G6XSU	—	52	43	95
G8XTJ	—	—	91	91
G4TGK	—	—	90	90
G1INK	—	42	42	84
G1IZO	—	—	82	82
G1DWQ	—	—	72	72
G4JZF/P	—	63	—	63
G4WHZ	—	8	49	57
G0BPS	—	—	50	50
G8UDV	—	2	42	44
GW6VZW	—	—	44	44
G1JOU	—	—	44	44
G1HGD	—	5	38	43
GM4WLL	—	—	39	39
G4WJR	—	—	37	37
G2DHV	—	1	34	35
G6SIS	—	1	31	32

Starting date January 1, 1975. No satellite or repeater QSOs. "Band of the Month" 23cm.

Four Metres

The GB4MTR operation is by G4ENB (BFD) till April 22. From Apr. 23, it will be by G4VIX (HFD) till May 20, with G3ASR (HWR) doing the honours for four weeks from May 21. In the Feb. *Ar,* G4ASR only worked GW4HBK (YL) on SSB. For G4SEU, it provided QSOs with GM4CAZ (LTH), G4FRE (SFK), GW4HBK, G3YYF (SXE) and G4VOZ (LEC). Jerry heard Dorset and Grampian region. Most of G4TIFs QSOs thus far have been in the *Cumulatives,* best contact being a "first" with GW4HBK on Feb. 9.

G4VOZ's comprehensive report mentions a drop of activity in February due to the initial rival attraction of the new 6m. band. John reports a number of stations trying both bands to compare results, however, sometimes 4m. is better than 6m., but at other times it is the opposite. During the Feb. *Ar,* he spent equal times on 4m. and 6m. and by pure chance, had the same number of QSOs. Furthest east worked was G4FRE (SFK), the furthest north GM4IGS (SCD), the furthest west GW4HBK and the furthest south G3YYF (ESX). The closest worked by *Ar* was G4SEU with no trace of a tropo. signal. John plans to enter the annual table next month but does not propose to include contest QSOs. He suggests that some participants only operate in contests to accumulate points, infering they are not casually on the band. GW4HBK agrees that the GB4MTR project has helped to improve activity for him and that it is nice to have a pile-up on the band. In the Feb. 8/9 *Ar,* Dave worked G3YYF, G4FRE, GM4IGS and some locals, while in the contest on the 9th, G4RDT (IOW) was an all-time new one.

Two metres

Charles Coughlan, EI5FK, (Co. Cork) has been a reader for some years and wrote for the first time. His station consists of a *Standard* C-5800 multi-mode transceiver, *BNOS* 100w amplifier, *Dressler Gasfet* masthead preamp. and a 16-ele. G2BCX *Yagi,* all used to good effect in the Feb. *Ar.* sessions. First QSO was at 1645 on the 7th with G3UTS (ZO) followed by another 10 until fade-out at 0038 on the 8th. GM4WMM (XQ) was the furthest north.

The next *Ar* started in the early afternoon of the 8th with G4XUM (YN) and GW4EAI (YL) then at 1419, he worked F6ETI (YH) and PA2VST (CM). The next log pages resemble 20m. he wrote, when listing such as DK2PR (EM), DF1CF (FH), Y22QG (FM), DK2EA (FK), SP6ASD (HL) at 1610 for a new country, OZ8QV (GP), OK3LQ (II), SM7LX (GP), DL5MAE (FI) and DL8ZAW (EK). Many Gs were worked and he made about 100 QSOs in 13 countries and ten new squares. Karl-Heinz Binder, DL3OAT, was only on for a short while in the afternoon of Feb. 8 from EM60c and contacted a few G and GM stations in XP, YQ and ZO squares at QTE 5°.

Mike Honeywell, G0ABB, (HPH) worked EI, G, GM and DL in the *Ar* but missed out on a UPI. In the CW contest he lists 15 stations including GM4YXI, and assorted D, F, G and PA CW contacts during February to bring his ladder score to 82. Colin Morris, G0CUZ, (WMD) is badly sited for working to the NE, so rarely hears anything over S2 during *Ar* events. However, in the Feb. affair, it was

different. It began around 1530 on the 7th with GMs in two new squares, XR and ZR worked. It peaked around 1700 and faded by 1830. On the 8th, first signals appeared at 1300, lasting almost continuously till 0230 on the 9th. Colin got FD1FVP (ZF) at 1530 and SM7MKT (GP) at 1537 and heard D, LA, OE, OK, OZ, PA, RQ2, SM, SP and Y. His main interest now is CW MS and six out of 14 recent skeds were completed, including OE3JPC (II), YU3ES (GF), SP2DXL (JO) and YU3TS (HF).

Dave Ackrill, G0DJA, (WMD) has just put up a rhombic antenna for the band with 10m. of wire in each leg and a 600 ohms terminating resistor. According to the books, the theoretical gain would be about 12 dBd. John Acton, G1DOX, has been a reader for some time. He was licensed three years ago and recently moved to Holbeck in Cumbria (YO75a) in WAB square SD26. The 2m. station comprises an *Icom* IC-271E with *muTek* front end, a single 4CX250B amplifier running 300w output *via Pope* H-100 feeder to a 10-ele. *Jaybeam* at 30ft. The QTH is 250ft. *a.s.l.* overlooking the north side of Morecambe Bay with a good take-off all around except for the NE. John enters the Annual Table and will be pleased to read that the 26 EI counties can be included in the totals.

Bob Nixon, G1KDF, (LNH) lists his best *Ar* QSOs as GM1DSK (TYS) at 1800 on Feb. 7 and between 1200 and 1615 on the 8th, GM0DRU and GM1MLY (WR) both in WIL, GM8PNP (SLD), GM0CUY (OKE), EI4EY (Limerick), FC1BRV (BG), along with assorted D, F and PA stations. Between 2130 and 0130, GM8PNP again, SP3MFI (JL) and F1FLA (CG). Nothing special in the March 1/2 contest in which 133 QSOs were made. Welcome to another new reader Ian Rose, G1PDW, from Harlow in Essex, whose gear consists of a *Yaesu* FT-480R running 10w to a 7-ele. *MET Yagi* at 25ft. Don't forget that the various British countries *e.g.* G, GW, etc., count for points in addition to the countries, OM.

G3COJ only worked one new square in 1985 but the Feb. 8 *Ar* produced three new ones; SM1MUT (JO97/JR), UP1BWR (KO24/MO) and RQ2GAG (KO26/MQ). John Quarmby, G3XDY, (SFK) was alerted to the Feb. 8 *Ar* by the remark slipped in from Jim Bacon, G3YLA, the *BBC* weather reporter at 2130. From 2135, his best DX included LA9BM (JP40/EU), SM5KP (IT), RQ2GAG, SM0FUO (JO89/IT), SM5IOT (JO99/JT), UQ2s GMD and GCG in KO17/LR and UQ2AO (KO26/MQ). All were at QTE 0 – 20° and contacted up to midnight. John came back to the band again at 0100 to find strong signals at 40 – 50° and his best DX in this session were UP1BWR, SM1MUT, Y21NB (JO53/FN), SP5EFO (KO02/KM), SM5CBN (JO78/HS), EI9FK (IO63/WN) and best of all, RA3LE (KO64AR/ QO21h) at 0139 at 2,049 kms. He found reflexions very selective, reminiscent of *Es. E.g.* G4FRE 10 kms, away was heard working an OH5 who was inaudible with John.

G3ZIG worked UQ2GMD at 1447 on the 8th and in the evening Roy managed GI4OMK, GM4UFD, DK3LL, LAs 2AB, 8AK and 9BM, UP2BKH, SM5IOT and RQ2GAG. G4ASR worked 18 countries in the Feb. 7 – 9 *Ar* events and David lists notable QSOs as HG8ET, HG0HO, UQ2GMD, UP2BH, YU3ES with whom he made two contacts, the second for a rag-chew, and UP2BFR at 1,805 kms. the best DX. A got-away was 3A2DD? who called at 1503 on the 8th. (Your scribe used to operate as 3A2BT from Monaco and, with the Alpes Maritimes immediately to the north, it would seem highly unlikely that any 3A could get into an *Aurora* from there). The QTEs for "locals" like GM, etc. were 20 – 40° and for the eastern Europeans, 45 – 55° and David made 95 CW and 4 SSB QSOs.

In spite of its being the best *Ar* so far experienced, Paul Whatton, G4DCV, (KNT) only got one new square from it, OH0JN (KU) at 1819 on the 8th, a new country too. In all, he worked 16 countries the best DX occurring between 1500 and 1600 on Feb. 8 with reflexions down as far as 110° for the YU stations. He contacted most all the "quality" DX that others did, but missed out on UB5BAE (MJ) and RA3LE. To pick a few from Paul's list, how about YU3BA (HF) at 1453, HG0HO (KH) at 1454, YU3TS (HF) at 1458, HG8ET (KG) at 1510, YU3LM (HG) at 1517, YU1MWP (JE) at 1526, YU7FF (KF) at 1531, all on the 8th, and on the 9th, OK1OA (HK) at 0017, SP5AD (KM) at 0034 and SP5EFO (KM) at 0039?

G4NBS has not been too active this year but did make 59 QSOs in the Feb. 2 CW Contest in abysmal conditions with GM4YXI the best DX and PA3BDK and F6FLB the only continentals worked. Tony operated in the Feb. 8/9 *Ar* from 2105 to 0208 working LA, SM, SP and Y. Best DX were UQ2GM at 2352 and F6BHJ (CG) at 0009 at 65°. In the first two hours, the *Doppler* shift was half to one kHz high frequency but after midnight, when beaming NE, it was LF up to 3 kHz in the case of SP5EFO, for example.

Dave Dibley, G4RGK, (BKS) found six new squares and his 39th country in the last 12 hours of the Feb. *Ar* and his choice DX included UQ2GMD at 1,626 kms., RQ2GAG, UP1BWR and SP5EFO. G4RSN only came on 2m. briefly to work GM1DSK (YQ) for new square on Feb. 9 and at 0150 heard GI4OMK working OK1KT but the OK was not copied by Rod. Ray Baker, G4SFY, (NOR) worked 48 stations in the Feb. 2 CW Contest in very poor conditions and with little activity to the east; DF7DJ (DL) was his best DX. On Feb. 7, the *Ar* events were from 1715 to 1830 with more weak signals for five minutes from 2141. OZ1FGP (EQ) and some GMs were worked. On the 8th, another *Ar* started at 0016 bringing LA6VBA (ES), LA2AB (FT) and some GMs till fade-out at 0114. The main event

ANNUAL VHF/UHF TABLE

January to December 1986

Station	FOUR METRES Counties	FOUR METRES Countries	TWO METRES Counties	TWO METRES Countries	70 CENTIMETRES Counties	70 CENTIMETRES Countries	23 CENTIMETRES Counties	23 CENTIMETRES Countries	TOTAL Points
G1KDF	—	—	78	12	46	6	11	3	156
G4NBS	—	—	34	11	39	4	7	1	96
G1DOX	—	—	46	7	27	3	10	2	95
G4WXX	—	—	72	14	—	—	—	—	86
G3FPK	—	—	66	14	—	—	—	—	80
G4SEU	31	3	14	3	23	2	—	—	76
G4MUT	19	1	23	6	17	3	*2*	*1*	69
G6XRK	—	—	58	9	—	—	—	—	67
G0CUZ	—	—	39	12	13	2	—	—	66
G6HKM	—	—	41	9	13	2	—	—	65
G4YCD	—	—	35	3	9	2	—	—	49
G4TGK	—	—	37	7	—	—	—	—	44
G6OKU	—	—	22	2	17	1	—	—	42
G8XTJ	—	—	33	6	—	—	—	—	39
G4DEZ	—	—	24	8	—	—	4	1	37
G4YIR	—	—	31	6	—	—	—	—	37
GW6VZW	—	—	30	6	—	—	—	—	36
G1PDW	—	—	29	3	—	—	—	—	32
G6AJE	—	—	3	1	22	1	—	—	27
G1HGD	—	—	10	2	11	2	—	—	25
GW4HBK	22	3	—	—	—	—	—	—	25
G4TIF	10	2	6	3	1	1	—	—	23
G2DHV	2	1	9	1	—	—	—	—	13

Three bands only count for points. Non-scoring figures in italics.

ANNUAL CW LADDER

Station	4m.	2m.	70cm	μWave	Points
G4SFY	—	110	—	—	110
G4XUM	—	105	—	—	105
G4YIR	—	83	—	—	83
G0ABB	—	82	—	—	82
G4OUT	—	75	—	—	75
G4AGQ	—	60	1	—	61
G0DJA	—	37	—	—	37
G4PPV	—	35	—	—	35
G3FPK	—	32	—	—	32
G4TJE	—	26	—	—	26
G4EIB	—	20	—	—	20
G2DHV	1	14	—	—	15
GW4HBK	12	—	—	—	12

No. of different stations worked since Jan. 1.

began at 1223 and Ray went on to work nine OZs, 27 DLs, 4 LAs, 3 GMs and 6 SMs, plus F6ETZ (ZH), HB9QQ (EH) and a couple of EIs. Square no. 200 was RQ2GAG and this phase faded at 1840. The final phase started at 2037 and ended at 0315 on the 9th, bringing three more new squares, UQ2GAJ (LQ), UQ2GCG (LR) and UP1BWR. DL, LA, OK, OZ, SM and Y stations were also contacted. In the March 1/2 Contest, Ray found conditions poor, best DX being FF6KIM (DI) and an OK1 heard.

John Wimble, G4TGK, (KNT) rarely hears any GMs but did manage GM1EHK (FFE) in the Feb. *Ar*, but missed out with GM1LAV (WIL) who was S7A, however, G4TIF did get the latter, along with a few GIs and GMs. Jack Charnock, G4WXX, (MCH) quotes his best DX in the *Ar* as SM4IOT (JT) on CW at 1,444 kms. (Sorry, it was SM5IOT, Jack). Other CW QSOs were with LAs and SM, while SSB mode brought OE5OLL (GI), EI4EY (Limerick), GM0CUY (YS) and GM1MLY in North Uist (WR). In the March 1/2 Contest, best DX was PA0FHG/P (CM). On Feb. 23, Jack worked GM1LVS in Skye (WR) on tropo.

Martin Platt, G4XUM, (CHS) wrote for the first time. He uses a *Yaesu* FT-726R and a two times 4CX250B amplifier, the antenna being a 17-ele. *F9FT Yagi* at 30ft. with MGF 1200 masthead preamp. He is an MS operator and thought this year's *Quadrantids* rather poor. He was alerted to the Feb. 7 *Ar* by Y22ME on the 20m. VHF net and went on to work LA7KK (FU), SM1MKY and UQ2GMD. The next phase appeared at 0020 on the 8th with EI, GI and SM worked. The main event was from 1210 on the 8th through 0300 on the 9th during which over 50 squares and 18 countries were worked, including SP7ABL (KL) and HG1S (IH). Martin was called by an LZ1 but constant QRM from DL stations prevented identification, let alone a QSO. The QTEs were 60 – 90°. He found another *Ar* on Feb. 11 with LA9BM worked and GI, GM and SM heard, while the GMs were working into OH.

Mark Holloway, G4YRY, from Bournemouth (DOR) saw the Feb. *Ar* from the coast. He uses a *Yaesu* FT-290R and 25w to a 10-ele. *Yagi* 10m. *a.s.l.* With this, he made four CW QSOs in the *Ar*. Ela Martyr, G6HKM, was alerted to the Feb. 8 *Ar* by G3YDY and, inspite of being confined to the house, dragged herself to the shack to make 17 QSOs with various GD, GI and GM stations and which provided WO, WS and XR for new squares.

John Fitzgerald, G8XTJ, (BKS) took part in the *Ar* on Feb. 8 and worked into GI and GW between 1546 and 1613. At 0030, he noticed the *Aurora* in the NE sky so switched on the station again and worked GM4TXX (XP) and GM6OFO (YQ). Keith Boleat, GJ6TMM, participated in his first *Ar* on Feb. 8 from 1740 and worked GI, GM and GW stations as well as several northerly Gs. WO, XO and XP were new squares to bring the total to 125 with 93 confirmed. His colleague Mike Thomson, GJ6SUI also took part in the *Ar* working GM4TXX (XP) and GI6ATZ (XO). The QTEs were 40 – 60°.

Reference was made last month to GM6TKS from information passed on over the telephone. Mark has since telephoned to correct matters. He worked 13 countries in the Feb. 8 *Ar* and did not contact OY9JD. However, he says that it was GM0BQM/P who worked the OY. He mentioned that GM3JIJ (WS) had received a report of *Ar* reception from an Italian *s.w.l.* in the 13 district which is in the NE of the country. QRB about 1,800 kms.

Paul Baker, GW6VZW, (GWT) has equipment troubles again. He did catch the Feb. *Ar* though, and worked G3YDY (ESX). Like many others, he found the March 1/2 Contest very poor, best DX being ON4ASL/A (JO10) and PI4VLI (JO11). As observed from G3FPK, the contest seemed poorly supported with lower-than-average scores. No doubt the bitterly cold weather discouraged all the portable stations from venturing out. Many people ignored the event altogether and numerous, ordinary QSOs were being conducted in what is normally contest-only parts of the band. The many CW practice nets also helped to interfere with whatever weak DX might have been around. It is a pity that those Class B and A operators practising their CW in the SSB part of 2m. never did heed the *RSGB's* advice in the Editorial in the February, 1985 *RadCom* to use the all-mode section of the band; *i.e.* from 144.50 to 144.845 MHz.

Seventy Centimetres

G1DOX uses an *Icom* IC-471E and *BNOS* 100w amplifier, with Rx preamp., and a 19-ele. *Tonna Yagi* at 45ft. on the band from Cumbria. Up to mid-Feb. John had accumulated 27 counties and from the list, it appears he has no great problem working towards the south and southeast. In the Fixed Contest on Feb. 16, G1KDF made 48 QSOs worth 296 points and in the March 1/2 affair, Bob managed 38 describing conditions for each as ". . . nothing special."

Mike Newell, G1HGD, (WKS) uses an *Icom* IC-490E running 10w to a *Yagi* in the loft. He lists QSOs with G3JXN (LDN), G4MGR (MSY), G8HHI (HPH), GW4RNC/P (CWD) and G1JGS/P (IOW). G3XDY reports poor conditions for the March Contest, John's best DX being DK8ZB/P and DL0WN/P in JO40/EK. G4NBS found the period between the Feb. *Ar* and the Fixed Contest quite good, with G1DOX and G1KDF worked, but the contest saw a return to poor conditions to the north, though reasonable E/W. Tony made 114 QSOs, including six PAs, GW3KJW (GDD) and the best DX, DL1EBS (JO31/DL). He noticed a lack of Welsh stations in his 38 counties contacted.

G4RGK took time off 2m. in the Feb. 8 *Ar* and at 1610 worked G4XOL (YN). Did any other readers make *Ar* QSOs on the band? G6AJE is another IC-490E user running 10w. Mike's antenna is a 48-ele. *Multibeam* fed through 20m. of *H-100* cable and he has a 3SK124 masthead preamp. by *LMW Electronics*. On Feb. 16 some good contacts were made although there was severe fading. In the contest on the 16th, the best DX were G3JXN, G8JHL (MCH), G8HHI, G4MGR, G8XVJ (CHS), G4LOJ (NOR), G3XDY (SFK), G1AZJ (KNT), G4RFR (DOR), G4YCD (AVN), G8AHK (SRY) and G1SVH (SXE). On Feb. 10, G6HKM worked G1DOX in YO, which was a new square for Ela.

The Microwaves

G1DOX will be a popular station from Cumbria, no doubt. John uses a *Trio* TR-9130 driving an *SSB Electronics* type LT23S transverter at 8w. This drives a home made 3CX100A5 PA at about 60w output, the antennas being four 23-ele. *Yagis* from *Tonna*, 35ft. *a.g.l.* He is also QRV on 13cm. as well as 23cm. On this band he uses a *Piper Communications Gasfet* mixer on receive. The Tx gear is being built including a brass cavity for about 20w output. The antenna is a 66-ele. *JVL Loop* at about 33ft. *a.g.l.* He writes, "I would appreciate any calls from stations wishing to work YO square on 23cm. and 13cm. My 'phone no. is Barrow 33591."

G1KDF reports QSOs with GI4OPH (DWN) on Jan. 29, G4NBS (CBE) on Feb. 13 and G6FK (WMD) on Feb. 19. Bob has tried numerous others. The March 1/2 Contest was also a Region 1 SHF event and in it, G3XDY worked three PAs on 23cm. and PA0EZ on 13cm. G4NBS is active on 23cm. and Tony contacted G1DOX on Feb. 10, and on the 12th, G8HHI and G8JVM (HPH), G4BYV (NOR), and G3APY (NOT). The next day he made a scratchy QSO with G1KDF and also worked G6DER (YSS) and G8GXP (YSW). Don't forget the 13cm. All-time Table which only has six entries at the moment. It is based on the total of counties, countries and squares.

Finale

As the final touches are being put to this month's VHFB, it seems that Spanish TV is being received in the Midlands, so perhaps there will be a tropo. lift to report in the May issue. The all-important deadlines are in the box so please be sure to make a note of them. All your reports, news, comments and claims to:— "VHF Bands," SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts., AL6 9EQ. *73 de G3FPK.*

'F' Layer — The DX Workhorse

A. D. TAYLOR, G8PG

MOST HF band DX working is *via* the F layer, so an understanding of how this layer operates, and how at times other layers may reduce its efficiency, is essential for consistently successful DX working.

The F layer itself is the highest of several regions surrounding the earth which are known collectively as the "Ionosphere", a name originated by Sir Robert Watson Watt of radar fame. Given the correct conditions, all of these layers except one (the D region) are capable of reflecting HF signals up to a certain frequency. In order of height above the surface of the earth we find the D region (about 80 km), the E layer (about 120 km), the F1 layer (about 200 km), which is only present in daylight at certain times of the year, and the F layer (300-400 km during the day, about 250 km at night). Some text books refer to the daytime F layer as the "F2" layer.

The reason that the layers above the D region can reflect HF radio signals is that when they are exposed to radiation from the sun a small number of gas particles in the layer are struck by ultraviolet particles radiated from the sun, causing electrons to be liberated. These free electrons change the nature of that part of the layer from an insulator to a semi-conductor, and the speed of a wavefront entering this semi-conducting area of the layer is changed, causing the wavefront to be bent from its original path. The process of producing these free electrons is known as "ionisation", and if the ionisation is sufficient the wave front will be bent from its original path to such an extent that it is returned to earth. If the ionisation is not sufficient the wave front will be bent to some extent from its original path, but it will eventually reach the top of the layer and escape through it. If this process takes place in one of the lower layers, say the E layer, a signal passing through the layer may still be reflected by a higher layer such as the F layer. If it passes through all the layers it is lost into outer space. Each time a wave passes through a layer, or is reflected by it, some of the wave energy is lost by collision with particles in the layer, thus producing "ionospheric attenuation".

Characteristics of the Ionosphere

The D region plays an important part in the propagation of LF signals (up to about 300 kHz), but during the daytime it seriously attenuates MF and lower HF band signals, often up to frequencies in excess of 14 MHz in summer during a sunspot maximum. Its effect disappears very quickly at sunset, and reappears equally quickly shortly after dawn. This can easily be demonstrated by listening to MF broadcasting and Top Band amateur signals around these times. The E layer will reflect lower frequency amateur signals during the day and evening, assuming that the daytime D region attenuation is not too high. It plays only an attenuating role as far as HF band DX working is concerned.

The F1 layer will, during the day, sometimes reflect HF DX signals, but it is more likely to attenuate them.

The F layer provides almost all serious HF band DX working. Its efficiency as a reflector of HF signals depends upon the time of day, the season of the year, and the time in the 11 year sunspot cycle (the E layer will also be similarly affected). Transmission *via* the F layer will also be affected by the condition of the layers below it, this governing the amount of attenuation occurring as the signal passes from the earth to the layer and then returns to earth. These effects will now be discussed in greater detail.

F-Layer Variations

One way to illustrate these is to consider the behaviour of the F layer by day and night at midsummer and midwinter.

During a summer day much sunlight falls on the layer. This will produce considerable ionisation, but it will also cause the layer to expand, increasing its height and also reducing the effective free electron density because the expansion moves the electrons further apart. This means that the overall ionisation will be reduced somewhat. Signals reaching the layer will have to pass through the D region and the E and F1 layers, all of which will be highly ionised and thus introduce attenuation. After reflection by the F layer the signals will have to pass back to earth *via* the other layers, thus introducing yet more attenuation. The amount of attenuation will be highest at a sunspot maximum and least at a sunspot minimum, but under the latter condition the F layer itself will be less highly ionised and will reflect less efficiently. These are the reasons for those "weak and watery" signals on 14 MHz during the long summer afternoons.

Around sunset a dramatic change takes place. Both the D region and the E layer rapidly lose ionisation and no longer attenuate the higher frequencies, and at the same time the F layer begins to contract and merges with the F1 layer at a lower height. The attenuation on the path to and from the F layer is thus greatly reduced, and the efficiency of the F layer itself is enhanced. This usually leads to several hours of very much improved conditions, particularly on 14 MHz. The actual period of the improvement will depend upon the existing stage of the sunspot cycle, being longest at a sunspot maximum amd shortest at a sunspot minimum. During this period the F layer will be losing ionisation, as there is no longer any sun emission reaching it, and the ionisation will reach its lowest level just before sunrise. Conditions will therefore deteriorate throughout the night, and in sunspot minimum years frequencies from 14 MHz upwards may fade out altogether during the latter part of the night. Shortly after dawn there will be a further peak in conditions, its length usually being shorter than the sunset peak, but still providing excellent DX opportunities. This occurs because the F layer, being at the top of the ionosphere, becomes re-ionised first and can thus provide a period of good conditions until the lower layers become sufficiently ionised to reintroduce attenuation.

At midwinter an entirely different set of conditions prevails. D region and E layer attenuation is low or non-existent from 14 MHz upwards during the day. The 14 MHz band opens shortly after sunrise and remains open on most days until shortly after sunset and sometimes, particularly in sunspot maximum years, longer. The F layer is also at a lower height because of the reduced solar heating, so it is a more efficient reflector. During the night the HF bands will usually be dead, however. In spring (late February and March) and autumn (October and early November) conditions lie to some extent between those of summer and winter, and are usually at their best on 14 MHz and upwards. The days are longer than in midwinter, and the evening fadeout will occur later. It is because of these good conditions that most major DX contests are held at these times.

Critical Frequency and MUF

The condition of the various layers at a given time is measured using a method known as "ionospheric sounding". The technique

is similar to radar. A pulse of RF energy is fired vertically upwards and if it is reflected by the layer it causes a blip to appear on the screen of a distance measuring radar set. This allows the height of the layer to be measured. By increasing the frequency of the pulse transmission in steps it is possible to determine the highest frequency at which the layer will reflect a wave fired vertically at it at that particular time; this is known as the "critical frequency" of the layer.

The importance of critical frequency is that once it is known it can be used to calculate the maximum frequency at which waves of various other angles will be reflected by the layer, right down to an angle of less than 1 degree. The frequency at which the latter will be reflected is the "maximum useable frequency" for the layer at that particular time, and will provide the maximum possible single hop path *via* the layer being examined. There are over 200 stations around the world making such measurements regularly, and their long-term records, plus records of sunspot activity, allow advance forecasts of HF propagation conditions to be made. These forecasts are fairly accurate, but statistics show that on average on 5 days of each month the actual maximum useable frequency (MUF) will be up to 20% greater than the forecast MUF. On such days the amateur who is prepared to monitor the bands often reaps a rich DX harvest by working on a band which the forecast says is above the MUF.

The Importance of Low Angle Radiation

Table 1 shows the relationship between critical frequency, antenna radiation angle, the highest frequency which will be reflected, and the single hop distance for various antenna radiation angles. To understand fully its implications the following points must be understood. Firstly, each hop in the transmisson path will incur attenuation losses, even when conditions are good; at a conservative estimate these will be 10dB per hop. Secondly, ionospheric attenuation varies according to the inverse square of the frequency. Put simply, this means that if one can use twice the frequency one reduces the attenuation by 75%.

Applying this to Table 1 we firstly see that to work over approximately 2800 km a station with an antenna having a lowest radiation angle of 30 degrees requires 3 hops, as against 1 hop for a station with an antenna giving a vertical radiation angle of 5 degrees. This means that the former will have a signal some 20dB down on the latter. But the station with the 5 degree radiation angle should also be able to use at least one band higher than the station with the 30 degree radiation angle, so he is also likely to gain an advantage through the reduction of attenuation with frequency. Low angle radiation is thus of vital importance for DX working. When horizontal antennas are used it may be difficult to obtain it without high masts, so experiments with vertical antennas may pay big dividends. (Hopefully this will be discussed in a further article).

Multi-Hop Transmissions and Control Points

For really long distance transmission on HF the signal is reflected backwards and forwards between the ionosphere and the earth several times, hence the term "multi-hop". For transmission over such a path to be satisfactory the ionosphere at the points where *the first hop and the last hop take place* must be capable of reflecting the frequency and antenna radiation angles in use. It is important to realise that the points of first and last hop will be many hundreds of kilometres away from the sending and receiving station respectively. Also, as the two control points are separated by thousands of km., one may be in daylight and have a high MUF whereas the other is in darkness and has a lower MUF. When this occurs the path can only be worked by using a frequency not above the *lower* of the two MUFs. For example if the MUF at the sending control point is 22 MHz and that at the receiving control point 16 MHz then the highest frequency that can be used for two-way working would be not greater than 16 MHz, meaning 14 MHz in amateur terms.

Seasonal and Sunspot Cycle Changes

During a sunspot maximum year midwinter MUFs will be very high, peaking around noon. On most days from around 0800 hours 28 MHz should be open, and at noon the MUF should be above 40 MHz. On several days per month 50 MHz DX openings are likely. 14 MHz and the other HF bands should be open until arond 1800, after which the MUF will fall rapidly, dropping to 12 MHz by midnight and remaining around that figure until dawn. During summer the MUF will peak around 1500 hours, reaching 28 MHz on a few days. It will decrease to around 24 MHz by midnight, and reach a low of about 18 MHz at 0300 hours.

In a sunspot minimum the winter peak MUF is again reached at noon, but will only exceed 20 MHz on a few days each month. By 2000 hours it will have dropped to around 6-7 MHz, and will remain at this figure until around dawn. In summer the peak MUF of around 16 MHz will occur about 1800 hours, dropping to about 12 MHz by midnight. By 0800 it will have risen to about 15 MHz.

Important areas of the above information are as follows. In a sunspot maximum year there is a very great difference between day and night winter MUFs, and between summer and winter MUFs. In a sunspot minimum period (like now!) there is very little difference between summer and winter MUFs, although they occur at different times of day, but they are both very much lower than those which occur in the sunspot maximum period.

Using Sunrise and Sunset Peaks

Mention has already been made of the fact that conditions tend to peak around sunrise and sunset. Some investigation of these peaks on 14 MHz has been carried out at G8PG and GW8PG using output powers of one to two watts on CW. The best known example of such peaks is in antipodean chordal hop propagation. In this mode a station working a station in the antipodes, if it is sunrise at one end of the link and sunset at the other, will have both his daylight path and dark path signals arrive at the distant receiver in phase. In addition, it has been deduced that on a considerable portion of the darkness path signals leave the F layer at such a low angle that they are again reflected by it without touching earth, thus greatly reducing path attenuation. (Experimental results show an attenuation reduction of as much as 26dB). This mode has been used to put a QRP signal into New Zealand in October at around 0700 GMT. Similar conditions should exist in February.

A much greater amount of work has been carried out on shorter east/west and west/east paths of up to 5000 miles. Taking the North Atlantic path as an example, it has been found that during the summer and early autumn, during periods of reasonable sunspot activity, there is a very definite peak approximately 3 hours after U.K. sunset. It lasts from 30 minutes to 1½ hours, and has allowed QRP contacts with stations ranging from eastern Canada down the U.S. seaboard and Caribbean to Columbia in northern South America. A second peak, about one hour after U.K. sunrise, has also allowed many U.S.A. contacts to be made (the much smaller number of Caribbean stations were probably in

Antenna Radiation (angle in degrees)	*Factor by which critical frequency is multiplied to obtain MUF*	*Single hop distance in kilometres*
30	2	900
20	2.5	1200
15	2.8	1600
10	3.25	2000
5	3.8	2800

Table 1.

bed at that time!). Even with the low sunspot numbers current in September, 1985, the evening peak was still often present, although earlier (around 2100 GMT) and of much shorter duration. It allowed contact with various U.S. stations.

Similar peaks occur with Asiatic Russian stations at their sunset time which is approximately 4 hours before U.K. sunset, and a large number of QRP contacts have been made in this way. The North American sunrise period (around noon in the U.K.) has also provided many U.S./Canada contacts, and 3 new countries in the West Indies. The path to the West Indies opens before the U.S. path, and there often seems to be a period of 10 to 15 minutes when signals are reaching the U.K. but not the rest of Europe; this allows one a chance without major competition!

Conclusion

There is less known about HF propagation than almost any other area of radio technology, and a surprising number of fundamental discoveries, including the fact that HF would support long distance communication, have come from the work and observations of ordinary amateurs. Thus an interest in propagation does not only improve DX results, but could allow any amateur to find one of the missing pieces in the HF propagation jigsaw.

• • • *"Practically Yours"* • • •

with GLEN ROSS, G8MWR

IT must be agreed that whilst to an amateur a large aerial system supported on a nice tall tower is a thing both to be desired and also a thing of extreme beauty, the same view point is rarely taken by those living around us. These people generally declare that whole installation is a complete eyesore and that "It lowers the tone (*i.e.* property values), old man". Many arguments are put forward as to why the erection is of benefit to the community, possibly the best one being that the owner of the tower has gone to great expense to protect his and, by default, the neighbours' very expensive houses from the damage which might be caused by lightning!

Lose It

There are also the problems faced by people who live in those areas where any form of external aerial system is not allowed. It has long been a point of honour in the hobby that, even under these circumstances, one does contrive to get on the air and many and wondrous have been the ideas used to achieve this end. One of the longest established ideas is the invisible aerial. This is usually in the form of a long wire made of something like 40 swg copper wire which disappears from sight at a distance of a few feet. This can make a most effective system when coupled to a good ATU. The tuner is required because of the tendency of the wire to stretch, it being barely able to support its own weight if more than fifty feet or so are strung up.

A favourite method of supporting the far end is to hang it over a branch of a tree, or perhaps a small pulley, and then to attach a small weight on the end of the verticle section. The weight adjusts to the stretch and also to the flexing of the aerial in the wind and so maintains a straight wire. There are strong theoretical reasons for using this type of aerial even in circumstances where a more robust unit can be installed. As is well known, RF travels on the skin of the wire and as a piece of 40 swg has very little or this then the RF is forced to leave for distant parts — at least that is the theory put forward by its advocates.

Other Advantages

Two other advantages of the system are more lighthearted and appeal particularly to the younger members of the family. The first is the dazed expression on the face of birds who fly straight into it, not having seen it. The second is the antics of birds who, having come to rest on it, are desperately trying to maintain a toe hold. Dipole aerials can also be built on this method but they should be erected with extreme caution. The sight of a piece of co-axial cable doing the Indian rope trick in the middle of the lawn can be disconcerting, especially to those who are just leaving the local public house. You could try the argument that whilst aerials may be forbidden, feeders are not — but this has not been reported as obtaining a favourable response.

More Ideas

There are many other ways of hiding an aerial system. Now that most houses use plastic guttering it is possible to hide a dipole by fixing it to the gutter using a suitable adhesive, the feeder being fed in through the eaves. This approach may give rise to reports of 'watery' signals, especially during rainy periods. Gable-ended houses are a natural for hiding Delta loops and similar systems, but all these ideas require the careful use of a GDO to determine the resonant frequency of the aerial. This will be significantly lower than you expect, due to the proximity loading effects of the adjacent structure.

Supports

It is all very well installing yourself a nice, neat invisible aerial system, but what does one do about the supports, be they masts or towers? Here we have in the past been really up against it and even the best efforts had very little effect on reducing the impact of these structures. It is pleasing to be able to report a breakthrough in this area which has met with complete success. The problem in the past has been identified as being due to the fact that, whether the mast was left in its natural finish or was painted, the finish reflected light which was visible to the human eye. It has been realised for at least the last thirty years that if a pigment could be developed that reflected light that was outside the range of the human eye then anything which was painted with such a material would become invisible. There was little commercial interest in such a paint until recently, when its uses in the defence industry became apparent. My attention was brought to a press release from the Berglux paint company of field trials of such a paint and the remarkable results achieved.

Experiments

A tin of this paint was obtained from a local dealer, but only after I had traced the part number (A.F.D. 13526a/5(c)). The problem in ordering being due to the fact that the paint did not

show up well on the colour chart provided. Several small items were covered and found to disappear completely as the paint dried out. Some problems in using the paint were discovered, the first being that it is not easy to apply paint you can't see using bristles that have disappeared due to being coated in paint. This can be overcome with practice. A bigger difficulty was in knowing how far to dip the brush into the invisible paint. A lot of thought was given to this problem and it was eventually beaten by cutting a heavy card disc a little smaller than the inside diameter of the tin and in this cutting a hole large enough for the brush to poke through. By carefully floating this on the paint the level became obvious and no further problem was experienced.

The Tower Job

The main job of painting the tower was done on a warm, dry day to speed the drying time. Careful attention was given to the job of preparing the work, particularly in the matter of removing any rust spots. Work commenced from the top of the tower and it was a tremendous satisfaction to see the painted area slowly disappearing as the work progressed. A problem was encountered when the tin was accidentally tilted whilst working near the top of the tower and the paint spilled onto a lower length of the structure. This was only discovered when I tried to descend for tea and suddenly "discovered" the missing section. At length the work was completed and I stood back to admire the effect only to find my beams suspended over the roof of the house with no visible means of support. This is even more mystifying than the Indian rope trick referred to earlier and drove home the point that it is essential to think before you paint.

Response

The neighbours' comments are generally "I see you got rid of all that rubbish" and similar remarks. I have a smile on my face because I have now got some really enormous aerials up in the air. I am currently working on a full size six-element Top Band beam for a friend now that he does not have to worry about overhanging the neighbour's property. The paint seems to weather very well and only slight retouching has been required. This work must be done in the small hours of a moonless night, the sight of someone clawing his way into the air on an invisible tower stretches credulity beyond bounds.

Amateur Radio Computing

A Bi-monthly Feature for All Those with a Radio Station and a Computer

PAUL NEWMAN, G4INP

I MUST first record my regret at the cessation of RAMTOP's activities at the end of 1985 and Richard's, G4NWH, decision to withdraw from this series. I hope we shall hear more from him in the future concerning radio computing with the BBC micro and I'm sure we all wish him luck with future projects.

The task of filling the space vacated by Richard has fallen to me for the time being so naturally I welcome any input from non-Sinclair users. If you have items which you think may be of interest to a wider audience in the area of radio computing, then please write in. The more information that is available, the more interesting this aspect of amateur radio becomes.

The last couple of months have seen some exciting developments on the Sinclair software scene, with little apparently happening elsewhere so I make no apology for this being a "Sinclair Forum" — though I hope this won't be a regular feature of this series.

The UOSAT1/2 (OSCAR9/11) Spectrum decoder issued by G4IDE Microsystems [3] (co-written with G4INP) has received good comments from several regular satellite users who remarked on its excellent data-capture rate which regularly reaches 100%. The ability of the program to customise to the user's own receiver/recorder phase has been praised too. It is now in use for research based on data transmitted by both satellites.

Close on the heels of the G4IDE UOSAT programs came G4HLX [1] "SUD" (Spectrum UOSAT Decoder). Although well written, the program sacrifices data-space for presentation and consequently can decode only half the volume of data of the G4IDE version. Neither, it seems, can data be easily saved for subsequent manipulation or display.

Although I had no problems I am not certain whether the "phase" problems solved by G4IDE will cause trouble with SUD. It is however, a very interesting program. Both programs are interfaceless.

G4HLX has also released Spectrum "SPOT" described as a location aid for the radio amateur. Although I feel this is rather over-specified as a pure locators calculator, it will be useful to VHF/UHF contesters since it contains a "contest panel". This allows the user to enter any form of locator, including NGR; the program calculates radial-ring scores, distance and subtotals every 25 contacts corresponding to a standard RSGB contest log. The program is not designed as a contest logbook, though.

Further Spectrum software is planned by G4HLX and I am sure we'll be seeing more interesting applications as time goes by.

G1FTU [2] has now released his interfaceless CW program and this has been very well received. It is a complex feature-packed program which challenges the capabilities of hardware-based systems. It even has an entirely software bandpass filter which performs outstandingly under 14 MHz conditions! Only time will show us what this can do, so I'll be very pleased to hear of your experiences using it.

G4IDE caused quite a lot of interest by publishing [6] an interfaceless MSF Rugby time-decoder program — believed to be a 'first' on any micro. A large number of people now have MSF facilities at negligible cost.

News now for Sinclair QL users. GM4IHJ has made available the propagation program WOTSON and a 34-satellite tracking program. SATS features all current satellites of amateur interest plus several new ones due for launch in the near future. Data includes skytrack which aids visual tracking of Shuttles, a table showing next times when all satellites are in range, next orbit acquisition times, and a Mercator projection footprint map which may be magnified onscreen for detailed study.

These are available only through SARUG (no membership necessary of course); details on receipt of stamped addressed envelope.

Issue 21 of the SARUG newsletter contains Part 1 of a comprehensive QL Morse teacher designed to provide total guidance from beginner to test. This will be presented in parts over the coming issues. It's hoped to have a complete cartridge version available by the time you read this.

Private information leads me to conclude that some very exciting software for radio use, based on the QL, will be forthcoming during 1986. It's very early days yet, much knowledge about the machine, QL SuperBasic and 68006 machine-code, still needs to be acquired before applications are developed to the full. I am very optimistic about the QLs place in amateur radio and welcome any news or views in this direction.

Interest in the reception of weather pictures and facsimile transmissions *via* the Spectrum has increased greatly over the last few months and at last I'm able to report progress.

After discussion with G4IDE of the various ways in which the system could be developed, it was decided to base it on the VLF (very low frequency) re-transmissions by the Deutscher Wettfadienst, Boden, station on 135 kHz. This station re-transmits computer enhanced WEFAX pictures, taken from a variety of satellites, on a daily schedule.

There are several reasons for this choice. Firstly, one very simple receiving setup will cater for most satellites. The antenna required is simply as long a piece of wire as you can put up. There are no tracking problems; it has clearly defined operating schedules; computer enhanced pictures are clearer and contain understandable information. Interfacing is kept to the minimum (signal input is *via* the EAR socket) and it is above all cheap but effective. The system is applicable to both WEFAX and facsimile in general.

The good news is that impressive pictures of many kinds from Boden and other VLF FAX stations [4] have been taken using this setup. At the time of writing, the display system is still under development since it is here that the main weakness lies. Since the Spectrum (in common with many home micros) can only display a grey-scale of 2 (white/black), pictures have to be processed in such a way as to put back as much of the information conveyed by grey-scale as possible.

By the time this is read, it is hoped that complete information on this system will be available through the SARUG newsletter. The amount of hardware other than VLF converter and receiver amounts only to a 2-chip timer which provides more accurate timing than the Spectrum's internal clock.

Correspondence from a German amateur working on Spectrum WEFAX reception has yielded useful information, including a hardware interface and program. The pictures given by this system at present leave a lot to be desired (mainly due, I think, to the lack of external clocking), but I hope that a little cooperation here will improve things. One possible advantage of this system is that the 800-by-800 pixel WEFAX picture can be viewed in sections or as a whole, for greater or lesser definition.

I understand from Reiner that once the Spectrum version is working he intends developing it for the Dragon micro. Obviously, I shall maintain contact here and bring you further information when available.

A reminder to those using GM4IHJ satellite tracking software to check the Keplerian elements in the programs and update them if necessary. Remember that gross inaccuracies will result if these get too out of date. Tables of Keplerian constants are available *via* AMSAT or the UOSAT news transmissions on OSCAR9/11; the weekend orbits usually carry them in full.

Satellite software obtained through SARUG does *not* require updating of Sidereal Time corrections since the programs contain factors good for the next 114 years! A "correction sheet" is in circulation (not by SARUG) — ignore it, it does not apply to these versions.

Several reports reaching me show that some recent commercial software, purporting various multimode interfaceless facilities, needs to be viewed with some scepticism, especially in view of its price. Bearing in mind that one of these programs loaded from tape at normal speed in under 30 seconds, it's not hard to see that it might be a little short on "features". One hapless user had considerable problems with software that just did not do the job claimed for it — and this with a price-tag exceeding 20 pounds! Price is no guarantee of quality, even for software.

With the increasing range of radio software, it would be good to hear your views on the programs you use. If there is sufficient response I'll compile a "survey"-style report in a future issue.

One item for 'B' users; CTP Software [5] have announced their AMPROM system which gives computerised communication facilities to BBC users. Unfortunately I was unable to review this due to no BBC micro being near at hand! Do send for details though — it has an impressive specification. If you are using it already, please pass on your experiences with it.

Finally — a plea to those writing to me (or indeed anyone in a similar position), either direct or *c/o Short Wave Magazine,* for information or comment on various aspect of radio computing — *please* don't forget the stamped addressed envelope, it's vital when you get as much post as I do; and after all, it's only common courtesy. Send an *s.a.e.* and you are guaranteed a reply!

References.

1. Mr. N. Taylor, 87 Hunters Field, Stanford-in-the-Vale, Faringdon, Oxon SN7 8ND. *(s.a.e.* please).

2. Mr. J. Pearson, 42 Chesterfield Rd., Barlborough, Chesterfield, Derbys S43 4TT. (*s.a.e.* please).

3. G4IDE Microsystems, 79 South Parade, Louth, Lincs PE21 7PN. (*s.a.e.* please).

4. Meteorological Office Publications: specifications, codes, frequencies, etc., available under references Met O.051, O.051a and O.051b. Order *via* HMSO or your bookseller.

5. CTP Software, 107a Shacklewell Lane, Shacklewell, London E8.

6. SARUG newsletter, No. 21.

CLUBS ROUNDUP

By "Club Secretary"

OUR first port of call is **Abergavenny and Nevill Hall** which means Thursday evenings at the Pen-y-Fal Hospital, Abergavenny, in the room above Male Ward 2. There are Morse classes every week as well as other interesting activities.

Acton, Brentford & Chiswick has its base at Chiswick Town Hall, Chiswick High Road; on Tuesday, April 15 there will be a discussion on "Current Affairs". Start at 7.30 p.m.—early for a London club.

The Forest Ring Community Centre, Sycamore Way, Winkle-bury, is **Basingstoke's** home; April 8 is down for the G3LTP talk on Propagation.

BATC is the club for the fans of amateur TV, whether slow or fast scan mode. The current letter refers in particular to the Television Rally, once again at Crick Post House on May 4, with talk-in on S22, SU8, and GB3ME if you can't find them; but all you need to do is to look out for Junction 18 off the M1. This year they have a marquee in the grounds for more space, and there is a fun castle for the kids as well.

Bath has alternate Wednesdays at the Englishcombe Inn, Englishcombe Lane, Bath; April 2 is an open night, and April 16 the AGM.

April 15 is a talk and demonstration on the subject of ATV, for

Biggin Hill at Downe Village Hall, next door to the "George & Dragon", 24 High Street, Downe, Kent.

At **Borehamwood** they use "The Wellington", at the Elstree station end of Theobald Street, Borehamwood. April's meeting is a Quiz, but the date isn't mentioned, so we must refer you to the Hon. Sec.—*see* Panel.

On April 7 *Arrow Electronics* visit **Braintree** at the Community Centre, Victoria Street, next to the bus park; April 21 was still to be finalised at the time they wrote.

Bredhurst is in session every Thursday at Parkwood Community Centre, Parkwood Green, Rainham, Kent, five minutes from Junction 4 on the M2. April 3 is a talk on active filters by G4EGH, and on 17th they have the "repeaters" lecture by Kent Repeater Group.

Now to **City of Bristol RSGB** and their Hq. at the Small Lecture Theatre, University of Bristol, University Walk, Clifton, Bristol. April 28 is down for a G-QRP Club talk by Norman Field, G4LQF.

Friday evenings is the time to go look for the **Bristol Shirehampton** crowd, at Twyford House, Lower High Street, Shirehampton, Bristol, for a varied programme.

A surplus sale is down for **Bromsgrove** on April 8, while on 22nd they have a club night; the Hq. is at the Hundred House, Stourbridge Road, Bromsgrove.

Bury members are interred at the Mosses Community Centre, Cecil Street, Bury, on Tuesdays; on April 8 they have a talk by G4KLT on fibre optics.

Turning to **Cheltenham** we find them settled in at the Stanton Room, Charlton Kings Library, Cheltenham. April 4 is a computer evening, and they skip the April 18 date in favour of a Sunday VHF D/F hunt on April 20—meet at Hq. for a first transmission at 1500z.

The **Cheshunt** meetings continue to be every Wednesday evening at Church Room, Church Lane, Wormley, near Cheshunt.

The **Chester** crowd has its Hq. at Chester RUFC, Ware Lane, Vicars Cross, Chester; on April 8 they have G3EON on power supplies, and on 15th G3SES will be on to oscillators; G3PFR has April 22 with his "Introduction to Microwaves" and on 29th there will be a session of "Your Questions Answered". Always there is a Morse class from 7.15, before the main meeting starts at 8 p.m.

On the first and third Tuesday of each month the **Chichester** group is in session at their new Hq. at the North Lodge Bar, County Hall, Chichester. Details from the Hon. Sec.—*see* Panel.

There seems to be just one gathering of the **Colchester** gang, on April 17, when the "Story of Broadcasting, 1919 – 26" will be recalled by J. Stanley Wood. Colchester Institute in Sheepen Road is the venue.

Down west now to **Cornish**; you find them at the Church Hall, Treleigh, on the old Redruth bypass; April 3 is the AGM.

Baden-Powell House, 121 St. Nicholas Street, in Coventry is home to the **Coventry** club every Friday evening. For details of the programme get in touch with the Hon. Sec.—*see* Panel for his details.

Change of Venue

The **Crawley** group has moved from their old Hq. of the past two decades or more, and now foregather at Crawley Leisure Centre, Haslett Avenue, as from the meeting scheduled for April 23, when G3TNO will talk about antennas.

On we go now to **Crystal Palace** where the venue is still the Church Hall, at the junction of Church Road and Beulah Hill, opposite the IBA mast Upper Norwood; April 19 is a talk on "Solar Cycle 21" by G2FKZ—and who better to relate that particular story?

The **Dartford Heath D/F** club magazine editor seems to be having a quiet moan about the number of times she has been the "hidden station" in the last season—but it also sounds as though she is the keenest one there! The pre-hunt meeting is at the "Horse and Groom" pub on Dartford Heath on April 15, and the hunt is on Sunday, April 20. The AGM is on Friday, May 2 at the Scout Hut in Broomhill Road, Dartford.

Deadlines for "Clubs" for the next three months—

May issue — March 27th
June issue — April 24th
July issue — May 29th
August issue — June 26th

Please be sure to note these dates!

The weekly meetings of the **Derby** group, at 119 Green Lane, Derby go rather like this: April 2 a junk sale; April 9, G4UIG on meteor scatter; April 16 a session of technical topics, and April 23 a video show. That leaves April 30 for Bob Neil's talk on enamelling.

Dover YMCA is usually known as SE Kent YMCA or even just the "Dover club"—all mean the group which has a place at the YMCA in Leyburne Road, every Wednesday evening. For details of what goes on, we must refer you to the Hon. Sec.—*see* Panel for his details. However, we do know they have an AGM on April 2.

The **Edgware** title is quite firm, though—and the venue has been for as long as we can recall at Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. April 10 sees Pat Hawker with his talk on clandestine radio, and on 24th they have an informal round-table discussion.

Falkirk has its AGM on April 16 at Grange Centre; details of other meetings from the Hon. Sec.—*see* Panel.

On to **Fareham** where things carry on as usual, but G3CCB takes over as Hon. Sec. from G4ITG; however he doesn't mention anything about the programme—the form, as we recall it, is to gather weekly at Portchester Community Centre.

At **Felixstowe** the programme is well nailed down for a while yet. April 7 is a social evening and on 21st they have a ten-pin bowling evening. All meetings take place in the back room of "The Feathers" pub in Walton High Street, Felixstowe.

On to **Fylde**; this means the Kite Club at Blackpool Airport and a combined subscription, so you can go and watch planes when you like. The radio club has the first and third Tuesdays; April 1 is a talk by G3AEP on a simple receiver, and the informal is on 15th.

The Focus Centre is the venue for the **Galashiels** crowd every Wednesday evening; April 9 is a talk on Oscar – 10 by GM0BPY, and on 23rd Stan Hastie will give a talk on computers and how to use them. The venue is in Livingstone Place, Galashiels.

At **Glossop** the locals get together at the "Nags Head" in Charlestown Road; April 24 is the date for a talk by G3LEE on satellite TV reception.

The **G-QRP Club** is the one to join if you are into home-brew gear or low-power operating—this one has to be the most successful amateur radio group of them all, in terms of steady sustained growth over years . . . get the details from the Hon. Sec., G3RJV, at the address in the Panel.

Now to **Grafton** and here we see they have moved to *TS Wizard* in White Hart Lane, opposite Haringey Football Ground, London, on the second and fourth Friday of each month.

The **Greater Peterborough** crowd are at Southfields Junior School, Stanground, on April 24 for an RSGB video on the space shuttle.

On to **Harrow**, and on March 7 and 21 they have activity nights; March 14 is a talk on converters, and as 28th is Good Friday they have no meeting. The Hq. is at Harrow Arts Centre, High Road, Harrow Weald, in the Roxeth Room; incidentally, in another part of their newsletter it is implied that the AGM is on March 21—a plot by Grubby Gremlin and Uncle Oscar to improve attendance at the AGM, we wonder?

April 2 sees the **Havering** club quarterly business meeting, and 9th and 23rd are both informal. That leaves April 16 for a talk by G6AKL, and April 30 for a topic—the details of this were yet to be

announced when they wrote. The venue, as for so long, is Fairkytes Arts Centre, Billet Lane, Hornchurch.

Now we must turn to **Hereford** and their Hq. at the County Control, Civil Defence Hq., Gaol Street, Hereford; April 4 is the Annual Constructional Contest, and on 18th they have the informal get-together.

The **Ipswich** group has its place at the "Rose & Crown", 77 Norwich Road, at the junction with Bramford Road; meetings are on the second and last Wednesday of each month, but there are usually Morse classes on the remaining Wednesdays.

Next **Lagan Valley**; this club is at Rathvarna Teachers Centre, Pond Park Road, Lisburn, on the second Monday of each month. Details from the Hon. Sec., GI4TCS, at the address in the Panel.

Back to England and **Lincoln** who are still to be found at the City Engineers' Club, Central Depot, Waterside South, Lincoln, every Wednesday evening. Activity nights for April are on 2nd, 16th, and 30th. April 9 is down for G6HZV asking "So—you want to build a shack?" and on April 23 they will entertain G400 to talk about aerials.

For **Lothians** you have to make for the Harwell House Hotel, Ettrick Drive, Edinburgh; April 9 is the construction contest for the Rat's-Nest Trophy and on 23rd they have an HF/VHF operating evening.

Lough Erne members have their Rally on Sunday, April 13, at a venue near Enniskillen which would have to be the one word we can't read . . . however, there is talk-in on S22 and SU8 on the day, so there shouldn't be too much of a problem. We gather they have boat trips on Lough Erne, and various demonstrations for the YLs and junior ops.

Mind My Bike!

Thus speaks G3ORP on behalf of the **Maidstone** YMCA crowd, who are running a Sponsored Bike Ride on April 6, from 10.00 to 3.45 p.m. to raise funds to refurbish the YMCA minibus. Rules and sponsorship forms from G3ORP or the 'Y' Sports-centre—amateurs requested to come with bike or wallet; G8TRF, G3TRF and G3YSC all operating on the day, and a bevy of YLs in shorts on the site too! The normal club meetings are on April 4 and 11, but there are people about every Friday, at the 'Y' Sports-centre, Melrose Close, Cripple Street, Maidstone.

Maltby's meetings are held at the Hellaby Community Hall, Clifford Road, just off Junction 1 of the M18—the A631 turn-off—every Friday. The AGM is on April 4, and on 11th they hear about amateur TV, by G6OYL; but what goes on for the other Fridays we don't know at the time of writing—doubtless the Hon. Sec. could assist, from the address in the Panel.

On to **Maxwelltown** and here the group gathers in the "Tam o'Shanter Inn" twice a month; get all the details from the Hon. Sec.—*see* Panel.

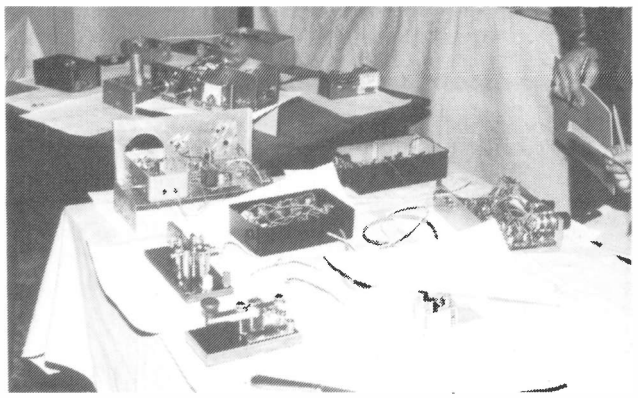
Midland is now settled in to Unit 3, Henstead House, Henstead Street, Birmingham B5, up, we hear, a lot of steps! April 15 sees them with G3BA, talking about 50 years of amateur radio.

Back to GI-land and **Mid-Ulster**, where they have their Annual Parkanaur Rally on May 18. Parkanaur House is about six miles from Dungannon on the road to Ballygally, and talk-in is on S22. The club's normal meetings are on the second Sunday of each month, at 3 pip-emma, in the Guide Hall, Castle Hill, Gilford.

Now to **Morecambe Bay** and here the Hq. is the canteen of the Luneside Engineering Company, Mill Lane, Halton, near Lancaster, on Mondays. Morse at 7 p.m. main meeting starts at 7.30. April 28, we note, is a junk sale.

Although they foregather every Thursday at the "White Horse", Fall Lane, East Ardsley, April 3 is the main one for **North Wakefield**, with G4FBA talking about SS/TV. Other evenings this month are informal.

The **Nottingham** club is based on Sherwood Community Association, Woodthorpe House, Mansfield Road, Sherwood, Nottingham, every Thursday. April 3 is AGM-time, and on 10th G3YUT gives an up-date on 10 GHz operation. They are on the air on 17th, and on 24th they have a talk on packet radio.



A selection of the entries in Todmorden and D.A.R.S. recent construction competition. G4XNF won the overall prize with his audio filter. The club also awarded a prize for originality, which was presented to G6MDB for—a model house roof with chimney sporting a 6-ele Yagi from which Father Christmas dangled!

photo: G4HYY

New Group

This one is at the Further Education Centre, Haverfordwest, and is called **Pembrokeshire**—we wonder if this could cause confusion with the Pembroke club if it is still alive? Meetings are on Thursdays, with a Morse class in addition, the latter on Wednesday evenings.

Plymouth Poly now—get all the details from the Hon. Sec.—*see* Panel.

Now up to **Pontefract** where they have a Ceilidh on April 4, and a visit to BT with other groups on 10th. April 17 is the Pontefract Raynet Group AGM, and on 24th they have a project evening. Venue is the top floor at Carleton Community Centre, Pontefract.

RAIBC is the one for the blind or invalid radio amateur or SWL; and of course they always can use supporters and representatives—details from the Hon. Sec.—*see* Panel.

RAOTA is the old-timers' club—membership qualification is twenty-five years of interest in amateur radio. Details from the Hon. Sec.—*see* Panel.

At **Reigate** the lads have their place in the Constitutional and Conservative Centre, Warwick Road, in the upstairs committee room. April 15 is the date for the AGM.

Membership of the **Royal Navy** group is open to serving and retired members of the Royal Navy, the Reserve, the Merchant Navy, and members of foreign navies. All the details from the Hon. Sec.—*see* Panel.

Thursday at **Skelmersdale** in April include the Project on April 3, and technical tips on 10th with G6HXL. April 17 is again the Project, and on 24th G1OKW says "Tanks a lot"—we wonder what his subject will be? go to Beacon Park Centre, Dalton Lane, to find out!

Now to **South Birmingham** where the main monthly meeting is on the first Wednesday of the month. Thursdays are HF nights, and Fridays are down for natter and Morse. There are also sessions on Monday evenings—all are at West Heath Community Association, Hamstead House, Fairfax Road, West Heath.

South Bristol has its corporate being in Room 3 or 4 at Whitchurch Folk House, East Dundry Road, Whitchurch, every Wednesday. April 2 is a talk entitled "CW in a Foreign Language" by G4WUB. April 9 is microwave activity night, and on 16th the start of the club VHF/UHF DX Contest. April 23 is a report on the expansion of club facilities, and on 30th the local crime prevention officer will be talking to them.

At **South Cheshire** we believe they gather at the Victoria Club, Gatefield Street, Crewe, but for all the current details we have to refer you to the Hon. Sec.—*see* Panel.

The **Southdown** monthly meetings are at Chaseley Home for Disabled Ex-Servicemen, Southcliff, Eastbourne, on the first

Names and Addresses of Club Secretaries reporting in this issue:

ABERGAVENNY: J. B. Davies, GW4XQH, 109 Croesonen Parc, Abergavenny, Gwent NP7 6PF. *(0873 4655)*
ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London W3 8LB. *(01-992 3778)*
BASINGSTOKE: D. A. Birleigh, G4WIZ, 14 Winchfield Gardens, Tadley, Basingstoke, Hants. RG26 6TX.
BATC: T. Brown, G8CJS, 25 Gainsborough Drive, Adel, Leeds LS16 7PF.
BATH: C. Ashley, G4UMN, 57 Stonebridge Drive, Frome, Somerset. *(Frome 63639)*.
BIGGIN HILL: R. Senft, G0AMP, Mill Hay, Standard Road, Downe, Kent BR6 7HL. *(0689 57848)*.
BOREHAMWOOD: The Hon. Sec., Borehamwood A.R.S. 140 Aycliffe Road, Borehamwood, Herts. *(Name wanted)*.
BRAINTREE: D. Willicombe, 355 Cressing Road, Braintree, Essex CM7 6PE.
BRISTOL CITY (RSGB): C. R. Hollister, G4SQQ, 34 Battersby Way, Henbury, Bristol BS10 7SU. *(0272 508451)*
BRISTOL (Shirehampton): R. G. Ford, G4GTD, 2 Jersey Avenue, St. Annes, Bristol BS4 4RA. *(0272 770504)*
BROMSGROVE: A. Kelly, G4LVK, 8 Greenslade Crescent, Bromsgrove, Worcs. B60 1DS. *(021-445 2088)*
BURY: M Sivieri, G4ZTB, 47 Ramsay, Bacup, Lancs.
CHELTENHAM: T. Kirby, G4VXE, 29 Tivoli Road, Cheltenham, Glos. GL50 2TD. *(0242 36723)*
CHESHUNT: J. & T. A. Watkins, G4VMR/G4VSL, 'One Ash,' Frogs Hall Lane, Haultwick, Herts. SG11 1JH. *(Dane End 250)*
CHESTER: A. Warne, G4EZO, 113 Queens Road, Vicars Cross, Chester. *(Chester 40055)*
CHICHESTER: C. Bryan, G4EHG, "Marmanet", Salthill Road, Fishbourne, Chichester, Sussex PO19 3PZ. *(Chichester 789587)*
COLCHESTER: F. R. Howe, G3FIJ, 29 Kingswood Road, Colchester. *(0206 70189)*
CORNISH: N. Pascoe, G4USB, Bosuathick Farm, Constantine, Falmouth, Cornwall. *(Falmouth 40367)*
COVENTRY: R. Tew, G4JDO, 4 Chetwode Close, Coventry CV5 9NA. *(Coventry 73999)*
CRAWLEY: D. L. Hill, G4IQM, 14 The Garrones, Worth, Crawley, West Sussex. *(Crawley 882641)*
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 11 Liphook Crescent, London SE23 3BN. *(01-699 6940)*
DARTFORD HEATH D/F: A. R. Burchmore, G4BWV, 49 School Lane, Horton Kirby, Dartford, Kent DA4 9DQ.
DERBY: Mrs. J. Shardlow, G4EYM, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ. *(0332 556875)*
DOVER YMCA: A. Moore, G3VSU, 42 Nursery Lane, Whitfield, Dover, Kent CT16 3HG. *(0304 822738)*
EDGWARE: J. Cobley, G4RMD, 4 Briars Close, Hatfield, Herts. *(Hatfield 64342)*
FALKIRK: B. Waddell, GM4XQJ, "Carsemount," Polmont Road, Lauriston, Falkirk FK2 9QQ.
FAREHAM: B. Davey, G4ITG, 31 Somervell Drive, Fareham, Hants. PO16 7QL. *(Fareham 234904)*
FELIXSTOWE: P. J. Whiting, G4YQC. *(Address wanted)*.
FYLDE: H. Fenton, G8GG, 5 Cromer Road, St. Annes, Lytham St. Annes, Lancs. FY8 3HD.
GALASHIELS: J. G. Campbell, GM0AMB, 21 Hareshaw Bank, Tweedbank, Galashiels. *(0896 55569)*
GLOSSOP: E. Calvert, G4ETC, 6 Barber Street, Padfield, Hadfield, via Hyde, Cheshire, SK14 7EQ.
G-QRP: Rev. G. C. Dobbs, G3RJV, 498 Manchester Road, Rochdale, Lancs. OL11 3HE.*(0706 31812)*
GRAFTON: J. Kaine, G4RPK, 74 Camden Mews, London NW1 9BX.
GREATER PETERBOROUGH: F. Brisley, G4NRJ, 27 Lady Lodge Drive, Orton Longueville, Peterborough, Cambs. *(0733 231848)*
HARROW: D. Atkins, G8XBZ, 25 Maxwell Close, Rickmansworth, Herts. *(0923 779942)*
HAVERING: D. St. J. Gray, G1HTQ, 6 Devonshire Road, Hornchurch, Essex RM12 4LQ.
HEREFORD: F. E. G. Cox, G3WRQ, 35 Thompson Place, Hereford. *(Hereford 54064)*
IPSWICH: J. Tootill, G4IFF, 76 Fircroft Road, Ipswich, Suffolk IP1 6PX. *(Ipswich (0473) 44047)*.
LAGAN VALLEY: W. J. Jackson, GI4TCS, 21 Carnreagh, Hillsborough, Co. Down BT26 0LJ.
LINCOLN: Mrs. P. G. Rose, G4STO, Pinchbeck Farmhouse, Mill Lane, Sturton-by-Stow, Lincoln LN1 2AS. *(Gainsborough 788356)*.
LOTHIANS: E. Evans, GM6JAG, 56 Southhouse Road, Edinburgh, EH17 8EU.
LOUGH ERNE: C. Corderoy, GI4CZW, 9 Tarman Brae, Enniskillen, Northern Ireland.
MAIDSTONE YMCA: G. D. Edy, G4AXD, 8 Farnborough Close, Maidstone, Kent ME16 8UE. *(0622 29462)*
MALTBY: I. Abel, G3ZHI, 52 Hollytree Avenue, Maltby, Rotherham, Yorks. *(Rotherham 814911)*.
MAXWELLTOWN: C. D. S. Rogers, GM4NNC, 5 Elder Avenue, Lincluden, Dumfries DG2 0NL.
MIDLAND: N. Gutteridge, G8BHE, 68 Max Road, Quinton, Birmingham B32 1LB.
MID-ULSTER: S. White, 19 Tragna Way, Lurgan, Craigavon, Co. Armagh. *(0762 22855)*
MORECAMBE BAY: W. E. Delamere, G3PER, 414 Heysham Road, Heysham, Morecambe LA3 2BL. *(Heysham 52659)*.
NORTH WAKEFIELD: S. Thompson, G4RCH, 2 Alden Close, Morley, Leeds LS27 0SG. *(Leeds 536633)*
NOTTINGHAM: I. Miller G4JAE, 93 Boxley Drive, West Bridgford, Nottingham NG2 7GN. *(0602 232604)*.
PEMBROKESHIRE: P. A. Delaney, Newton West Farm, Hayscastle, Haverfordwest, Dyfed SA62 5PY.
PLYMOUTH (Poly): D. Salter, G1ERM, 33 New Street, The Barbican, Plymouth, Devon.
PONTEFRACT: C. Mills, G0AAO, 27 Pendennis Avenue, South Elmsall, Nr. Pontefract, W. Yorks.
RAIBC: Mrs. C. Clark, G1CQJ, 9 Conigre, Chinnor, Oxfordshire OX9 4JY.
RAOTA: G. R. Jessop, G6JP, 32 North View, Eastcote, Pinner, Middlesex HA5 1PE.
REIGATE: T. I. P. Trew, G8JXV, Hoath Meadow, Church Hill, Merstham, Redhill, Surrey.
ROYAL NAVY: M. Puttick, G3LIK, 21 Sandyfield Crescent, Cowplain, Portsmouth, Hants. *(Waterlooville 55880)*.
SKELMERSDALE: G. Crowhurst, G4ZPY, 41 Mill Dam Lane, Burscough, Ormskirk, Lancs. L40 7TG. *(0704 894299)*.
SOUTH BIRMINGHAM: M. Twyman, G6KOA, 65 Griffinsbrook Lane, Bournville, Birmingham B30 1QB, *(021 – 458 1941)*.
SOUTH BRISTOL: L. Baker, G4RZY, 62 Court Farm Road, Whitchurch, Bristol, Avon BS14 0EG.
SOUTH CHESHIRE: C. Wiseman, G1PUV, 14 Whiteridge Road, Whitehill, Kidsgrove, Stoke-on-Trent, Staffs. ST7 4TH. *(Kidsgrove 73185)*.
SOUTHDOWN: T. Rawlance, G4MVN, 18 Royal Sussex Crescent, Eastbourne.
SOUTHEND: A. Adams, G3YOA, 9 Fairland Close, Rayleigh, Essex.
SOUTHGATE: R. Snary, G4OBE, 12 Borden Avenue, Enfield, Middx. EN1 2BZ. *(01-360 6555)*.
SOUTH MANCHESTER, D. Holland, G3WFT, 32 Woodville Road, Sale, Greater Manchester. *(061-973 1837)*.
STEVENAGE: F. E. Wilson, G4ISO, 15 Byrd Walk, Baldock, Herts. SG7 6LN. *(Baldock 892765)*.
STOURBRIDGE: C. S. Williamson, G1IEB, 7 Hanbury Hill, Stourbridge DY8 1BE.
SURREY: J. Simkins, G8IYS, 18 Riding Hill, Sanderstead, Croydon CR2 9LN. *(01-657 0454)*.
SUTTON & CHEAM: A. Keech, G4BOX, 26 St. Albans Road, Cheam, Surrey.
TODMORDEN: Mrs. J. Gamble, G6MDB, 283 Halifax Road, Todmorden, Lancs. OL14 5SQ.
TORBAY: B. Wall, G1EUA, 48 Pennyacre Road, Teignmouth, Devon TQ14 8LB. *(Teignmouth 78554)*.
U.K. FM GROUP (Northern): J. P. Laughton, G4UNA, Claremont, Main Street, East Ardsley, Wakefield, Yorks. WF3 2AP.
VANGE: Mrs. D. Thompson, 10 Feering Row, Basildon, Essex.
VERULAM: H. Claytonsmith, G4JKS, 115 Marshalswick Lane, St. Albans, Herts. *(St. Albans 59318)*.
WACRAL: L. Colley, G3AGX, "Micasa", 13 Ferry Road, Wawne, Nr. Hull, Yorks. HU7 5XU.
WAKEFIELD: W. Parkin, G8PBE, 14 Cleveland Grove, Lupset Park, Wakefield WF2 8LD. *(Wakefield 378727)*
WELWYN/HATFIELD: D. Fairbank, G0AII, 2 Sandpit Road, Welwyn Garden City, Herts. AL7 3TN. *(W.G.C. 326138)*.
WEST MIDDLESEX: R. Oakley, G1DDR, 62 Seward Road, London W7 2JL. *(01-579 7860)*
WIMBLEDON: G. Cripps, G3DWW, 115 Bushey Road, Raynes Park, London SW20 0JN. *(01-540 2180)*
WIRRAL (W. Kirby): G. Scott, G8TRY, 19 Penkett Road, Wallasey, Merseyside L45 7QF. *(051-630 1393)*
WISBECH: D. Wilkinson, G4KHF, 'Leon,' Lutton Gowts, Long Sutton, Spalding, Lincs. PE12 9LQ.
WOLVERHAMPTON: K. Jenkinson, G1OIA, 10 Avondale Road, Wolverhampton, WV6 0AI. *(0902 24870)*.
WORCESTER: D. W. Batchelor, G4RBD, 14 Oakleigh Heath, Hallow, Worcester. *(Worcester 641733)*.
WORKSOP: Mrs. C. Gee, G4ZUN, 100 Plantation Hill, Kilton, Worksop, Notts. *(0909 486614)*.
YEOVIL: E. H. Godfrey, G3GC, Dorset Reach, 60 Chilton Grove, Yeovil, Somerset BA21 4AW. *(0935 75533)*.
YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

Monday of each month, or the second should the first be a Bank Holiday. In addition they are at the Wealden District Council Offices, Vicarage Fields, Hailsham, on Tuesday and Friday evenings.

The **Southend** club is nowadays to be found every Friday at Rocheway Centre, Rocheway, Rochford, Essex; and this is also the venue for the Mobile Rally slated for June 1—enquiries to G6SOH or G4RDS on the latter.

Southgate now, and this means Holy Trinity Church Hall, Green Lanes, Winchmore Hill, London; April 10 is a surplus sale.

At **South Manchester** one finds the Sale Moor Community Centre, Norris Road, Sale, on any Friday evening—details on programme from the Hon. Sec.—*see* Panel.

Stevenage has a meeting on April 1, and a title for it to suit . . . and on April 15 they have a video/film evening. Both are at the club Hq. Sitec Ltd., Ridgemond Park, Telford Avenue, Stevenage.

On the first and third Monday of each month the **Stourbridge** group is to be found at the Robin Woods Centre, School Street, off Enville Street; we don't have current details as the AGM occurs while this is being printed.

At **Surrey** the meetings are at *TS Terra Nova,* 34 The Waldrons, South Croydon, on the first and third Monday. April 7 is the AGM, and doubtless the other date will be informal.

Turning to **Sutton & Cheam,** it is to be found on the third Friday of each month at Downs Lawn Tennis Club, Holland Avenue, Cheam. April 18 is down for G5KW, Ken Ellis, to talk about 6 metres, and there is an informal session in the Downs club bar on April 7.

At **Todmorden** we find the locals at the Queen Hotel, with April 7 down for a talk by UKAEA, and 21st an informal chat night.

The **Torbay** crowd is to be found on Friday evenings at ECC Social Club, Ringslade Road, Highweek, Newton Abbot, and in addition there is the formal meeting on the last Saturday. We don't have details of the latter for April, but for May they have a talk on digital recording. A reminder also of their TARS 30 Award—the details from the Hon. Sec.—*see* Panel.

UK FM Group (Northern) has its place at the Royal Hotel, Barnsley,at 7.30 p.m. on the first Sunday of the month—April 6.

Vange is a club covering Basildon area; get the details from the Hon. Sec.—*see* Panel—and at the same time ask about their Rally on September 7 at Nicholas School, Basildon.

As ever, the **Verulam** crowd has its Hq. at the R.A.F.A. Hq. New Kent Road, St. Albans. On April 8 they have an activity evening and on April 22 there will be a talk by G3BDQ on LF antennas and sunspot minimum.

WACRAL is an international group for practising Christian radio amateurs and SWLs. Details from the Hon. Sec.—*see* Panel.

At **Wakefield** they have Hq. at Ossett Community Centre, Prospect Road, Ossett. April 1 is a natter night, and on April 15 they have the AGM. April 29 is computer night, and they have a visit to BNFL at Sellafield on April 26.

On now to **Welwyn/Hatfield** where the venue is at WGC Scout Hq., Knightsfield, Welwyn Garden City, on first and third Mondays. April 7 is a talk on packet radio, and 21st is informal.

Our next reporter is **West Middlesex,** which meets every Tuesday evening at Drayton Court Hotel, The Avenue, West Ealing; events include a special-event station at the Boat Race, and the annual Star and Garter Appeal using GB1RSG and GB2RSG. Details from the Hon. Sec.—*see* Panel.

A session on electric shock is down for **Wimbledon** on April 11, and on March 28 the normal meeting is cancelled. The Hq. is at the St. John Ambulance Hq., Kingston Road, Wimbledon.

Over to **Wirral** now,—the group of this name based at Irby Cricket Club, Mill Hill Road, Irby. On April 9 they have a talk on skydiving, and on 23rd a St. George's Day night-on-the-air using GB2WDC.

Another one active on that day is **Wisbech,** where they have GB0SGD, GB4SGD and GB6SGD 'alive' on most days between April 20 and May 7 for a rather nice award—get the details from the Hon. Sec.—*see* Panel.

Turning to **Wolverhampton** we find them at Wolverhampton Electricity Sports & Social Club, St. Marks Road, Chapel Ash; April 1 is a discussion on what members can do for the club, and on 8th they have G3KQJ on the development of home computing. On Saturday 12 they are putting a demonstration on for those other users of their Hq. who are not amateurs. April 15 is a visit to Eddystone's works, and on 22nd there is a committee meeting; the month is rounded off by a D/F Hunt on VHF starting from the Paddling Pool at Tettenhall Rock at 1100.

April 7 and 16 are the dates for **Worcester;** the former is the Construction Contest and the latter an informal. Both are at the Oddfellows Hall, New Street.

At **Worksop** the locals are at the Sub-Aqua Club Hq., on April 8 for a video by G5UM on 'VHF then and now', plus the VHF Award system of RSGB. On April 22 G8VHB will talk about power supplies.

Nowadays the **Yeovil** members enjoy their Thursday evenings at The Recreation Centre, Chilton Grove, Yeovil; on April 10 G3MYM talks about the 'Lambda Diode Oscillator', and on 17th they have the AGM. April 24 is a natter night, and on May 1st, G3MYM deals with fading and fade-out.

Finally **York,** where the club has its first YL member; Barbara has RAE firmly in the sights. The Annual Home-Brew Night is on April 18, but you can find them on any Friday evening at the United Services Club, 61 Micklegate, York, where visitors are welcome.

Finale

We've found the bottom of the pile again, and the time has come to mention deadlines—they are in the 'box' in the body of the piece and are the dates for arrival of your letters, addressed to your "Club Secretary", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts, AL6 9EQ. 'Bye now!

May Rallies

May 4, Anglo-Scottish Rally, Tait Hall, Kelso, Roxburghshire, 11 a.m. to 5 p.m., admission £1, bring-and-buy, club and trade stands, bar, snacks, talk-in on S22. More information from GM3VLB (0573-24664) or GM4UIB (0573-24654) any evening, both QTHR. **May 11, Swindon** Rally, Oakfield School, Marlowe Avenue, Swindon, Wilts., 10 a.m. to 5 p.m., admission 50p, bring-and-buy, trade stands, BARTG and local repeater groups stands, family attractions, refreshments. **May 25, East Suffolk Wireless Revival,** Civil Service Sportsground, Straight Road, Bucklesham, Ipswich, admission 80p, trade stands, car boot sale, aerial testing range and vintage radio display, many family attractions. Further information from G4IFF (0473-44047). **May 25, Plymouth** Rally, Plymstock Comprehensive School, Plymstock, Plymouth, 10a.m. to 5 p.m., trade stands, bring-and-buy, ample parking, talk-in on S22. Details from G0BNT (0752-777777).

For April, don't forget the **RSGB National Convention, April 5/6,** at the NEC, Birmingham.

Special Event Stations

Scunthorpe A.R.C. will be holding a Radio Rendezvous on **April 27** at the Hobbies Centre, Grange Farm, Franklin Crescent, Scunthorpe, using the call **GB2HRR** and talk-in on 144 and 432 MHz. For more information contact G6OSA on 0427-873827 evenings.

Wisbech & D.A.R.C. is once again organising three stations to celebrate St. George's Day; callsigns are **GB0SGD, GB4SGD and GB6SGD,** and the stations will be active on most days between **April 20 and May 17.** For details of the accompanying award write to Dave Wilkinson, G4KHF, "Leon", Lutton Gowts, Long Sutton, Spalding, Lincs. PE12 9LQ, enclosing an s.a.e.

GB4LF will be operating from the 5th Annual *Llantrisant Festival* on **May 4/5.** Activity will be SSB/CW on HF, mainly on 80m. and 20m., plus 2m. A special QSL will be available and SWL reports will be welcomed. Further details from GW3POM, QTHR (tel: 0443-224532).

Nene Valley Radio Club will be visiting Lundy again this year over **May 10-17.** Using the call **GB4LI,** the expedition will be sited at The Old Lighthouse with main operation on all HF bands, plus limited facilities for 2m. and 70cm. A special QSL will be available.

("SITUATIONS" AND "TRADE")

30p per word, minimum charge £3.60. No series discount. All charges payable with order. Insertions of radio interest only accepted. Add 50 per cent for Bold Face (Heavy Type). No responsibility accepted for transcription errors. Box Numbers 80p extra. Send copy, with remittance, to the Classified Dept., Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ. Prices include VAT

Copy must be received by April 11th to be sure of inclusion in the May issue.

TRADE

G3LLL/Holdings holidays: closed 16th to 30th May. Special pre-holiday offers: G.E. 6146B (as fitted to Yaesu), matched pair £27.50; matched three £40, plus FREE driver. Three new bands WARC kit, FT-101, £16. DBM for quieter Rx, FT-101, £17. 160m. kit, Z-match/E-Zee match, £7. Black Star 600 MHz counters, £145. All prices include post/packing.—**Holdings/ Amateur Electronics,** 45 Johnston Street, Blackburn BB2 1EF (Tel: 0254-59595). *Access/Barclaycard.*

May issue: due to appear on Friday, April 25th. Single copies at £1.60 post paid will be sent by first-class mail for orders received by Wednesday, April 23rd, as available—Circulation Dept., Short Wave Magazine, 34 High Street, Welwyn, Herts. AL6 9EQ.

Course for City & Guilds, Radio Amateur's Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCE, Career and professional examination, etc.) write or phone: **THE RAPID RESULTS COLLEGE, Dept. JV8, Tuition House, London SW19 4DS.** Tel: 01-947 7272 (9 a.m. to 5 p.m.) or use our 24 hour Recordacall Service, 01-946 1102 quoting Dept. JV8.

Amidon toroidal cores, ferrite rings and beads. Send *s.a.e.* for data and prices. Business hours: 10-5 p.m. Tues., Wed., Fri.; 10-4 p.m. Sat. — **SMC (TMP Electronics),** Unit 27, Pinfold Workshops, Pinfold Lane, Buckley, Clwyd CH7 3PL.

QSL cards printed at competitive rates, send s.a.e. for details. — **Deltacards,** 62 Newark Lane, Ripley, Surrey.

READERS ADVERTISEMENTS

10p per word, minimum charge £1.50 payable with order. Add 25 per cent for Bold Face (Heavy Type). Please write clearly, using full punctuation and recognised abbreviations. No responsibility accepted for transcription errors. Box numbers 80p extra. Send copy, with remittance, to the Classified Dept., Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ. Prices include VAT.

Copy must be received by April 11th to be sure of inclusion in the May issue.

READERS

For Sale: Trio R-2000 with converter, £425. Heathkit SW-717 receiver, £80.—Wood, Sylvania, Enzie, Buckie, Banffshire AB5 2BN.

Wanted: Eddystone 888A receiver. Please state condition, price and phone number.—Tucker, 18 Clements Rise, Norton, Cleveland TS20 1HD.

For Sale: Eddystone 940 receiver, as new condition, with manual, checked and overhauled, £170 or near offer.—Ring 01-699 4413 after 6 p.m.

Sale: Yaesu FRG-7 receiver, mint, original packing, £130. Philips RL-798 marine global radio, 0.150 to 28 MHz, azimuth base, VHF band, £45.—Ring 047483-3437 (Kent).

Radio boot fair will be held at Whitfield, near Dover, on Saturday 10th May, opening at 10 a.m. with 20p entrance fee. There is room for at least 30 pitches and anyone interested should contact Ian Keyser, "Rosemount", Church Whitfield, Dover, Kent. (Tel: 0304-821588).

May issue: due to appear on Friday, April 25th. Single copies at £1.60 post paid will be sent by first-class mail for orders received by Wednesday, April 23rd, as available.—Circulation Dept., Short Wave Magazine, 34 High Street, Welwyn, Herts. AL6 9EQ.

Technical Books and Manuals

(ENGLISH AND AMERICAN)

AERIAL INFORMATION

Antenna Handbook (Orr and Cowan)	£7.75
Beam Antenna Handbook	£6.50
Cubical Quad Antennae. 3rd Edition	£6.90
Simple Low Cost Wire Antennas, by Orr	£6.20
Aerial Projects (Penfold)	£2.30
Antenna Book (ARRL) *latest 14th Edition*	£8.00
The (ARRL) Antenna Anthology	£4.50
Two-metre Antenna Handbook, F. C. Judd G2BCX	£6.35
HF Antennas for All Locations (RSGB)	£6.65
25 Simple Shortwave Broadcast Band Aerials (E. M. Noll)	£2.25
25 Simple Amateur Band Aerials (E. M. Noll)	£2.25
25 Simple Indoor and Window Aerials	£2.05
25 Simple Tropical and MW Band Aerials	£2.05
The ARRL Antenna Compendium, Vol. 1 *(new title)*	£8.95

BOOKS FOR THE BEGINNER

Amateur Radio *(Lutterworth Press)*	£9.60
Solid State Short Wave Receivers for Beginners (R. A. Penfold)	£2.25
Beginners Guide to Radio (9th Edition)	£5.45
Beginners Guide to Electronics, 4th Edition	£5.45
Beginners Guide to Amateur Radio (Newnes)	£5.45
Beginners Guide to Integrated Circuits, 2nd edn.	£5.00
Guide to Amateur Radio, 19th Edition (RSGB)	£3.40
Morse Code for the Radio Amateur (RSGB)	£1.70
Understanding Amateur Radio (ARRL)	£5.45
Radio Amateur's Examination Manual, *latest 11th edition* (RSGB)	£3.90
How to Pass the Radio Amateurs' Examination (RSGB)	£3.30

GENERAL

Weekend Projects for the Radio Amateur (ARRL)	£3.05
Projects in Amateur Radio and Short Wave Listening *(Newnes)*	£4.20
How to Build your own Solid State Oscilloscope (Rayer)	£2.25
How to Design and Make Your Own PCB's	£2.25
How to Build Advanced Short Wave Receivers	O/P
Better Short Wave Reception, *(5th Ed)*	£6.20
FM & Repeaters for the Radio Amateur (ARRL)	£4.35
Easibinder (to hold 12 copies of "Short Wave Magazine" together)	O/S
World Radio & TV Handbook 1986 Edition	£19.15
The World's Radio Broadcasting Stations and European FM/TV (Newnes)	£8.10
Guide to Broadcasting Stations (18th Edition)	£5.50
International Radio Stations Guide *(new ed.)*	£3.25
Long Distance Television Reception (TV-DX) for the Enthusiast *(revised edition)*	O/S
An Introduction to Radio DXing	£2.30
Radio Amateurs DX Guide (14th Edition)	£2.45
Power Supply Projects (Penfold)	£2.80

HANDBOOKS AND MANUALS

Radio Communication Handbook, *5th ed.*, Vols. 1 and 2 combined (paperback), RSGB	£14.15
Teleprinter Handbook. New 2nd Ed. (RSGB)	£12.70
TVI Manual *(2nd Edn.)* (RSGB)	£2.20
The ARRL 1986 Handbook for the Radio Amateur, *soft cover*	£16.00
The ARRL 1986 Handbook for the Radio Amateur, *hard cover*	£23.50
Weather Satellite Handbook	O/S
The Satellite Experimenter's Handbook (ARRL)	£9.70
Test Equipment for the Radio Amateur (RSGB)	£5.75
Amateur Radio Operating Manual (RSGB) *3rd Ed.*	£6.10
Oscilloscopes — How to Use Them, How They Work (Newnes)	£5.40
Practical Handbook of Valve Radio Repair (Newnes)	£17.15

USEFUL REFERENCE BOOKS

Solid State Design for the Radio Amateur (ARRL)	£7.60
Foundations of Wireless and Electronics, 10th Edition (Scroggie)	£10.05
Amateur Radio Techniques, 7th Edn. (RSGB)	O/P
U.K. Call Book 1986 (RSGB)	**available shortly**
Hints and Kinks (ARRL)	£4.30
Electronics Data Book (ARRL)	O/P
Radio Frequency Interference (ARRL)	£2.40
Amateur Radio Awards, (RSGB)	O/P
Electronics Pocket Book, 4th Edition (Newnes)	£6.20
Radio Data Reference Book, *new* 5th edition (RSGB)	£8.90
Amateur Radio Software (RSGB) *new title*	£8.60

VALVE AND TRANSISTOR MANUALS

Towers' International Transistor Selector, latest 1985 Edition (Up-Date No. 3)	£14.50
Semiconductor Data Book, 11th Edition (Newnes)	£8.50
International Transistor Equivalents Guide	£3.40
International Diode Equivalents Guide	£2.60

VHF PUBLICATIONS

VHF Handbook, Wm. I. Orr W6SAI *latest* 3rd Edition	£9.75
VHF/UHF Manual (RSGB) 4th edition	£11.20

orders despatched by return of post

O/P (Out of print) — THE ABOVE PRICES INCLUDE POSTAGE AND PACKING

O/S (Out of stock) — Many of these titles are American in origin — (Terms C.W.O.)

Prices are subject to alteration without notice.

Available from SHORT WAVE MAGAZINE

Publications Dept.

34 High Street, Welwyn, Herts. AL6 9EQ — Welwyn (043871) 5206/7

(Counter Service: 9.30 – 5.00 Mon. to Fri.) (GIRO A/C No. 5476151)

Printed by K&SC Printers Ltd., Tunbridge Wells for the Proprietors and Publishers, The Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ. The *Short Wave Magazine* is obtainable through the following: Continental Publishers & Distributors Ltd., William Dawson & Son Ltd.; AUSTRALIA AND NEW ZEALAND — Gordon & Gotch Ltd.; AMERICA — International News Company, 131 Varick Street, NEW YORK. Registered for transmission to Canada by Magazine Post. *April 1986.*